



Deliverable D2.9

**Final report on the creation of national gridded datasets,
per country**

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INTRODUCTION

According to the accepted deliverables D1.12, D2.5 the homogenization and the harmonization procedures had been finished and the next step was the gridding.

Overview of the main steps for gridded datasets:

- Near border data exchange before homogenization
- Homogenization (MASH)
- Data exchange after homogenization
- Controlling of the cross-border harmonization (MASH)
- Gridding, interpolation (MISH) per country, with exchanged data
- Compilation of gridded series from countries in one file per variable

The above steps were applied for all the variables except snow depth and snow water equivalent. The special methodology used for the snow variables is presented at section 6 by Johann Hiebl.

The description of procedures MASH (Multiple Analysis of Series for Homogenization; Szentimrey, 1999, 2011) and MISH (Meteorological Interpolation based on Surface Homogenized Data Basis; Szentimrey and Bihari, 2007a, b) can be found in the service contract and the accepted deliverables D1.7, D1.8, D1.11, D2.3. The preliminary results of the gridded datasets were presented in the accepted deliverables D2.6, D2.7. The description of final version of gridded datasets is included by the deliverable D2.8 while the methodology, the working plan and some statistical results of gridding procedure are detailed in this deliverable D2.9.

At the end of this deliverable there is also Annex 13 that includes the report on gridding of some extra wind variables provided for the Digital Climate Atlas.

1. WORKING PLAN IN MODULE 2 FOR GRIDDING

The main steps for gridding of data series of meteorological variables presented in Table 1 except snow are briefly explained below.

The homogenized, controlled, completed and harmonized station data series constituted the predictor system (Output of Module 1). The gridding (spatial interpolation) was made on national level, implemented by common software MISHv1.03. Between the neighbouring countries the near border station data series were exchanged in order to cross-border harmonization of spatial interpolation.

I. Spatial modelling of climate statistical parameters (local and stochastic parameters) by MISH on national level, but using the near border data.

1. Determination of some supplementary deterministic model variables, altitude and e.g. other topographic variables (AURELHY principal components) for the station locations as well as for a half minutes (0.5'x0.5') grid that covers the given area.
2. Modelling of the statistical parameters for the above half minutes grid by use of the derived monthly station data series and the model variables.

Result: For each month, 4 tables of parameters for the half minutes grid, altogether 12x4 tables of parameters per countries.

3. Controlling of the cross-border harmonization of the above parameter tables between the neighbouring countries.

II. Interpolation of daily data series for a grid (gridding) by MISH on national level, but using the near border data.

1. Determination of the grid at $0.1^\circ \times 0.1^\circ$ ($\approx 10 \times 10$ km) resolution.
2. Interpolation for the grid (II.1.) by use of the homogenized, controlled, complemented daily station data series and the 12x4 tables of parameters (I.2).

Result: Interpolated daily data series of good quality for the grid.

2. MODEL VARIABLES: AURELHY PRINCIPAL COMPONENTS

The AURELHY method has been developed at the French Meteorological Service by Benichou and Le Breton (1987). This two-step method firstly describes the meteorological fields as a function of the land surface via multiple linear regression equations. Secondly, the resulting surface of differences between the calculated and measured meteorological values is smoothed by ordinary kriging.

From this method MISH applies the so called AURELHY principal components as model variables to model the expected value of the meteorological element.

In the original version of AURELHY method (Benichou and Le Breton, 1987) for the calculation of AURELHY parameters each grid point is characterized by its elevation and the elevation differences between the central point and 120 neighbouring point (on a 11X11 grid-section). Therefore each grid point is assigned to 121 data values.

In the modified version developed at OMSZ the grid points are characterized by their 1616 neighbours. It means 2×16 neighbours in latitudinal directions and 2×24 neighbours in longitudinal directions ($1616 = (2 \times 16 + 1) \times (2 \times 24 + 1) - 1$). The difference of the number of neighbours is because on middle latitudes this rate assures about equal distance in the two directions.

This immense amount of information has been condensed by principal component analysis, thus the grid points are represented by their elevation and the appropriate values of the first 15 principal components, which account for about 90% of the orography variance preserving sufficient accuracy.

OMSZ calculated these components from a digital elevation map of the CARPATCLIM region. This map was cut from the freely available gridded, quality-controlled global Digital Elevation Model (DEM) of NOAA (GLOBE Task Team and others, 1999). The horizontal coordinate system is seconds of latitude and longitude referenced to World Geodetic System 84 (WGS84). The vertical units represent elevation in meters above Mean Sea Level. The resolution of maps is 30 arc-second.

The principal components are stored in the modvarigrid.dat files for the area of each partner country. These files are applied in the modelling part of MISH.

The first five principal components (PC) can easily be interpreted geometrically (Figure 1.):

PC 1 indicates peaks (positive values) and valleys (negative values).

PC 2 indicates east-west slopes.

PC 3 indicates north-south slopes

PC 4 indicates north-south saddle
PC 5 indicates northeast-southwest saddle
Further principal components account for subtle structures.

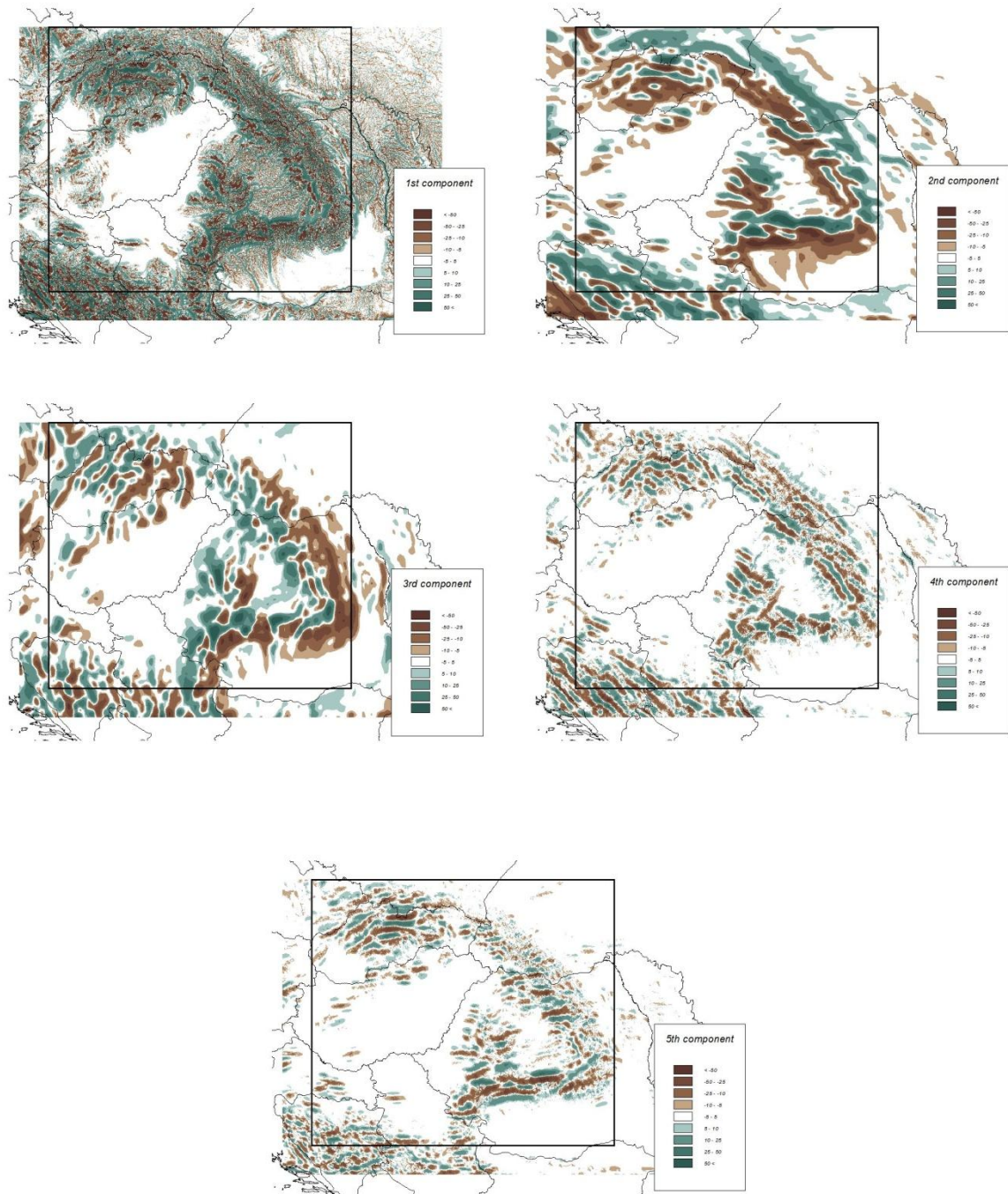


Figure 1. The first AURELHY components in the CARPATCLIM region

3. THE INPUT AND OUTPUT FILES OF MISH PROCEDURE

3.1 Special input files of gridding by MISHv1.03

daily.dat: daily data series for the stations (Output of Module 1)

filambdahst.dat: coordinates λ° , φ° and altitudes for the stations

heightgrid.dat: altitudes for the half minutes grid

modvarist.dat: model variables for the stations (AURELHY principal components)

modvarigrid.dat: model variables for the half minutes grid (AURELHY principal components)

obsfila.dat: coordinates λ° , φ° of the stations

predtandfila.dat: coordinates of the predictand gridpoints ($0.1^\circ \times 0.1^\circ$ resolution)

3.2 The result files of gridding by MISHv1.03

Three types of the results can be differentiated.

A, The first is the output file of the gridded daily data series (*DailyGrid.ser*).

B, The second type is the tables of the modelled statistical parameters (included by the subdirectories *ModParInt01,..., ModParInt12*).

C, The third type is the statistical result files of the modelling procedure in order to give a chance for evaluation of the quality of gridding. These files are as follows,

- monthly modelling results for the spatial trend
(*detmodstat01.res,..., detmodstat12.res*)
- maps of modelled many years means (*meangrid01.res,..., meangrid12.res*)
- monthly benchmark results (*benchmark01.res,..., benchmark12.res*).

In the Appendix 1-10 such types of result tables (*detmodstat* and *benchmark*) are presented. Some explanation for the tables can be found at the session 5.2.

4. AUTOMATIC ALGORITHM FOR GRIDDING BY MISHV1.03 USED PER COUNTRY

Input daily data series after MASH: Daily.dat (input at steps 1 and 4)

1, MISH\MODEL\Dataserie12\DailyData.exe: obtaining input from Daily Data for modelling
Input: Daily.dat , Output: dser01.dat,...,dser12.dat

2, MISH\MODEL\ModelA12.bat: automatic modelling of the climate statistical parameters for 12 months

Input: filambdahst.dat, heightgrid.dat, modvarist.dat, modvarigrid.dat
and subdirectory Dataserie12

Output: statistical parameters in subdirectories Model\ModParInt01,..., ModParInt12

Statistical result tables in subdirectory Model\Modelres12:

detmodstat01.res,..., detmodstat12.res

benchmark01.res,..., benchmark12.res

meangrid01.res,..., meangrid12.res

3, MISH\CopyModParInt1-12.bat: copying the subdirectories ModParInt01,..., ModParInt12 from directory MISH\MODEL into MISH\INTERPOL

- 4, MISH\INTERPOL\MishInterSer\Observed12\ObsDaily.exe: obtaining input from Daily Data for gridding
Input: Daily.dat , Output: obs01.dat,...,obs12.dat
- 5, MISH\INTERPOL\MishInterSer\MishInterSerA12.bat: automatic gridding of series for 12 months
Input: obsfila.dat, predtandfila.dat and subdirectory Observed12
Output in subdirectory Interpol\GridSer12:
gridded series per months, grid01.ser,..., grid12.ser
statistical results per months, gridstat01.res,..., gridstat12.res
- 6, MISH\INTERPOL\MishInterSer\ GridSer12\DailyGrid.exe:
obtaining the final gridded daily data series *DailyGrid.ser*

5. THE METEOROLOGICAL VARIABLES AND THE RESULT FILES

5.1 The meteorological variables and their gridding

Table 1. The meteorological variables in daily temporal resolution to be provided

Variable	Description	units
<i>Ta</i>	<i>2 m mean daily air temperature</i>	<i>°C</i>
<i>Tmin</i>	<i>Minimum air temperature</i>	<i>°C</i>
<i>Tmax</i>	<i>Maximum air temperature</i>	<i>°C</i>
<i>p</i>	<i>Accumulated total precipitation</i>	<i>mm</i>
<i>DD</i>	<i>10 m wind direction, Degrees</i>	<i>0-360</i>
<i>VV</i>	<i>10 m horizontal wind speed</i>	<i>m/s</i>
<i>Sunshine</i>	<i>Sunshine duration</i>	<i>hours</i>
<i>cc</i>	<i>Cloud cover</i>	<i>tenths</i>
<i>Rglobal</i>	<i>Global radiation</i>	<i>J/cm²</i>
<i>RH</i>	<i>Relative humidity</i>	<i>%</i>
<i>pvapour</i>	<i>Surface vapour pressure</i>	<i>hPa</i>
<i>pair</i>	<i>Surface air pressure</i>	<i>hPa</i>
<i>Snow depth</i>	<i>Snow depth</i>	<i>cm</i>

In this report D2.9 together with the deliverable D2.8 we present the gridding results for all the above variables. The description of the gridded datasets is included by the deliverable D2.8, while the statistical result tables of gridding are presented in this deliverable D2.9. The special methodology used for the snow depth with the snow water equivalent is presented separately at section 6.

5.2 Remarks on some special variables from Table 1

In general the steps described at session 1 were applied for gridding of daily data series however there were some variables with special procedures.

5.2.1 Daily mean temperature (T_a)

The gridded daily $T_a(t)$ series were calculated as the arithmetic mean of the gridded daily

$$T_{\min}(t), T_{\max}(t) \text{ series: } T_a(t) = \frac{1}{2}(T_{\min}(t) + T_{\max}(t))$$

5.2.2 Daily mean wind speed and direction (VV, DD)

The following algorithm was developed for gridding of daily mean wind speed and wind direction.

The input data are the homogenized, controlled, completed, harmonized daily wind speed $z(t)$ and wind vector component $u(t), v(t)$ ($t = 1, \dots, n$) series for the stations (predictors).

These series are the result data series of Module1 (D1.12, D2.5).

The aimed gridding heights (wh) and roughness (r) are: wh=10m, r=0.1m

The main steps are as follows.

i, Gridding of wind speed series $z(t)$ by MISH with multiplicative model.

Special model variables: based on wind observation heights (wh) and roughness (r) for the stations (**Remark** below)

Special output: wind profile parameters α, γ by months (**Remark** below)

Gridded series: $z_G(t)$

ii, Transformation of the component series $u(t), v(t)$ for wh=10m, r=0.1 by using the wind profile parameters α, γ : $u_0(t), v_0(t)$

iii, Gridding of component series $u_0(t), v_0(t)$ by MISH with additive model.

Gridded series: $u_G(t), v_G(t)$

iv, Calculation of the gridded direction series in degree: $\phi_G(t) = \frac{180}{\pi} \cdot \text{atan2}[-u_G(t), -v_G(t)]$

Remark. The applied wind profile model and special output wind profile parameters:

$$\text{Speed at location } \mathbf{s}: z(wh, r; \mathbf{s}) = \left(\frac{\ln(wh/r)}{\ln(wh/r_0)} \right)^{\gamma(r_0)} \cdot wh^{\alpha(r_0)} \cdot \delta_z(\mathbf{s}) \quad (1)$$

Components at location $\mathbf{s}$:

$$u(wh, r; \mathbf{s}) = \left(\frac{\ln(wh/r)}{\ln(wh/r_0)} \right)^{\gamma(r_0)} \cdot wh^{\alpha(r_0)} \cdot \delta_u(\mathbf{s}),$$

$$v(wh, r; \mathbf{s}) = \left(\frac{\ln(wh/r)}{\ln(wh/r_0)} \right)^{\gamma(r_0)} \cdot wh^{\alpha(r_0)} \cdot \delta_v(\mathbf{s})$$

where r_0 is a fixed roughness e.g. $r_0 = 0.1$.

The above model is derived from the power law and logarithmic profile models.

The special model variables for the wind speed data series of the stations:

$$\text{variable 1: } \frac{\ln(wh/r)}{\ln(wh/r_0)} \quad \text{variable 2: } wh$$

Variable 3-17 are the generally used AURELHY principal components.

5.2.3 Daily surface vapour pressure (pvapour)

The gridded daily surface vapour pressure series were calculated from the gridded daily $RH(t)$, $T_{\min}(t)$, $T_{\max}(t)$ series according to the following formula:

$$e(t) = \frac{RH(t)}{100} e_w(t)$$

where,

$e(t)$: vapour pressure (hPa)

$RH(t)$: relative humidity (%)

$e_w(t)$: saturation vapour pressure (hPa) estimated as,

$$e_w(t) = \frac{6.112}{2} \left(\exp^{17.62 T_{\min}(t)(243.12 + T_{\min}(t))} + \exp^{17.62 T_{\max}(t)(243.12 + T_{\max}(t))} \right)$$

5.3 The statistical result tables of gridding

For the presentation of the tables we have the same structure that was applied at the deliverables D1.12, D2.5, where the result tables for 12 variables were given in Annex 1-12: maximum air temperature (1), minimum air temperature (2), precipitation sum (3), relative humidity (4), cloud cover (5), surface vapour pressure (6), surface air pressure (7), sunshine duration (8), global radiation (9), wind speed (10), wind direction, component U (11), wind direction, component V (12).

The statistical result tables of gridding for the above variables except (6) which was calculated according to section 5.2.3 are also in the enclosed Annex 1-12.

There are two basic types of the tables for the evaluation of the quality of gridding:

a, The monthly modelling results for the spatial trend (tables "a")

The modelling is based on a multiple linear regression procedure in case of additive model, which model was applied for all the variables except precipitation sum (3) and the wind speed (10). For the latter variables a multiplicative model was applied that can be led back to the additive one by some logarithmic transformation procedure.

At the regression procedure the dependent variable is the spatial trend (expected values in the space) and the station means by formula (2) constitute the sample for it. The independent variables are the altitude (h) and the first 15 AURELHY principal components. For the wind speed two other independent variables are also applied because of the wind profile model (5.2.2).

At the tables the following statistics are presented: the significantly non-zero coefficients, the multiple correlation and a similar statistic to characterize the explained part:

percent = $(1 - \text{RMSE} / (\text{Standard Deviation})) * 100\%$

Remark: $\text{correlation}^2 = 1 - \text{RMSE}^2 / (\text{Standard Deviation})^2$

b, The monthly benchmark results (tables "b")

The benchmark to evaluate the complete modelling results is based on some cross-validation test procedures, namely the station data series are interpolated between each others. Two procedures were implemented, first the interpolation with optimum parameters, second the interpolation with modelled parameters. In case of station data series the optimum interpolation parameters can be estimated from the data series. In the

tables the representativity values are presented for both the optimal and the modelled cases: $REP=1-RMSE/(Standard\ Deviation)$

Further details for the statistics can be found e. g. in the manual of MISH (Szentimrey, Bihari, 2007b).

The tables of countries in Annex 1-2 are listed in anti-clockwise direction starting with Hungary and Croatia ending with Czech Republic: Hungary and Croatia (1), Serbia (2), Romania (3), Ukraine (4), Slovakia (5), Poland (6), Czech Republic (7).

5.4 ANOVA (Analysis Of Variance) examination

The efficiency of the spatial trend modelling and the benchmark results are depending not only on the method and sampling, but also on the spatial probability distribution of the variables. The examined meteorological variables (5.1) have very different type of the spatial probability distribution. Therefore certain ANOVA examinations were also performed in order to present the differences between the variables. The applied mathematical apparatus is as follows.

Notations:

$X(s_j, t)$ ($j = 1, \dots, N$; $t = 1, \dots, n$) – monthly data series (s_j : location; t : time)

$$E(s_j) = \frac{1}{n} \sum_{t=1}^n X(s_j, t) \quad (j = 1, \dots, N) \quad \text{– mean at station } s_j \quad (2)$$

$$D^2(s_j) = \frac{1}{n} \sum_{t=1}^n (X(s_j, t) - E(s_j))^2 \quad (j = 1, \dots, N) \quad \text{– variance at station } s_j$$

$$E = \frac{1}{N} \sum_{j=1}^N E(s_j) \quad \text{– total mean}$$

Total variance:

$$\frac{1}{N \cdot n} \sum_{j=1}^N \sum_{t=1}^n (X(s_j, t) - E)^2 = \frac{1}{N} \sum_{j=1}^N (E(s_j) - E)^2 + \frac{1}{N} \sum_{j=1}^N D^2(s_j) = S_{space}^2 + D_{time}^2 ,$$

where $S_{space}^2 = \frac{1}{N} \sum_{j=1}^N (E(s_j) - E)^2$ is the variance of spatial trend while $D_{time}^2 = \frac{1}{N} \sum_{j=1}^N D^2(s_j)$ is the mean temporal variance.

The above analysis was realized for the data series of Hungary and Croatia and the mean E as well as the square root values S_{space} , D_{time} are presented in the tables marked with “c”.

6. GRIDDING OF SNOW DEPTH AND SNOW WATER EQUIVALENT (Johann Hiebl)

The gridding of the two variables concerning the snow cover, snow depth and snow water equivalent (SWE), features substantial differences compared to the interpolation of the other climate variables: Firstly, not direct interpolation of station observation applying the MISH software was performed, but a process-related snow cover model based on pre-finished CARPATCLIM grids was applied. Secondly, the application of the snow cover model was not divided among the project members according to their national domains but collectively by the project associate member ZAMG.

The applied model is a continuous development of different authors at different institutes. It rests mainly upon the work by Scheppler (2000) in a version by Schöner and Hiebl (2009) with adjustments according to Jordan (1991) and Olefs (2010). But also for the application in the Carpathian region was not a plug-and-play procedure but the result of model calibration and adjustments.

6.1 Model structure

The used snow cover model is based on the degree day procedure and easily applicable in many regions. It calculates the build-up and degradation of the snow cover (but ignores the outflow from the snow cover) in daily resolution.

The input variables of each day are grids of mean air temperature (TaDailyGrid.ser), precipitation sum (PrecDailyGrid.ser) and relative air humidity (RhDailyGrid.ser). They are then processed by the snow cover model regarding three main parts accumulation of snow cover, ablation of snow cover and transformation of SWE to snow depth. This results in daily output grids of SWE, snow depth and snow temperature, which all in turn are used as additional input variables for the next day.

The model is carried out for hydrological years. For the CARPATCLIM project, it is initiated on October 1st of every year from 1961 to 2010 (setting all snow cover variables to zero on that day) and runs uninterruptedly until September 30th. Due to the missing of the first part of the hydrological year 1960/61, calculation starts with the season 1961/62 and covers the almost 50 years from October 1st, 1961 to December 31st, 2010.

6.2 Parameters

Five parameters, four seasonally constant ones and one seasonally variable parameter, control the day-to-day build-up and degradation of snow cover:

- The critical melting temperature ($T_{mc} = 0\text{ °C}$) accounts for the threshold beneath which all precipitation falls in solid form.
- The critical temperature ($T_c = 0\text{ °C}$) specifies the temperature above which all precipitation falls in liquid form and cannot be used for snow cover build-up. It most importantly steers snow accumulation.

Figure 2. Scheme of processing steps for the simulation of snow cover accumulation.

6.3.2 Ablation of snow cover

- Preliminary SWE and preliminary snow temperature after accumulation are used to calculate the preliminary cold content (fig. 3).
- With the aid of air temperature the amount of potential melt or effective cooling respectively is specified.
- The preliminary cold content and potential melt/effective cooling together determine the amount of effective melt and decrease of cold content (if air temperatures are above melting temperature) or the increase of cold content (if air temperature is below melting temperature).
- Effective melt subtracted from preliminary SWE gives the final output variable SWE.
- The cold content applied on the final SWE allows the calculation of the final snow temperature.

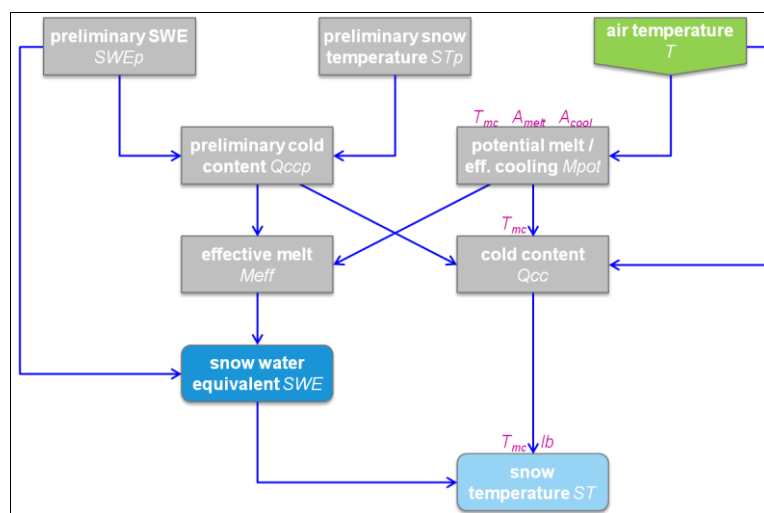


Figure 3. Scheme of processing steps for the simulation of snow cover ablation.

6.3.3 Transformation of SWE to snow depth

- For the calculation of the depth of fresh-fallen snow, the SWE of fresh-fallen snow is used considering the settling by degrading transformation (i.e. breakup of snow crystals) which depends on air temperature and the density of fresh-fallen snow (fig. 4).
- For the calculation of the depth of old snow, the old SWE is used considering the settling by degrading transformation, which depends on air temperature and the density of old snow, and the settling by the weight of the fresh-fallen snow, which depends on air temperature, the density of old snow and the SWE of fresh-fallen snow.
- The snow depths of fresh-fallen snow and old snow are added up to the final total snow depth.

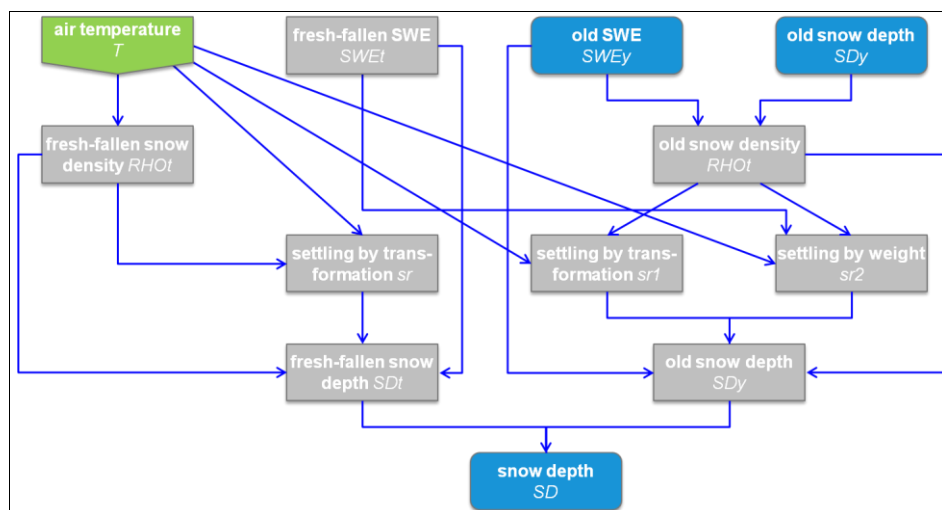


Figure 4. Scheme of processing steps for the transformation of SWE to snow depth.

6.4 Calibration

In order to produce better results in terms of the concrete study region, the most important model parameters were calibrated with respect to observational station data from the Carpathian region. As SWE measurements are not available, daily snow depth observations are the only reference for calibration and evaluation.

Daily snow depth measurements were provided by the national data holders. Altogether, 220 series were available, from which again those 121 series were selected for evaluation whose station altitude differs less than ± 50 m (cf. fig. 6). For calibration, the first five seasons of the study period were used.

The critical temperature (T_c), responsible for accumulation, was progressively altered from the initial value 1.5°C to 0°C leading to smaller and smaller error values (fig. 5a). Finally, a value of 0°C was assigned to T_c making it practically ineffective. Apparently, this is due to the fact that the mean daily temperature is too rough as an input variable to describe temperature at the precipitation event.

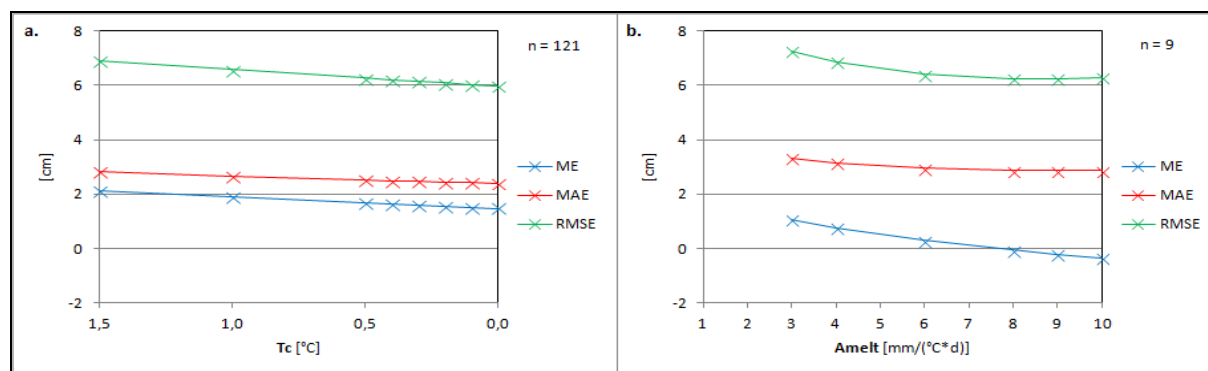


Figure 5: Mean error (bias, ME), mean absolute error (MAE) and root mean squared error (RMSE) in dependence of different values for the critical temperature (T_c ; left) and for the degree day factor (A_{melt} ; right).

Next, the degree day factor (A_{melt}) highly controlling ablation was changed watching the effect on error measures. This was done by maintaining the minimum seasonal value at 1 mm/(°C*d) but changing the maximum value from 3 to 10 mm/(°C*d). Taking into account all stations the error values could constantly be lowered with higher A_{melt} values (fig. 5b). Still, there is a strong bias among the reference stations towards low altitudes. Regarding the nine highest stations only, the turning point of error values can be detected at 8 mm/(°C*d). This number was accepted for the final model run.

6.5 Evaluation

Evaluation was based on the same 121 observational snow depth series as calibration. This time, the entire study period was investigated.

The overall mean error (ME) is 0.3 cm indicating a small tendency of the model to overestimate snow depth in terms of the station observations. Obviously, the model tends to slightly overestimate at lower altitude and underestimate at higher estimates where the potential measurement errors of winter precipitation may play a role (fig. 6a).

The mean absolute error (MAE) accounts for 1.2 cm. Good agreement can be seen in the Pannonian Basin whereas MAE values of 2 to 3 cm are typical for the more complex terrain of the Carpathian mountain chain and towards the northeast where generally higher snow depth values appear (fig. 6b). The root mean squared error (RMSE) is 3.8 cm showing a similar spatial distribution as the MAE.

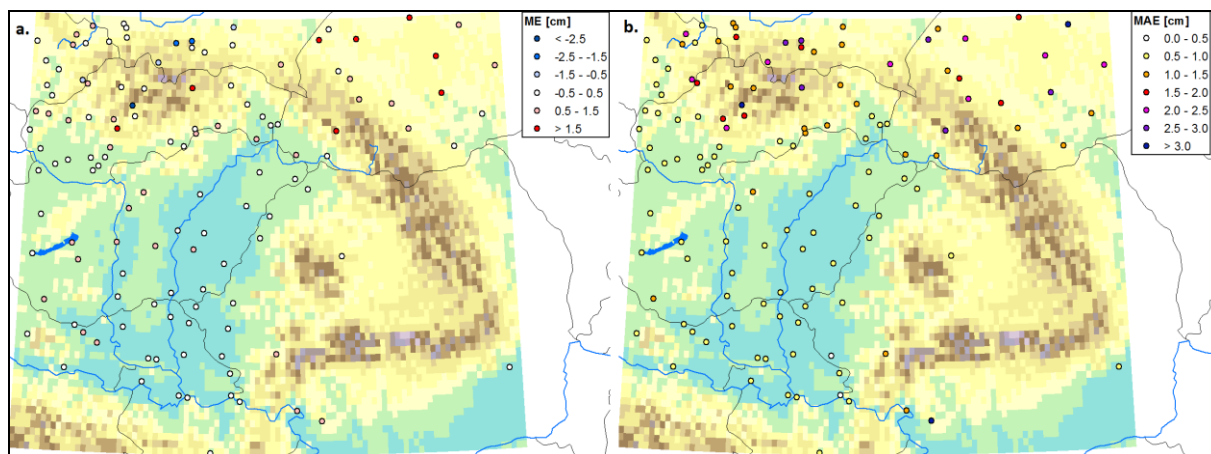


Figure 6: Spatial distribution of the final model error in terms of mean error (ME; left) and mean absolute error (MAE; right). Additionally, the locations of the 121 observational snow depth stations used for calibration and evaluation can be seen.

6.6 Discussion

The reliability of calibration and evaluation has to be questioned by, among others, representativity and measuring accuracy issues. Firstly, the lack of SWE measurements excludes calibration and evaluation of the main output variable of the snow cover model and restricts all efforts in this regard to snow depth which is object to a potentially higher

model error. Secondly, the representativity of a locally limited snow depth observation for a grid cell covering about 85 km² is problematic thinking of differences in altitude, wind exposure, slope orientation, radiation balance etc. Thirdly, snow depth measurements cannot be regarded to reflect reality themselves as they are object to observation and data processing errors or have not been homogenized or even quality-controlled. Nevertheless, the consistent results in terms of different parameterization and spatial distribution are in favor of the informative value of calibration and evaluation.

This is directly related to the discussion of assets and drawbacks of the applied snow cover model approach to create daily SWE and snow depth grids. A clear strength of the model approach is that a number of physical processes of snow accumulation and ablation can be simulated, even though daily resolution is obviously too rough in some cases. The advantage that the resultant SWE and snow depth grids are physically consistent with temperature, precipitation and humidity input grids is countered by the fact that the outputs are product of pure model world. However, not directly involving snow observations is beneficial: No errors from potentially problematic snow observations are taken over as well as complex and irresolvable representativity issues do not need to be dealt with. Additionally, available snow observations remain independently for model evaluation.

References

- D1.7 Proposal for quality control tests to be performed for all observational time series, Submitted to JRC.
- D1.8 Proposal for homogenization methods to be applied to all observational time series, Submitted to JRC.
- D1.11 Report on preliminary results of the quality control and data homogenization measures applied per country, including QC protocols and measures to determine the achieved increase in data quality
- D1.12 Final report on quality control and data homogenization measures applied per country, including QC protocols and measures to determine the achieved increase in data quality
- D2.3 Proposal for the methodology to harmonize observational time series across country borders
- D2.4 Report with preliminary results of the data harmonization procedures applied, including all protocols, per country
- D2.5 Report with final results of the data harmonization procedures applied, including all protocols, per country
- D2.6 Preliminary version of gridded datasets of harmonized and spatially interpolated meteorological parameters, per country
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- D2.8 Final version of gridded datasets of harmonized and spatially interpolated meteorological parameters, per country
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Annex 1. Maximum air temperature

Table 1.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.727	percent:	31.4%
variables:	h 1 3 5 7 10				
coefficients:	-0.0029 0.0202 0.0259 -0.0458 0.0826 0.0518				
2: number of model variables:	5	correlation:	0.815	percent:	42.0%
variables:	h 1 3 5 9				
coefficients:	-0.0025 0.0278 0.0357 -0.0424 -0.0460				
3: number of model variables:	4	correlation:	0.881	percent:	52.7%
variables:	h 1 3 9				
coefficients:	-0.0027 0.0377 0.0443 -0.0887				
4: number of model variables:	3	correlation:	0.905	percent:	57.4%
variables:	h 1 3				
coefficients:	-0.0035 0.0412 0.0320				
5: number of model variables:	3	correlation:	0.912	percent:	58.9%
variables:	h 1 3				
coefficients:	-0.0044 0.0426 0.0362				
6: number of model variables:	3	correlation:	0.914	percent:	59.4%
variables:	h 1 3				
coefficients:	-0.0047 0.0434 0.0366				
7: number of model variables:	3	correlation:	0.914	percent:	59.4%
variables:	h 1 3				
coefficients:	-0.0044 0.0450 0.0384				
8: number of model variables:	3	correlation:	0.902	percent:	56.8%
variables:	h 1 3				
coefficients:	-0.0042 0.0439 0.0426				
9: number of model variables:	3	correlation:	0.896	percent:	55.5%
variables:	h 1 3				
coefficients:	-0.0038 0.0441 0.0413				
10: number of model variables:	5	correlation:	0.874	percent:	51.3%
variables:	h 1 3 7 9				
coefficients:	-0.0047 0.0382 0.0545 0.1008 -0.0759				
11: number of model variables:	6	correlation:	0.829	percent:	44.1%
variables:	h 1 2 3 6 7				
coefficients:	-0.0036 0.0247 0.0489 0.0569 -0.0571 0.1340				
12: number of model variables:	6	correlation:	0.772	percent:	36.5%
variables:	h 1 2 3 7 8				
coefficients:	-0.0030 0.0220 0.0265 0.0385 0.1065 0.0559				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 1.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 68

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.891	0.820
2	0.913	0.848
3	0.919	0.827
4	0.892	0.779
5	0.891	0.767
6	0.864	0.721
7	0.857	0.713
8	0.879	0.756
9	0.889	0.773
10	0.877	0.763
11	0.899	0.807
12	0.879	0.781
MEAN	0.887	0.780

Table 1.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E:	1.85	4.85	10.42	16.48	21.63	24.71	26.78	26.39	21.87	16.14	8.76	3.01
D _t :	2.67	3.24	2.69	1.87	1.96	1.64	1.71	1.98	1.96	1.83	2.43	2.11
S _s :	1.00	1.23	1.33	1.21	1.31	1.34	1.37	1.39	1.43	1.34	1.21	1.02

Table 1.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.847	percent:	46.8%
variables:	h 1 2 3 4 11				
coefficients:	-0.0034 0.0151 0.0314 0.0256 -0.0551 -0.0847				
2: number of model variables:	4	correlation:	0.923	percent:	61.6%
variables:	h 1 7 10				
coefficients:	-0.0046 0.0180 -0.0727 -0.1271				
3: number of model variables:	4	correlation:	0.958	percent:	71.4%
variables:	h 1 8 15				
coefficients:	-0.0050 0.0163 0.0879 -0.0955				
4: number of model variables:	2	correlation:	0.943	percent:	66.6%
variables:	h 1				
coefficients:	-0.0067 0.0129				
5: number of model variables:	2	correlation:	0.944	percent:	67.0%
variables:	h 1				
coefficients:	-0.0069 0.0102				
6: number of model variables:	2	correlation:	0.950	percent:	68.9%
variables:	h 1				
coefficients:	-0.0071 0.0091				
7: number of model variables:	4	correlation:	0.965	percent:	73.7%
variables:	h 8 14 15				
coefficients:	-0.0057 0.0877 -0.1666 -0.0763				
8: number of model variables:	2	correlation:	0.940	percent:	65.9%
variables:	h 1				
coefficients:	-0.0069 0.0113				
9: number of model variables:	4	correlation:	0.960	percent:	72.0%
variables:	h 1 8 15				
coefficients:	-0.0058 0.0128 0.0623 -0.0793				
10: number of model variables:	4	correlation:	0.948	percent:	68.2%
variables:	h 1 8 15				
coefficients:	-0.0045 0.0134 0.0717 -0.0921				
11: number of model variables:	6	correlation:	0.900	percent:	56.4%
variables:	h 1 2 3 4 11				
coefficients:	-0.0044 0.0163 0.0250 0.0258 -0.0568 -0.0764				
12: number of model variables:	6	correlation:	0.892	percent:	54.7%
variables:	h 1 2 3 4 11				
coefficients:	-0.0039 0.0121 0.0345 0.0305 -0.0579 -0.0864				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 1.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 39

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.864	0.755
2	0.897	0.818
3	0.912	0.815
4	0.887	0.727
5	0.882	0.714
6	0.850	0.671
7	0.839	0.686
8	0.873	0.720
9	0.880	0.752
10	0.867	0.728
11	0.882	0.792
12	0.851	0.742
MEAN	0.874	0.743

Table 1.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	3	correlation:	0.877	percent:	52.0%
variables:	h				
coefficients:	-0.0029	0.0058	-0.0397		
2: number of model variables:	1	correlation:	0.956	percent:	70.8%
variables:	h				
coefficients:	-0.0052				
3: number of model variables:	1	correlation:	0.981	percent:	80.7%
variables:	h				
coefficients:	-0.0070				
4: number of model variables:	1	correlation:	0.987	percent:	83.9%
variables:	h				
coefficients:	-0.0081				
5: number of model variables:	1	correlation:	0.989	percent:	85.3%
variables:	h				
coefficients:	-0.0082				
6: number of model variables:	1	correlation:	0.991	percent:	86.3%
variables:	h				
coefficients:	-0.0082				
7: number of model variables:	1	correlation:	0.991	percent:	86.4%
variables:	h				
coefficients:	-0.0082				
8: number of model variables:	1	correlation:	0.990	percent:	86.0%
variables:	h				
coefficients:	-0.0081				
9: number of model variables:	1	correlation:	0.990	percent:	86.1%
variables:	h				
coefficients:	-0.0076				
10: number of model variables:	1	correlation:	0.986	percent:	83.2%
variables:	h				
coefficients:	-0.0064				
11: number of model variables:	1	correlation:	0.954	percent:	70.0%
variables:	h				
coefficients:	-0.0049				
12: number of model variables:	2	correlation:	0.885	percent:	53.5%
variables:	h				
coefficients:	-0.0035	-0.0371			

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 1.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 140

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.847	0.698
2	0.878	0.771
3	0.890	0.810
4	0.867	0.769
5	0.860	0.756
6	0.822	0.696
7	0.821	0.711
8	0.847	0.753
9	0.862	0.777
10	0.838	0.732
11	0.868	0.743
12	0.821	0.623
MEAN	0.852	0.737

Table 1.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.901 percent: 56.7%
variables: h 1 2 7 8 9
coefficients: -0.0030 0.0106 0.0188 -0.0213 0.0604 -0.0567

2: number of model variables: 5 correlation: 0.926 percent: 62.3%
variables: h 1 3 6 9
coefficients: -0.0042 0.0254 -0.0419 -0.0557 -0.0823

3: number of model variables: 5 correlation: 0.940 percent: 65.8%
variables: h 1 6 7 10
coefficients: -0.0061 0.0213 -0.1126 -0.0923 -0.0589

4: number of model variables: 6 correlation: 0.952 percent: 69.4%
variables: h 1 2 3 11 12
coefficients: -0.0057 0.0221 -0.0583 -0.0829 -0.0834 -0.0929

5: number of model variables: 6 correlation: 0.943 percent: 66.7%
variables: h 1 2 3 11 12
coefficients: -0.0056 0.0203 -0.0627 -0.0859 -0.0924 -0.0947

6: number of model variables: 6 correlation: 0.946 percent: 67.6%
variables: h 1 2 3 11 12
coefficients: -0.0057 0.0203 -0.0622 -0.0884 -0.0950 -0.0941

7: number of model variables: 6 correlation: 0.945 percent: 67.4%
variables: h 1 2 3 11 12
coefficients: -0.0059 0.0194 -0.0640 -0.0910 -0.0971 -0.0941

8: number of model variables: 6 correlation: 0.949 percent: 68.3%
variables: h 1 2 3 11 12
coefficients: -0.0056 0.0194 -0.0604 -0.0823 -0.0962 -0.0866

9: number of model variables: 6 correlation: 0.949 percent: 68.6%
variables: h 1 2 3 9 12
coefficients: -0.0054 0.0200 -0.0543 -0.0970 -0.1109 -0.0802

10: number of model variables: 5 correlation: 0.951 percent: 69.1%
variables: h 1 6 7 10
coefficients: -0.0049 0.0179 -0.0824 -0.0922 -0.0614

11: number of model variables: 5 correlation: 0.928 percent: 62.7%
variables: h 1 7 8 9
coefficients: -0.0040 0.0086 -0.0527 0.0702 -0.0578

12: number of model variables: 6 correlation: 0.907 percent: 58.0%
variables: h 1 2 7 8 9
coefficients: -0.0034 0.0058 0.0186 -0.0282 0.0712 -0.0603

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 1.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.883	0.767
2	0.897	0.783
3	0.905	0.784
4	0.889	0.658
5	0.891	0.641
6	0.866	0.585
7	0.869	0.593
8	0.858	0.599
9	0.888	0.691
10	0.877	0.727
11	0.892	0.748
12	0.859	0.704
MEAN	0.881	0.690

Table 1.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	3	correlation:	0.858	percent:	48.7%
variables:	h 6 8				
coefficients:	-0.0029 -0.0237 0.0467				
2: number of model variables:	2	correlation:	0.938	percent:	65.3%
variables:	h 8				
coefficients:	-0.0047 0.0472				
3: number of model variables:	2	correlation:	0.971	percent:	76.0%
variables:	h 8				
coefficients:	-0.0068 0.0379				
4: number of model variables:	1	correlation:	0.980	percent:	80.0%
variables:	h				
coefficients:	-0.0080				
5: number of model variables:	1	correlation:	0.977	percent:	78.6%
variables:	h				
coefficients:	-0.0077				
6: number of model variables:	1	correlation:	0.979	percent:	79.5%
variables:	h				
coefficients:	-0.0077				
7: number of model variables:	1	correlation:	0.977	percent:	78.5%
variables:	h				
coefficients:	-0.0078				
8: number of model variables:	1	correlation:	0.976	percent:	78.4%
variables:	h				
coefficients:	-0.0076				
9: number of model variables:	1	correlation:	0.973	percent:	77.1%
variables:	h				
coefficients:	-0.0071				
10: number of model variables:	2	correlation:	0.966	percent:	74.0%
variables:	h 8				
coefficients:	-0.0058 0.0313				
11: number of model variables:	2	correlation:	0.940	percent:	65.9%
variables:	h 8				
coefficients:	-0.0045 0.0413				
12: number of model variables:	3	correlation:	0.859	percent:	48.8%
variables:	h 2 8				
coefficients:	-0.0031 0.0085 0.0550				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 1.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 59

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.857	0.724
2	0.880	0.772
3	0.895	0.787
4	0.883	0.746
5	0.880	0.727
6	0.856	0.686
7	0.873	0.730
8	0.861	0.717
9	0.885	0.752
10	0.869	0.745
11	0.867	0.734
12	0.841	0.667
MEAN	0.871	0.732

Table 1.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.927	percent:	62.5%
variables:	h 2 5 8				
coefficients:	-0.0046 0.0356 -0.0393 0.0537				
2: number of model variables:	3	correlation:	0.963	percent:	73.1%
variables:	h 2 3				
coefficients:	-0.0054 0.0364 -0.0262				
3: number of model variables:	2	correlation:	0.986	percent:	83.4%
variables:	h 8				
coefficients:	-0.0064 0.0410				
4: number of model variables:	2	correlation:	0.994	percent:	88.7%
variables:	h 12				
coefficients:	-0.0075 0.0626				
5: number of model variables:	2	correlation:	0.994	percent:	89.4%
variables:	h 12				
coefficients:	-0.0076 0.0682				
6: number of model variables:	1	correlation:	0.994	percent:	88.6%
variables:	h				
coefficients:	-0.0072				
7: number of model variables:	1	correlation:	0.994	percent:	89.2%
variables:	h				
coefficients:	-0.0071				
8: number of model variables:	1	correlation:	0.993	percent:	88.4%
variables:	h				
coefficients:	-0.0070				
9: number of model variables:	1	correlation:	0.993	percent:	88.0%
variables:	h				
coefficients:	-0.0065				
10: number of model variables:	3	correlation:	0.985	percent:	82.5%
variables:	h 1 3				
coefficients:	-0.0043 0.0132 -0.0146				
11: number of model variables:	3	correlation:	0.965	percent:	73.9%
variables:	h 2 3				
coefficients:	-0.0054 0.0409 -0.0282				
12: number of model variables:	4	correlation:	0.929	percent:	63.1%
variables:	h 2 5 8				
coefficients:	-0.0046 0.0334 -0.0387 0.0518				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 1.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 38

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.861	0.708
2	0.884	0.716
3	0.888	0.793
4	0.874	0.772
5	0.874	0.785
6	0.842	0.713
7	0.871	0.762
8	0.852	0.728
9	0.881	0.782
10	0.869	0.737
11	0.867	0.691
12	0.840	0.665
MEAN	0.867	0.738

Table 1.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.972	percent:	76.3%
variables:	h 3		4 12		
coefficients:	-0.0048 0.0209		0.0176 -0.0630		
2: number of model variables:	4	correlation:	0.979	percent:	79.5%
variables:	h 4		7 12		
coefficients:	-0.0059 0.0320		0.1273 -0.0516		
3: number of model variables:	4	correlation:	0.983	percent:	81.4%
variables:	h 4		7 12		
coefficients:	-0.0079 0.0510		0.1592 -0.0658		
4: number of model variables:	4	correlation:	0.986	percent:	83.3%
variables:	h 2		7 11		
coefficients:	-0.0070 -0.0514		0.1281 0.0525		
5: number of model variables:	4	correlation:	0.984	percent:	82.1%
variables:	h 1		2 7		
coefficients:	-0.0076 -0.0107		-0.0340 0.1554		
6: number of model variables:	4	correlation:	0.982	percent:	81.1%
variables:	h 1		2 7		
coefficients:	-0.0083 -0.0155		-0.0322 0.1929		
7: number of model variables:	4	correlation:	0.981	percent:	80.6%
variables:	h 1		2 7		
coefficients:	-0.0087 -0.0203		-0.0510 0.1973		
8: number of model variables:	4	correlation:	0.984	percent:	81.9%
variables:	h 1		2 7		
coefficients:	-0.0083 -0.0181		-0.0475 0.1904		
9: number of model variables:	4	correlation:	0.979	percent:	79.6%
variables:	h 1		2 7		
coefficients:	-0.0078 -0.0142		-0.0445 0.1619		
10: number of model variables:	4	correlation:	0.980	percent:	80.2%
variables:	h 4		7 12		
coefficients:	-0.0065 0.0499		0.1756 -0.0565		
11: number of model variables:	4	correlation:	0.981	percent:	80.7%
variables:	h 3		12 15		
coefficients:	-0.0064 0.0241		-0.0573 0.0669		
12: number of model variables:	3	correlation:	0.969	percent:	75.2%
variables:	h 3		12		
coefficients:	-0.0049 0.0327		-0.0473		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 1.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 18

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.855	0.790
2	0.879	0.808
3	0.888	0.807
4	0.875	0.789
5	0.861	0.770
6	0.838	0.687
7	0.862	0.754
8	0.859	0.744
9	0.879	0.767
10	0.859	0.762
11	0.865	0.785
12	0.838	0.745
MEAN	0.863	0.767

Annex 2. Minimum air temperature

Table 2.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.529	percent:	15.1%
variables:	h 1		5 10 12 14		
coefficients:	-0.0021 0.0078	-0.0779 0.1370	0.1732 0.1568		
2: number of model variables:	6	correlation:	0.560	percent:	17.1%
variables:	h 1		4 7 10 14		
coefficients:	-0.0017 0.0209	0.1354 0.1810	0.2098 0.2160		
3: number of model variables:	6	correlation:	0.614	percent:	21.0%
variables:	h 1		4 7 10 12		
coefficients:	-0.0040 0.0153	0.1106 0.1487	0.1607 0.1489		
4: number of model variables:	6	correlation:	0.564	percent:	17.4%
variables:	h 1		4 7 10 12		
coefficients:	-0.0052 0.0153	0.1261 0.1837	0.1791 0.1863		
5: number of model variables:	6	correlation:	0.590	percent:	19.3%
variables:	h 1		4 7 10 12		
coefficients:	-0.0062 0.0132	0.1379 0.1729	0.1748 0.2086		
6: number of model variables:	6	correlation:	0.589	percent:	19.2%
variables:	h 1		4 7 10 12		
coefficients:	-0.0061 0.0140	0.1221 0.1689	0.1700 0.1933		
7: number of model variables:	6	correlation:	0.553	percent:	16.7%
variables:	h 1		4 7 10 12		
coefficients:	-0.0055 0.0115	0.1262 0.1745	0.1773 0.2264		
8: number of model variables:	6	correlation:	0.519	percent:	14.5%
variables:	h 1		4 7 10 12		
coefficients:	-0.0046 0.0081	0.1261 0.1640	0.1692 0.2276		
9: number of model variables:	6	correlation:	0.550	percent:	16.5%
variables:	h 1		4 7 10 12		
coefficients:	-0.0039 0.0091	0.1180 0.1724	0.1657 0.2128		
10: number of model variables:	6	correlation:	0.557	percent:	16.9%
variables:	h 4		7 10 12 14		
coefficients:	-0.0023 0.1102	0.1363 0.2314	0.2166 0.1156		
11: number of model variables:	6	correlation:	0.626	percent:	22.0%
variables:	h 1		4 7 10 12		
coefficients:	-0.0040 0.0121	0.0817 0.1449	0.1505 0.1422		
12: number of model variables:	6	correlation:	0.617	percent:	21.3%
variables:	h 1		4 7 10 14		
coefficients:	-0.0039 0.0199	0.1168 0.1543	0.1778 0.2040		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 2.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
Number of stations: 68

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.865	0.771
2	0.872	0.757
3	0.838	0.650
4	0.782	0.426
5	0.753	0.352
6	0.766	0.355
7	0.779	0.363
8	0.768	0.324
9	0.776	0.419
10	0.810	0.574
11	0.853	0.696
12	0.848	0.723
MEAN	0.809	0.534

Table 2.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :	-4.38	-2.72	0.84	5.37	9.96	13.17	14.57	14.20	10.53	5.80	1.67	-2.56
D _t :	2.76	2.88	1.86	1.35	1.20	1.12	1.21	1.18	1.29	1.67	1.97	2.12
S _s :	0.85	0.85	0.83	0.88	0.91	0.87	0.90	0.88	0.82	0.77	0.70	0.80

Table 2.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.815 percent: 42.1%
variables: h 3 4 5 8 12
coefficients: -0.0034 0.0408 -0.0690 0.0476 0.0719 -0.0975

2: number of model variables: 5 correlation: 0.835 percent: 45.0%
variables: h 3 4 5 11
coefficients: -0.0042 0.0311 -0.0685 0.0609 -0.0505

3: number of model variables: 5 correlation: 0.850 percent: 47.4%
variables: h 3 4 5 8
coefficients: -0.0042 0.0365 -0.0851 0.0817 0.0655

4: number of model variables: 5 correlation: 0.821 percent: 42.9%
variables: h 3 4 5 11
coefficients: -0.0047 0.0357 -0.0755 0.0609 -0.0504

5: number of model variables: 5 correlation: 0.848 percent: 47.0%
variables: h 1 3 4 5
coefficients: -0.0054 -0.0115 0.0286 -0.0649 0.0686

6: number of model variables: 5 correlation: 0.826 percent: 43.7%
variables: h 1 3 4 5
coefficients: -0.0049 -0.0092 0.0170 -0.0651 0.0743

7: number of model variables: 6 correlation: 0.750 percent: 33.9%
variables: h 1 3 4 5 8
coefficients: -0.0042 -0.0126 0.0238 -0.0878 0.0975 0.0834

8: number of model variables: 6 correlation: 0.742 percent: 33.0%
variables: h 1 3 4 5 15
coefficients: -0.0051 -0.0133 0.0361 -0.1057 0.1137 0.1065

9: number of model variables: 6 correlation: 0.752 percent: 34.1%
variables: h 1 3 4 5 15
coefficients: -0.0049 -0.0093 0.0420 -0.0976 0.0891 0.1255

10: number of model variables: 5 correlation: 0.756 percent: 34.6%
variables: h 3 4 5 15
coefficients: -0.0040 0.0445 -0.0963 0.0584 0.0838

11: number of model variables: 4 correlation: 0.815 percent: 42.0%
variables: h 3 4 11
coefficients: -0.0040 0.0318 -0.0662 -0.0595

12: number of model variables: 6 correlation: 0.845 percent: 46.5%
variables: h 3 4 10 11 12
coefficients: -0.0042 0.0282 -0.0421 -0.0552 -0.0452 -0.0543

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 39

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.839	0.730
2	0.860	0.740
3	0.833	0.635
4	0.778	0.473
5	0.744	0.426
6	0.757	0.392
7	0.768	0.338
8	0.770	0.349
9	0.778	0.435
10	0.805	0.568
11	0.826	0.666
12	0.817	0.684
MEAN	0.798	0.536

Table 2.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.765	percent:	35.7%
variables:	h 1 4 10				
coefficients:	-0.0033 -0.0071 -0.0373 0.0428				
2: number of model variables:	3	correlation:	0.878	percent:	52.1%
variables:	h 4 10				
coefficients:	-0.0037 -0.0294 0.0381				
3: number of model variables:	2	correlation:	0.938	percent:	65.4%
variables:	h 4				
coefficients:	-0.0044 -0.0250				
4: number of model variables:	2	correlation:	0.937	percent:	65.1%
variables:	h 4				
coefficients:	-0.0045 -0.0301				
5: number of model variables:	3	correlation:	0.935	percent:	64.4%
variables:	h 1 4				
coefficients:	-0.0051 -0.0079 -0.0367				
6: number of model variables:	3	correlation:	0.941	percent:	66.2%
variables:	h 1 4				
coefficients:	-0.0053 -0.0090 -0.0365				
7: number of model variables:	3	correlation:	0.922	percent:	61.2%
variables:	h 1 4				
coefficients:	-0.0051 -0.0100 -0.0392				
8: number of model variables:	3	correlation:	0.895	percent:	55.4%
variables:	h 1 4				
coefficients:	-0.0049 -0.0109 -0.0451				
9: number of model variables:	3	correlation:	0.884	percent:	53.3%
variables:	h 1 4				
coefficients:	-0.0045 -0.0087 -0.0377				
10: number of model variables:	4	correlation:	0.842	percent:	46.1%
variables:	h 1 4 10				
coefficients:	-0.0039 -0.0076 -0.0345 0.0375				
11: number of model variables:	3	correlation:	0.873	percent:	51.2%
variables:	h 4 10				
coefficients:	-0.0033 -0.0282 0.0349				
12: number of model variables:	4	correlation:	0.854	percent:	48.0%
variables:	h 1 4 10				
coefficients:	-0.0036 -0.0063 -0.0322 0.0394				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 140

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.829	0.654
2	0.849	0.702
3	0.821	0.611
4	0.777	0.448
5	0.740	0.361
6	0.727	0.317
7	0.760	0.330
8	0.759	0.285
9	0.741	0.282
10	0.781	0.421
11	0.832	0.630
12	0.812	0.615
MEAN	0.786	0.471

Table 2.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.665 percent: 25.3%
variables: h 1 7 8 11 13
coefficients: -0.0033 -0.0073 0.0405 0.1380 -0.0729 -0.1077

2: number of model variables: 5 correlation: 0.778 percent: 37.2%
variables: h 8 10 11 13
coefficients: -0.0036 0.0948 -0.0457 -0.0782 -0.1121

3: number of model variables: 5 correlation: 0.827 percent: 43.7%
variables: h 8 10 11 13
coefficients: -0.0045 0.1104 -0.0482 -0.0873 -0.1260

4: number of model variables: 6 correlation: 0.834 percent: 44.8%
variables: h 3 6 8 10 13
coefficients: -0.0048 -0.0389 -0.1038 0.0666 -0.0543 -0.0882

5: number of model variables: 6 correlation: 0.810 percent: 41.4%
variables: h 3 6 8 10 13
coefficients: -0.0046 -0.0449 -0.1198 0.0558 -0.0606 -0.1038

6: number of model variables: 6 correlation: 0.829 percent: 44.0%
variables: h 2 3 6 9 10
coefficients: -0.0052 -0.0204 -0.0732 -0.1094 -0.0855 -0.0454

7: number of model variables: 6 correlation: 0.829 percent: 44.1%
variables: h 2 3 6 9 10
coefficients: -0.0048 -0.0226 -0.0742 -0.1056 -0.0744 -0.0440

8: number of model variables: 5 correlation: 0.781 percent: 37.6%
variables: h 3 6 9 10
coefficients: -0.0047 -0.0581 -0.1265 -0.0732 -0.0492

9: number of model variables: 6 correlation: 0.764 percent: 35.4%
variables: h 6 8 10 11 13
coefficients: -0.0040 -0.0651 0.0921 -0.0571 -0.0713 -0.1263

10: number of model variables: 5 correlation: 0.722 percent: 30.8%
variables: h 1 8 10 13
coefficients: -0.0031 -0.0087 0.1198 -0.0410 -0.0937

11: number of model variables: 4 correlation: 0.779 percent: 37.2%
variables: h 8 11 13
coefficients: -0.0032 0.0938 -0.0643 -0.0854

12: number of model variables: 5 correlation: 0.747 percent: 33.5%
variables: h 7 8 11 13
coefficients: -0.0035 0.0396 0.1149 -0.0788 -0.0992

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.870	0.694
2	0.873	0.707
3	0.854	0.619
4	0.800	0.424
5	0.795	0.373
6	0.778	0.308
7	0.802	0.398
8	0.782	0.352
9	0.744	0.263
10	0.793	0.434
11	0.862	0.646
12	0.845	0.631
MEAN	0.816	0.487

Table 2.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.773 percent: 36.6%
 variables: h 1 6 8 11 13
 coefficients: -0.0046 -0.0176 -0.0277 0.0216 0.0753 0.0503

2: number of model variables: 5 correlation: 0.859 percent: 48.7%
 variables: h 1 6 11 13
 coefficients: -0.0056 -0.0170 -0.0373 0.1023 0.0546

3: number of model variables: 4 correlation: 0.905 percent: 57.4%
 variables: h 1 6 11
 coefficients: -0.0058 -0.0117 -0.0252 0.0771

4: number of model variables: 5 correlation: 0.868 percent: 50.4%
 variables: h 1 6 10 11
 coefficients: -0.0055 -0.0110 -0.0344 -0.0299 0.0779

5: number of model variables: 5 correlation: 0.862 percent: 49.4%
 variables: h 1 4 10 13
 coefficients: -0.0055 -0.0138 0.0334 -0.0279 0.0683

6: number of model variables: 4 correlation: 0.879 percent: 52.3%
 variables: h 1 8 15
 coefficients: -0.0058 -0.0133 0.0327 0.0435

7: number of model variables: 6 correlation: 0.876 percent: 51.7%
 variables: h 1 4 7 9 13
 coefficients: -0.0058 -0.0137 0.0415 0.0602 0.0353 0.0747

8: number of model variables: 5 correlation: 0.840 percent: 45.8%
 variables: h 1 4 9 13
 coefficients: -0.0055 -0.0181 0.0297 0.0229 0.0772

9: number of model variables: 6 correlation: 0.849 percent: 47.2%
 variables: h 1 4 7 9 13
 coefficients: -0.0053 -0.0146 0.0398 0.0498 0.0359 0.0896

10: number of model variables: 6 correlation: 0.869 percent: 50.5%
 variables: h 1 6 8 11 13
 coefficients: -0.0047 -0.0128 -0.0243 0.0178 0.0665 0.0436

11: number of model variables: 4 correlation: 0.918 percent: 60.2%
 variables: h 1 8 12
 coefficients: -0.0046 -0.0097 0.0239 -0.0304

12: number of model variables: 6 correlation: 0.869 percent: 50.5%
 variables: h 1 2 5 8 12
 coefficients: -0.0052 -0.0161 0.0132 -0.0205 0.0393 -0.0447

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 59

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.846	0.705
2	0.855	0.726
3	0.829	0.649
4	0.761	0.369
5	0.757	0.394
6	0.748	0.329
7	0.769	0.364
8	0.739	0.313
9	0.737	0.346
10	0.783	0.535
11	0.829	0.665
12	0.821	0.661
MEAN	0.789	0.505

Table 2.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.788	percent:	38.5%
variables:	h 1 3 5 8 10				
coefficients:	-0.0052 -0.0157 0.0526 -0.0507 0.0815 0.0496				
2: number of model variables:	6	correlation:	0.862	percent:	49.4%
variables:	h 1 3 4 5 8				
coefficients:	-0.0059 -0.0132 0.0576 0.0231 -0.0379 0.0364				
3: number of model variables:	6	correlation:	0.908	percent:	58.2%
variables:	h 3 4 5 11 13				
coefficients:	-0.0057 0.0376 0.0366 -0.0280 0.0674 0.0622				
4: number of model variables:	6	correlation:	0.865	percent:	49.9%
variables:	h 4 7 11 13 14				
coefficients:	-0.0052 0.0517 0.0722 0.0951 0.1227 0.1053				
5: number of model variables:	6	correlation:	0.864	percent:	49.7%
variables:	h 3 4 5 7 8				
coefficients:	-0.0049 0.0312 0.0449 -0.0451 0.0637 0.0538				
6: number of model variables:	6	correlation:	0.881	percent:	52.7%
variables:	h 4 7 11 13 14				
coefficients:	-0.0051 0.0523 0.0716 0.0945 0.1241 0.0850				
7: number of model variables:	6	correlation:	0.865	percent:	49.8%
variables:	h 4 7 11 13 14				
coefficients:	-0.0052 0.0578 0.0913 0.0860 0.1346 0.1021				
8: number of model variables:	6	correlation:	0.825	percent:	43.4%
variables:	h 4 7 11 13 14				
coefficients:	-0.0046 0.0502 0.0670 0.1057 0.1343 0.0854				
9: number of model variables:	6	correlation:	0.830	percent:	44.2%
variables:	h 3 4 5 11 13				
coefficients:	-0.0050 0.0289 0.0395 -0.0319 0.0761 0.1043				
10: number of model variables:	6	correlation:	0.849	percent:	47.2%
variables:	h 2 5 7 8 11				
coefficients:	-0.0046 0.0220 -0.0539 0.0432 0.0446 0.0878				
11: number of model variables:	6	correlation:	0.913	percent:	59.3%
variables:	h 5 8 10 11 15				
coefficients:	-0.0045 -0.0315 0.0574 0.0545 0.0713 0.0802				
12: number of model variables:	6	correlation:	0.871	percent:	50.9%
variables:	h 1 3 5 8 10				
coefficients:	-0.0054 -0.0153 0.0401 -0.0412 0.0680 0.0427				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 39

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.839	0.701
2	0.847	0.725
3	0.832	0.671
4	0.758	0.397
5	0.764	0.432
6	0.741	0.333
7	0.767	0.385
8	0.739	0.352
9	0.727	0.336
10	0.770	0.535
11	0.824	0.695
12	0.816	0.674
MEAN	0.785	0.520

Table 2.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.988	percent:	84.6%
variables:	h 1 6 11				
coefficients:	-0.0055 -0.0171 -0.0207 0.1546				
2: number of model variables:	4	correlation:	0.988	percent:	84.3%
variables:	h 1 2 11				
coefficients:	-0.0061 -0.0165 -0.0262 0.1908				
3: number of model variables:	4	correlation:	0.989	percent:	85.0%
variables:	h 1 8 11				
coefficients:	-0.0067 -0.0130 0.0669 0.1671				
4: number of model variables:	4	correlation:	0.974	percent:	77.3%
variables:	h 1 11 15				
coefficients:	-0.0056 -0.0106 0.1176 -0.0938				
5: number of model variables:	4	correlation:	0.967	percent:	74.4%
variables:	h 1 2 11				
coefficients:	-0.0058 -0.0181 -0.0424 0.1743				
6: number of model variables:	4	correlation:	0.973	percent:	76.8%
variables:	h 1 2 11				
coefficients:	-0.0057 -0.0165 -0.0373 0.1580				
7: number of model variables:	4	correlation:	0.966	percent:	74.1%
variables:	h 7 8 11				
coefficients:	-0.0042 -0.1027 0.1276 0.1510				
8: number of model variables:	4	correlation:	0.959	percent:	71.6%
variables:	h 1 2 11				
coefficients:	-0.0054 -0.0197 -0.0452 0.1756				
9: number of model variables:	4	correlation:	0.957	percent:	71.2%
variables:	h 1 2 11				
coefficients:	-0.0052 -0.0148 -0.0279 0.1622				
10: number of model variables:	4	correlation:	0.979	percent:	79.6%
variables:	h 1 6 11				
coefficients:	-0.0048 -0.0102 -0.0214 0.1341				
11: number of model variables:	2	correlation:	0.990	percent:	85.8%
variables:	h 11				
coefficients:	-0.0044 0.0881				
12: number of model variables:	4	correlation:	0.986	percent:	83.6%
variables:	h 1 6 11				
coefficients:	-0.0056 -0.0142 -0.0110 0.1057				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 2.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 18

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.836	0.792
2	0.843	0.784
3	0.812	0.741
4	0.746	0.581
5	0.739	0.533
6	0.720	0.484
7	0.758	0.576
8	0.722	0.500
9	0.729	0.509
10	0.776	0.638
11	0.811	0.747
12	0.813	0.755
MEAN	0.775	0.637

Annex 3. Precipitation sum

Table 3.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.418 percent: 9.1%
 variables: h 5 6 7 8 12
 coefficients: 0.0003 -0.0036 -0.0068 0.0069 0.0057 -0.0089

2: number of model variables: 6 correlation: 0.507 percent: 13.8%
 variables: h 5 6 7 8 12
 coefficients: 0.0005 -0.0047 -0.0082 0.0062 0.0053 -0.0069

3: number of model variables: 5 correlation: 0.543 percent: 16.0%
 variables: h 1 6 12 15
 coefficients: 0.0005 -0.0012 -0.0065 -0.0076 0.0085

4: number of model variables: 4 correlation: 0.572 percent: 18.0%
 variables: h 6 7 15
 coefficients: 0.0006 -0.0051 0.0059 0.0052

5: number of model variables: 2 correlation: 0.605 percent: 20.4%
 variables: h 1
 coefficients: 0.0008 0.0015

6: number of model variables: 5 correlation: 0.614 percent: 21.1%
 variables: h 1 2 6 11
 coefficients: 0.0008 0.0014 0.0015 -0.0025 0.0079

7: number of model variables: 6 correlation: 0.548 percent: 16.4%
 variables: h 1 3 7 11 15
 coefficients: 0.0007 0.0012 0.0026 0.0036 0.0093 0.0077

8: number of model variables: 4 correlation: 0.535 percent: 15.5%
 variables: h 1 4 12
 coefficients: 0.0008 0.0019 0.0028 -0.0058

9: number of model variables: 4 correlation: 0.465 percent: 11.5%
 variables: h 3 11 12
 coefficients: 0.0006 0.0024 0.0098 -0.0040

10: number of model variables: 3 correlation: 0.420 percent: 9.2%
 variables: h 6 12
 coefficients: 0.0005 -0.0033 -0.0043

11: number of model variables: 6 correlation: 0.574 percent: 18.1%
 variables: h 6 7 10 12 15
 coefficients: 0.0006 -0.0050 0.0060 0.0044 -0.0061 0.0090

12: number of model variables: 6 correlation: 0.432 percent: 9.8%
 variables: h 1 5 6 7 12
 coefficients: 0.0001 -0.0012 -0.0046 -0.0079 0.0055 -0.0074

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 233

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.778	0.723
2	0.779	0.724
3	0.757	0.706
4	0.692	0.636
5	0.619	0.562
6	0.569	0.511
7	0.551	0.491
8	0.627	0.575
9	0.715	0.670
10	0.805	0.770
11	0.798	0.755
12	0.794	0.742
MEAN	0.707	0.655

Table 3.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :	36.1	34.4	36.6	47.5	62.7	77.3	67.3	64.4	52.0	43.2	55.4	48.5
D _t :	22.5	22.9	21.3	25.6	36.2	39.0	39.3	40.7	36.5	35.7	33.3	27.9
S _s :	7.1	5.9	6.9	7.8	7.8	8.9	9.3	10.5	10.2	8.3	10.8	8.6

Table 3.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 5 correlation: 0.544 percent: 16.1%
 variables: h 2 8 9 15
 coefficients: 0.0005 0.0023 0.0118 -0.0093 0.0088

2: number of model variables: 4 correlation: 0.564 percent: 17.4%
 variables: h 2 3 8
 coefficients: 0.0005 0.0026 0.0020 0.0077

3: number of model variables: 5 correlation: 0.642 percent: 23.3%
 variables: h 2 6 11 12
 coefficients: 0.0004 0.0047 -0.0037 -0.0094 0.0072

4: number of model variables: 2 correlation: 0.565 percent: 17.5%
 variables: h 2
 coefficients: 0.0004 0.0030

5: number of model variables: 6 correlation: 0.789 percent: 38.6%
 variables: h 1 2 3 8 14
 coefficients: 0.0007 0.0010 0.0028 0.0018 0.0063 -0.0064

6: number of model variables: 6 correlation: 0.708 percent: 29.3%
 variables: h 1 2 3 8 10
 coefficients: 0.0003 -0.0008 0.0034 0.0035 0.0040 0.0057

7: number of model variables: 5 correlation: 0.789 percent: 38.5%
 variables: h 3 8 12 15
 coefficients: 0.0006 0.0055 0.0121 -0.0121 0.0073

8: number of model variables: 6 correlation: 0.729 percent: 31.5%
 variables: h 3 6 8 12 15
 coefficients: 0.0005 0.0030 -0.0052 0.0068 -0.0109 0.0084

9: number of model variables: 5 correlation: 0.755 percent: 34.4%
 variables: h 2 3 8 15
 coefficients: 0.0006 0.0026 0.0032 0.0098 0.0080

10: number of model variables: 4 correlation: 0.647 percent: 23.8%
 variables: h 1 2 11
 coefficients: 0.0007 0.0016 0.0032 -0.0071

11: number of model variables: 6 correlation: 0.599 percent: 20.0%
 variables: h 2 4 9 10 15
 coefficients: 0.0003 0.0033 -0.0031 -0.0045 0.0061 0.0057

12: number of model variables: 6 correlation: 0.615 percent: 21.2%
 variables: h 2 6 8 9 11
 coefficients: 0.0004 0.0027 -0.0031 0.0082 -0.0063 -0.0036

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 114

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.760	0.686
2	0.733	0.652
3	0.719	0.641
4	0.624	0.541
5	0.571	0.508
6	0.528	0.465
7	0.530	0.466
8	0.572	0.508
9	0.701	0.651
10	0.784	0.729
11	0.731	0.665
12	0.747	0.670
MEAN	0.667	0.599

Table 3.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 5 correlation: 0.505 percent: 13.7%
 variables: h 1 6 7 10
 coefficients: 0.0003 0.0010 -0.0054 0.0075 0.0072

2: number of model variables: 4 correlation: 0.572 percent: 18.0%
 variables: h 6 7 10
 coefficients: 0.0003 -0.0050 0.0063 0.0065

3: number of model variables: 6 correlation: 0.616 percent: 21.3%
 variables: h 1 4 6 10 11
 coefficients: 0.0004 0.0010 -0.0031 -0.0055 0.0056 0.0063

4: number of model variables: 6 correlation: 0.538 percent: 15.7%
 variables: h 1 3 4 10 11
 coefficients: 0.0003 0.0009 -0.0013 -0.0030 0.0041 0.0051

5: number of model variables: 5 correlation: 0.659 percent: 24.7%
 variables: h 1 5 9 11
 coefficients: 0.0004 0.0014 -0.0030 -0.0044 0.0070

6: number of model variables: 3 correlation: 0.714 percent: 30.0%
 variables: h 1 4
 coefficients: 0.0005 0.0014 -0.0030

7: number of model variables: 2 correlation: 0.709 percent: 29.5%
 variables: h 1
 coefficients: 0.0005 0.0017

8: number of model variables: 3 correlation: 0.760 percent: 35.0%
 variables: h 1 12
 coefficients: 0.0006 0.0019 0.0053

9: number of model variables: 5 correlation: 0.678 percent: 26.5%
 variables: h 1 3 6 11
 coefficients: 0.0004 0.0015 0.0015 -0.0029 0.0074

10: number of model variables: 6 correlation: 0.612 percent: 20.9%
 variables: h 1 4 5 6 11
 coefficients: 0.0004 0.0016 -0.0027 -0.0036 -0.0029 0.0087

11: number of model variables: 6 correlation: 0.502 percent: 13.5%
 variables: h 1 4 6 7 10
 coefficients: 0.0003 0.0012 -0.0040 -0.0078 0.0077 0.0080

12: number of model variables: 6 correlation: 0.534 percent: 15.5%
 variables: h 1 6 7 10 11
 coefficients: 0.0003 0.0010 -0.0070 0.0091 0.0089 0.0109

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 3.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 182

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.675	0.565
2	0.645	0.530
3	0.654	0.554
4	0.570	0.471
5	0.535	0.444
6	0.477	0.388
7	0.465	0.368
8	0.515	0.432
9	0.647	0.581
10	0.716	0.647
11	0.664	0.544
12	0.671	0.545
MEAN	0.603	0.506

Table 3.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.671 percent: 25.8%
 variables: h 2 3 4 7 12
 coefficients: 0.0004 -0.0083 0.0065 -0.0058 0.0048 -0.0150

2: number of model variables: 6 correlation: 0.635 percent: 22.7%
 variables: h 2 3 4 8 12
 coefficients: 0.0006 -0.0058 0.0050 -0.0059 0.0076 -0.0159

3: number of model variables: 6 correlation: 0.696 percent: 28.2%
 variables: h 1 2 4 7 12
 coefficients: 0.0009 0.0026 -0.0056 -0.0049 0.0064 -0.0117

4: number of model variables: 6 correlation: 0.664 percent: 25.3%
 variables: h 1 3 8 12 13
 coefficients: 0.0007 0.0010 0.0034 0.0112 -0.0072 -0.0093

5: number of model variables: 4 correlation: 0.620 percent: 21.6%
 variables: h 1 8 12
 coefficients: 0.0006 0.0013 0.0079 -0.0069

6: number of model variables: 4 correlation: 0.745 percent: 33.3%
 variables: h 1 2 8
 coefficients: 0.0006 0.0018 0.0021 0.0069

7: number of model variables: 4 correlation: 0.745 percent: 33.3%
 variables: h 1 6 12
 coefficients: 0.0008 0.0026 0.0059 -0.0078

8: number of model variables: 4 correlation: 0.633 percent: 22.6%
 variables: h 1 6 12
 coefficients: 0.0007 0.0022 0.0076 -0.0103

9: number of model variables: 5 correlation: 0.676 percent: 26.3%
 variables: h 1 3 8 13
 coefficients: 0.0007 0.0023 0.0038 0.0103 -0.0066

10: number of model variables: 6 correlation: 0.603 percent: 20.2%
 variables: h 1 3 7 8 10
 coefficients: 0.0006 0.0020 0.0048 0.0080 0.0100 0.0076

11: number of model variables: 6 correlation: 0.716 percent: 30.2%
 variables: h 1 2 7 10 12
 coefficients: 0.0007 0.0024 -0.0083 0.0139 0.0094 -0.0103

12: number of model variables: 6 correlation: 0.719 percent: 30.4%
 variables: h 1 2 7 10 12
 coefficients: 0.0008 0.0026 -0.0100 0.0123 0.0095 -0.0139

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 148

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.683	0.556
2	0.712	0.596
3	0.726	0.629
4	0.654	0.556
5	0.552	0.443
6	0.563	0.480
7	0.573	0.485
8	0.549	0.453
9	0.714	0.649
10	0.759	0.683
11	0.708	0.593
12	0.696	0.562
MEAN	0.657	0.557

Table 3.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables:	5	correlation:	0.707	percent:	29.3%
variables:	h 4 5 6 11				
coefficients:	0.0006 -0.0056 -0.0050 -0.0055 -0.0077				
2: number of model variables:	4	correlation:	0.755	percent:	34.4%
variables:	h 4 5 6				
coefficients:	0.0006 -0.0045 -0.0053 -0.0071				
3: number of model variables:	4	correlation:	0.795	percent:	39.4%
variables:	h 4 5 6				
coefficients:	0.0006 -0.0056 -0.0046 -0.0068				
4: number of model variables:	5	correlation:	0.813	percent:	41.8%
variables:	h 3 4 5 6				
coefficients:	0.0005 0.0030 -0.0027 -0.0045 -0.0066				
5: number of model variables:	6	correlation:	0.797	percent:	39.6%
variables:	h 1 2 3 5 6				
coefficients:	0.0005 0.0015 0.0016 0.0029 -0.0024 -0.0029				
6: number of model variables:	6	correlation:	0.814	percent:	41.9%
variables:	h 1 2 3 7 8				
coefficients:	0.0006 0.0016 0.0022 0.0037 -0.0032 -0.0020				
7: number of model variables:	5	correlation:	0.807	percent:	41.0%
variables:	h 1 2 3 6				
coefficients:	0.0006 0.0016 0.0018 0.0044 -0.0027				
8: number of model variables:	5	correlation:	0.813	percent:	41.8%
variables:	h 1 2 3 8				
coefficients:	0.0006 0.0016 0.0020 0.0037 -0.0021				
9: number of model variables:	5	correlation:	0.799	percent:	39.8%
variables:	h 1 2 3 6				
coefficients:	0.0006 0.0011 0.0015 0.0046 -0.0033				
10: number of model variables:	6	correlation:	0.781	percent:	37.5%
variables:	h 1 3 5 6 11				
coefficients:	0.0006 0.0013 0.0032 -0.0036 -0.0038 -0.0047				
11: number of model variables:	6	correlation:	0.736	percent:	32.3%
variables:	h 4 5 6 10 11				
coefficients:	0.0004 -0.0039 -0.0043 -0.0060 0.0044 -0.0051				
12: number of model variables:	6	correlation:	0.720	percent:	30.6%
variables:	h 2 4 5 6 11				
coefficients:	0.0005 -0.0015 -0.0049 -0.0055 -0.0061 -0.0067				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 165

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.695	0.581
2	0.703	0.599
3	0.708	0.626
4	0.665	0.587
5	0.599	0.533
6	0.537	0.461
7	0.585	0.517
8	0.592	0.528
9	0.696	0.637
10	0.769	0.715
11	0.696	0.604
12	0.708	0.603
MEAN	0.663	0.583

Table 3.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.771 percent: 36.3%
 variables: h 4 5 6 7 8
 coefficients: 0.0006 -0.0076 -0.0064 -0.0070 -0.0069 0.0051

2: number of model variables: 5 correlation: 0.798 percent: 39.7%
 variables: h 4 5 6 7
 coefficients: 0.0007 -0.0048 -0.0056 -0.0079 -0.0051

3: number of model variables: 4 correlation: 0.820 percent: 42.8%
 variables: h 3 5 6
 coefficients: 0.0007 0.0048 -0.0035 -0.0080

4: number of model variables: 6 correlation: 0.862 percent: 49.3%
 variables: h 2 3 4 5 6
 coefficients: 0.0005 0.0026 0.0031 -0.0027 -0.0031 -0.0063

5: number of model variables: 6 correlation: 0.868 percent: 50.3%
 variables: h 2 3 5 6 7
 coefficients: 0.0003 0.0030 0.0041 -0.0024 -0.0051 -0.0038

6: number of model variables: 6 correlation: 0.868 percent: 50.3%
 variables: h 2 3 4 6 7
 coefficients: 0.0004 0.0037 0.0046 -0.0028 -0.0042 -0.0054

7: number of model variables: 5 correlation: 0.879 percent: 52.3%
 variables: h 2 3 6 7
 coefficients: 0.0004 0.0028 0.0057 -0.0057 -0.0032

8: number of model variables: 5 correlation: 0.879 percent: 52.3%
 variables: h 2 3 6 9
 coefficients: 0.0004 0.0031 0.0055 -0.0047 0.0038

9: number of model variables: 6 correlation: 0.861 percent: 49.1%
 variables: h 2 3 5 6 7
 coefficients: 0.0004 0.0022 0.0059 -0.0022 -0.0059 -0.0031

10: number of model variables: 6 correlation: 0.836 percent: 45.2%
 variables: h 3 5 6 8 10
 coefficients: 0.0004 0.0055 -0.0029 -0.0084 0.0027 0.0054

11: number of model variables: 6 correlation: 0.794 percent: 39.2%
 variables: h 3 5 6 12 15
 coefficients: 0.0005 0.0041 -0.0040 -0.0076 0.0063 0.0071

12: number of model variables: 6 correlation: 0.777 percent: 37.1%
 variables: h 3 4 5 6 8
 coefficients: 0.0006 0.0030 -0.0054 -0.0055 -0.0088 0.0052

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 102

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.669	0.533
2	0.677	0.550
3	0.683	0.569
4	0.657	0.569
5	0.593	0.515
6	0.541	0.445
7	0.615	0.542
8	0.589	0.514
9	0.699	0.636
10	0.767	0.704
11	0.666	0.542
12	0.677	0.534
MEAN	0.653	0.554

Table 3.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.838 percent: 45.4%
 variables: h 1 5 8 12 13
 coefficients: 0.0015 0.0054 -0.0114 0.0119 -0.0175 -0.0186

2: number of model variables: 6 correlation: 0.855 percent: 48.2%
 variables: h 1 3 5 12 13
 coefficients: 0.0013 0.0043 0.0038 -0.0133 -0.0182 -0.0206

3: number of model variables: 6 correlation: 0.885 percent: 53.5%
 variables: h 1 3 5 6 13
 coefficients: 0.0012 0.0033 0.0056 -0.0043 -0.0105 -0.0123

4: number of model variables: 6 correlation: 0.870 percent: 50.8%
 variables: h 2 3 4 6 10
 coefficients: 0.0006 0.0042 0.0049 -0.0047 -0.0097 0.0088

5: number of model variables: 5 correlation: 0.844 percent: 46.3%
 variables: h 2 4 5 14
 coefficients: 0.0005 0.0060 -0.0056 -0.0041 0.0079

6: number of model variables: 4 correlation: 0.846 percent: 46.6%
 variables: h 2 3 4
 coefficients: 0.0006 0.0034 0.0034 -0.0076

7: number of model variables: 3 correlation: 0.845 percent: 46.5%
 variables: h 1 3
 coefficients: 0.0009 0.0024 0.0060

8: number of model variables: 4 correlation: 0.849 percent: 47.2%
 variables: h 1 2 3
 coefficients: 0.0008 0.0023 0.0050 0.0031

9: number of model variables: 5 correlation: 0.855 percent: 48.1%
 variables: h 1 2 3 6
 coefficients: 0.0008 0.0021 0.0047 0.0046 -0.0045

10: number of model variables: 6 correlation: 0.887 percent: 53.9%
 variables: h 1 3 6 7 13
 coefficients: 0.0010 0.0028 0.0043 -0.0072 0.0115 -0.0096

11: number of model variables: 6 correlation: 0.861 percent: 49.1%
 variables: h 1 3 6 7 13
 coefficients: 0.0010 0.0020 0.0037 -0.0096 0.0139 -0.0091

12: number of model variables: 6 correlation: 0.829 percent: 44.1%
 variables: h 4 5 6 7 14
 coefficients: 0.0010 -0.0102 -0.0069 -0.0087 0.0176 0.0141

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 3.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 51

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.677	0.548
2	0.694	0.581
3	0.693	0.612
4	0.655	0.581
5	0.608	0.549
6	0.523	0.456
7	0.603	0.537
8	0.611	0.550
9	0.692	0.642
10	0.736	0.681
11	0.666	0.553
12	0.686	0.581
MEAN	0.654	0.573

Annex 4. Relative Humidity

Table 4.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.541	percent:	15.9%
variables:	h 1	5	11	14	15
coefficients:	-0.0184 -0.0786	0.3343	0.5694	-0.6856	0.6881
2: number of model variables:	6	correlation:	0.615	percent:	21.2%
variables:	h 1	7	9	14	15
coefficients:	-0.0149 -0.1134	-0.6192	0.4632	-0.6673	0.8454
3: number of model variables:	6	correlation:	0.583	percent:	18.7%
variables:	h 1	7	9	11	15
coefficients:	-0.0179 -0.1251	-0.6593	0.4900	0.5728	1.1386
4: number of model variables:	6	correlation:	0.562	percent:	17.3%
variables:	h 1	7	11	14	15
coefficients:	-0.0221 -0.1588	-0.6946	0.7092	-0.7691	1.1500
5: number of model variables:	6	correlation:	0.452	percent:	10.8%
variables:	h 1	4	7	10	14
coefficients:	0.0031 -0.0948	-0.4198	-0.7854	-0.7133	-1.0088
6: number of model variables:	6	correlation:	0.382	percent:	7.6%
variables:	h 7	10	11	12	13
coefficients:	0.0096 -0.4550	-0.6418	0.5500	-0.6149	-1.3873
7: number of model variables:	6	correlation:	0.402	percent:	8.4%
variables:	h 7	10	11	12	13
coefficients:	0.0101 -0.4202	-0.5647	0.5577	-0.7658	-1.3955
8: number of model variables:	6	correlation:	0.455	percent:	11.0%
variables:	h 7	10	11	12	13
coefficients:	0.0084 -0.5882	-0.7569	0.5362	-0.7879	-1.4759
9: number of model variables:	6	correlation:	0.483	percent:	12.5%
variables:	h 7	10	11	12	13
coefficients:	0.0084 -0.6246	-0.8009	0.6554	-0.8180	-1.5428
10: number of model variables:	6	correlation:	0.479	percent:	12.2%
variables:	h 2	7	10	12	13
coefficients:	0.0120 0.0950	-0.5539	-0.6083	-0.4415	-1.1259
11: number of model variables:	6	correlation:	0.512	percent:	14.1%
variables:	h 1	7	8	14	15
coefficients:	-0.0042 -0.0927	-0.5992	-0.2552	-0.2258	0.6805
12: number of model variables:	6	correlation:	0.538	percent:	15.7%
variables:	h 1	7	11	14	15
coefficients:	-0.0139 -0.1039	-0.6208	0.6507	-0.6849	0.7460

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 4.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 68

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.489	0.113
2	0.527	0.203
3	0.593	0.306
4	0.567	0.223
5	0.565	0.187
6	0.572	0.188
7	0.584	0.219
8	0.620	0.319
9	0.590	0.221
10	0.519	0.167
11	0.519	0.191
12	0.416	-0.011
MEAN	0.547	0.194

Table 4.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :	84.37	79.95	73.16	67.81	69.04	69.87	68.57	70.59	74.96	78.72	83.94	85.83
D _t :	3.99	4.55	5.65	5.17	5.02	4.88	5.12	5.89	5.10	4.18	3.90	3.14
S _s :	2.86	3.39	3.49	4.01	3.58	3.54	3.74	3.97	3.96	3.10	2.42	2.79

Table 4.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.544	percent:	16.1%
variables:	h 3		9 11 12 14		
coefficients:	-0.0052 -0.1003 -0.3322 0.6179 0.5601 0.9910				
2: number of model variables:	5	correlation:	0.561	percent:	17.2%
variables:	h 10		11 12 14		
coefficients:	-0.0018 0.3589 0.6390 0.3820 0.9700				
3: number of model variables:	4	correlation:	0.582	percent:	18.7%
variables:	h 4		11 14		
coefficients:	-0.0004 0.1870 0.5779 1.1404				
4: number of model variables:	4	correlation:	0.523	percent:	14.7%
variables:	h 4		11 14		
coefficients:	-0.0003 0.1880 0.4916 1.0533				
5: number of model variables:	3	correlation:	0.488	percent:	12.7%
variables:	h 4		11		
coefficients:	0.0071 0.2244 0.3878				
6: number of model variables:	3	correlation:	0.477	percent:	12.1%
variables:	h 4		11		
coefficients:	0.0084 0.2025 0.3007				
7: number of model variables:	3	correlation:	0.558	percent:	17.0%
variables:	h 4		11		
coefficients:	0.0095 0.3253 0.4566				
8: number of model variables:	3	correlation:	0.546	percent:	16.2%
variables:	h 4		11		
coefficients:	0.0074 0.2615 0.4794				
9: number of model variables:	5	correlation:	0.552	percent:	16.6%
variables:	h 4		10 11 14		
coefficients:	-0.0019 0.2813 -0.4228 0.6501 0.8834				
10: number of model variables:	5	correlation:	0.495	percent:	13.1%
variables:	h 3		4 11 12		
coefficients:	0.0069 -0.0791 0.1890 0.3735 0.3793				
11: number of model variables:	6	correlation:	0.562	percent:	17.3%
variables:	h 1		3 4 11 12		
coefficients:	0.0015 -0.0460 -0.1471 0.2356 0.4643 0.5016				
12: number of model variables:	6	correlation:	0.539	percent:	15.8%
variables:	h 2		3 11 12 14		
coefficients:	-0.0007 -0.1123 -0.1186 0.5590 0.4965 0.7608				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 4.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 35

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.463	0.018
2	0.527	0.157
3	0.598	0.240
4	0.539	0.058
5	0.553	0.059
6	0.578	0.052
7	0.595	0.069
8	0.641	0.267
9	0.598	0.176
10	0.543	0.089
11	0.537	0.125
12	0.416	-0.075
MEAN	0.549	0.103

Table 4.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.441	percent:	10.3%
variables:	h 1 4 5 8 12				
coefficients:	-0.0003 -0.0019 0.0127 0.0155 0.0094 -0.0215				
2: number of model variables:	6	correlation:	0.330	percent:	5.6%
variables:	h 1 2 4 5 12				
coefficients:	0.0000 -0.0020 -0.0029 0.0082 0.0090 -0.0197				
3: number of model variables:	5	correlation:	0.607	percent:	20.6%
variables:	h 2 7 13 15				
coefficients:	0.0008 -0.0067 -0.0152 -0.0136 0.0190				
4: number of model variables:	3	correlation:	0.665	percent:	25.3%
variables:	h 4 5				
coefficients:	0.0008 0.0098 0.0099				
5: number of model variables:	4	correlation:	0.676	percent:	26.3%
variables:	h 2 4 5				
coefficients:	0.0008 -0.0046 0.0101 0.0103				
6: number of model variables:	3	correlation:	0.675	percent:	26.2%
variables:	h 1 5				
coefficients:	0.0010 0.0021 0.0148				
7: number of model variables:	4	correlation:	0.676	percent:	26.3%
variables:	h 1 5 13				
coefficients:	0.0011 0.0026 0.0116 -0.0182				
8: number of model variables:	5	correlation:	0.634	percent:	22.6%
variables:	h 1 4 5 11				
coefficients:	0.0009 0.0031 0.0115 0.0148 -0.0139				
9: number of model variables:	5	correlation:	0.585	percent:	18.9%
variables:	h 1 4 5 8				
coefficients:	0.0007 0.0023 0.0112 0.0156 0.0086				
10: number of model variables:	6	correlation:	0.406	percent:	8.6%
variables:	h 2 4 5 7 12				
coefficients:	0.0001 -0.0043 0.0132 0.0149 -0.0066 -0.0144				
11: number of model variables:	6	correlation:	0.435	percent:	9.9%
variables:	h 2 4 5 6 12				
coefficients:	-0.0001 -0.0024 0.0133 0.0137 -0.0047 -0.0211				
12: number of model variables:	6	correlation:	0.480	percent:	12.3%
variables:	h 1 4 5 8 12				
coefficients:	-0.0003 -0.0012 0.0121 0.0159 0.0085 -0.0211				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 4.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 139

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.391	-0.040
2	0.416	-0.016
3	0.504	0.096
4	0.447	-0.017
5	0.467	0.038
6	0.453	0.061
7	0.451	0.056
8	0.489	0.098
9	0.483	0.103
10	0.413	0.009
11	0.449	0.075
12	0.307	-0.181
MEAN	0.439	0.024

Table 4.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.688 percent: 27.4%
 variables: h 2 3 5 9 13
 coefficients: 0.0041 -0.1794 -0.1096 0.1039 0.1982 -0.2751

2: number of model variables: 6 correlation: 0.552 percent: 16.6%
 variables: h 2 3 8 9 10
 coefficients: 0.0074 -0.1454 -0.1316 -0.2059 0.2120 0.1498

3: number of model variables: 5 correlation: 0.695 percent: 28.1%
 variables: h 8 9 10 12
 coefficients: 0.0097 -0.1550 0.3337 0.1740 0.2490

4: number of model variables: 5 correlation: 0.714 percent: 30.0%
 variables: h 8 9 10 12
 coefficients: 0.0103 -0.1444 0.4041 0.1842 0.2347

5: number of model variables: 6 correlation: 0.695 percent: 28.1%
 variables: h 6 8 9 10 15
 coefficients: 0.0091 0.1275 -0.1649 0.2495 0.1719 -0.2776

6: number of model variables: 4 correlation: 0.733 percent: 32.0%
 variables: h 6 9 10
 coefficients: 0.0102 0.1198 0.2242 0.1533

7: number of model variables: 5 correlation: 0.706 percent: 29.2%
 variables: h 3 6 9 10
 coefficients: 0.0091 0.0998 0.1679 0.3145 0.1635

8: number of model variables: 5 correlation: 0.625 percent: 22.0%
 variables: h 3 6 9 10
 coefficients: 0.0079 0.0705 0.1916 0.2755 0.1676

9: number of model variables: 5 correlation: 0.604 percent: 20.3%
 variables: h 1 8 9 10
 coefficients: 0.0080 0.0289 -0.2037 0.2395 0.1410

10: number of model variables: 6 correlation: 0.573 percent: 18.0%
 variables: h 2 3 6 9 10
 coefficients: 0.0054 -0.1097 -0.0544 0.1567 0.1891 0.1478

11: number of model variables: 6 correlation: 0.676 percent: 26.3%
 variables: h 2 3 8 9 13
 coefficients: 0.0045 -0.1670 -0.1250 -0.1661 0.1958 -0.1604

12: number of model variables: 6 correlation: 0.702 percent: 28.8%
 variables: h 2 3 5 8 10
 coefficients: 0.0041 -0.1982 -0.1825 0.1254 -0.1746 0.1459

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 4.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.386	-0.003
2	0.424	0.023
3	0.554	0.287
4	0.544	0.295
5	0.567	0.378
6	0.602	0.383
7	0.585	0.352
8	0.568	0.280
9	0.571	0.304
10	0.545	0.253
11	0.534	0.260
12	0.419	0.039
MEAN	0.525	0.238

Table 4.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.742 percent: 33.0%
variables: h 6 8 11 14
coefficients: -0.0024 0.0564 -0.2019 -0.2804 0.2301

2: number of model variables: 6 correlation: 0.638 percent: 23.0%
variables: h 6 8 11 14 15
coefficients: 0.0012 0.0755 -0.1571 -0.2294 0.2556 0.1511

3: number of model variables: 5 correlation: 0.760 percent: 35.0%
variables: h 6 7 8 11
coefficients: 0.0076 0.0983 -0.1784 -0.1989 -0.2394

4: number of model variables: 6 correlation: 0.793 percent: 39.1%
variables: h 6 8 10 11 15
coefficients: 0.0084 0.1074 -0.1251 0.1235 -0.3048 0.2322

5: number of model variables: 6 correlation: 0.799 percent: 39.8%
variables: h 4 5 7 8 10
coefficients: 0.0062 -0.0795 -0.0825 -0.1452 -0.1570 0.1508

6: number of model variables: 6 correlation: 0.782 percent: 37.6%
variables: h 4 5 7 8 10
coefficients: 0.0061 -0.0838 -0.0909 -0.1253 -0.1221 0.1926

7: number of model variables: 5 correlation: 0.809 percent: 41.3%
variables: h 3 4 5 10
coefficients: 0.0055 0.0676 -0.0711 -0.1203 0.1413

8: number of model variables: 6 correlation: 0.724 percent: 31.0%
variables: h 3 4 5 10 11
coefficients: 0.0046 0.0537 -0.0775 -0.1063 0.1974 -0.1982

9: number of model variables: 5 correlation: 0.673 percent: 26.1%
variables: h 3 6 11 15
coefficients: 0.0048 0.0556 0.0581 -0.1817 0.1936

10: number of model variables: 6 correlation: 0.646 percent: 23.7%
variables: h 8 9 11 14 15
coefficients: 0.0010 -0.1224 0.0488 -0.2091 0.1655 0.1190

11: number of model variables: 6 correlation: 0.721 percent: 30.7%
variables: h 1 8 10 11 14
coefficients: -0.0003 -0.0141 -0.2060 -0.0849 -0.2018 0.2483

12: number of model variables: 6 correlation: 0.773 percent: 36.6%
variables: h 2 5 8 11 14
coefficients: -0.0004 -0.0419 0.0586 -0.2346 -0.2287 0.2570

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 4.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 44

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.349	-0.050
2	0.395	0.056
3	0.512	0.255
4	0.526	0.242
5	0.541	0.293
6	0.528	0.236
7	0.563	0.317
8	0.582	0.317
9	0.527	0.253
10	0.510	0.265
11	0.436	0.130
12	0.346	-0.081
MEAN	0.485	0.186

Table 4.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.671	percent:	25.8%
variables:	h 2 7 8 11 12				
coefficients:	-0.0001 -0.0402 -0.1891 -0.2572 -0.4080 0.2887				
2: number of model variables:	6	correlation:	0.487	percent:	12.6%
variables:	h 1 2 7 9 15				
coefficients:	-0.0013 -0.0238 -0.0429 -0.3289 -0.1569 0.3637				
3: number of model variables:	6	correlation:	0.846	percent:	46.6%
variables:	h 1 2 8 11 12				
coefficients:	0.0072 -0.0179 -0.0472 -0.2192 -0.4023 0.3120				
4: number of model variables:	6	correlation:	0.888	percent:	54.1%
variables:	h 1 5 6 10 11				
coefficients:	0.0054 -0.0256 -0.1028 0.1560 0.2505 -0.5667				
5: number of model variables:	6	correlation:	0.922	percent:	61.3%
variables:	h 5 6 8 11 12				
coefficients:	0.0061 -0.1072 0.0847 -0.2920 -0.2915 0.2310				
6: number of model variables:	6	correlation:	0.906	percent:	57.6%
variables:	h 1 5 10 12 15				
coefficients:	0.0035 -0.0217 -0.1558 0.1905 0.2361 0.3738				
7: number of model variables:	6	correlation:	0.879	percent:	52.3%
variables:	h 5 6 9 12 15				
coefficients:	0.0038 -0.1342 0.1131 -0.1538 0.1693 0.2959				
8: number of model variables:	6	correlation:	0.831	percent:	44.4%
variables:	h 5 6 9 14 15				
coefficients:	0.0008 -0.0942 0.1804 -0.2680 0.2895 0.3795				
9: number of model variables:	6	correlation:	0.785	percent:	38.0%
variables:	h 1 2 3 12 15				
coefficients:	0.0012 -0.0252 -0.0449 0.0768 0.1985 0.3276				
10: number of model variables:	6	correlation:	0.562	percent:	17.3%
variables:	h 1 2 6 12 15				
coefficients:	-0.0006 -0.0249 -0.0542 -0.1187 0.3111 0.2911				
11: number of model variables:	6	correlation:	0.639	percent:	23.1%
variables:	h 1 2 8 11 12				
coefficients:	0.0000 -0.0306 -0.0480 -0.0884 -0.3173 0.2345				
12: number of model variables:	6	correlation:	0.682	percent:	26.8%
variables:	h 2 7 8 11 12				
coefficients:	0.0003 -0.0472 -0.1610 -0.2250 -0.3653 0.2847				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 4.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 31

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.298	-0.095
2	0.343	-0.006
3	0.488	0.240
4	0.516	0.265
5	0.554	0.400
6	0.535	0.340
7	0.589	0.426
8	0.553	0.352
9	0.522	0.275
10	0.485	0.231
11	0.411	0.106
12	0.329	-0.009
MEAN	0.469	0.210

Table 4.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.810	percent:	41.3%
variables:	h 4		8 12		
coefficients:	0.0070 -0.1772	0.2675	0.2355		
2: number of model variables:	4	correlation:	0.874	percent:	51.5%
variables:	h 4		12 15		
coefficients:	0.0078 -0.1717	0.2541	0.3037		
3: number of model variables:	4	correlation:	0.963	percent:	72.9%
variables:	h 1		4 12		
coefficients:	0.0165 0.0415	-0.0836	0.2132		
4: number of model variables:	4	correlation:	0.892	percent:	54.8%
variables:	h 4		5 15		
coefficients:	0.0110 -0.2347	-0.2178	0.4147		
5: number of model variables:	4	correlation:	0.878	percent:	52.1%
variables:	h 1		3 13		
coefficients:	0.0119 0.0566	0.1686	-0.3609		
6: number of model variables:	4	correlation:	0.939	percent:	65.6%
variables:	h 1		2 12		
coefficients:	0.0163 0.0916	0.1855	0.2782		
7: number of model variables:	4	correlation:	0.929	percent:	63.1%
variables:	h 1		2 12		
coefficients:	0.0192 0.1182	0.2154	0.3087		
8: number of model variables:	4	correlation:	0.913	percent:	59.2%
variables:	h 1		2 12		
coefficients:	0.0173 0.1178	0.2313	0.2875		
9: number of model variables:	4	correlation:	0.931	percent:	63.6%
variables:	h 1		3 13		
coefficients:	0.0142 0.0749	0.2031	-0.3196		
10: number of model variables:	4	correlation:	0.872	percent:	51.0%
variables:	h 4		12 15		
coefficients:	0.0059 -0.1302	0.2342	0.2876		
11: number of model variables:	4	correlation:	0.925	percent:	62.1%
variables:	h 8		12 14		
coefficients:	0.0068 0.3204	0.1913	0.1774		
12: number of model variables:	4	correlation:	0.771	percent:	36.4%
variables:	h 4		12 14		
coefficients:	0.0057 -0.1738	0.2346	0.2503		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 4.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 16

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.325	0.015
2	0.378	0.104
3	0.490	0.348
4	0.543	0.337
5	0.540	0.360
6	0.525	0.340
7	0.573	0.339
8	0.613	0.350
9	0.538	0.373
10	0.505	0.343
11	0.400	0.179
12	0.305	0.003
MEAN	0.478	0.258

Annex 5. Cloud Cover

Table 5.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.614 percent: 21.0%
 variables: h 1 4 9 11 13
 coefficients: -0.0011 0.0071 0.0232 -0.0373 0.0790 -0.0919

2: number of model variables: 6 correlation: 0.356 percent: 6.6%
 variables: h 3 6 9 11 13
 coefficients: -0.0014 -0.0119 -0.0251 -0.0616 0.0994 -0.0872

3: number of model variables: 3 correlation: 0.217 percent: 2.4%
 variables: h 9 15
 coefficients: 0.0004 -0.0424 -0.0592

4: number of model variables: 5 correlation: 0.286 percent: 4.2%
 variables: h 4 8 12 15
 coefficients: -0.0001 0.0230 0.0375 0.0577 -0.0485

5: number of model variables: 3 correlation: 0.221 percent: 2.5%
 variables: h 9 15
 coefficients: 0.0000 -0.0389 -0.0632

6: number of model variables: 2 correlation: 0.223 percent: 2.5%
 variables: h 15
 coefficients: 0.0009 -0.0606

7: number of model variables: 5 correlation: 0.331 percent: 5.6%
 variables: h 3 8 12 15
 coefficients: 0.0003 -0.0100 0.0473 0.0685 -0.0475

8: number of model variables: 4 correlation: 0.251 percent: 3.2%
 variables: h 3 7 15
 coefficients: 0.0016 -0.0113 -0.0287 -0.0534

9: number of model variables: 3 correlation: 0.210 percent: 2.2%
 variables: h 12 15
 coefficients: 0.0007 0.0325 -0.0490

10: number of model variables: 4 correlation: 0.208 percent: 2.2%
 variables: h 9 11 13
 coefficients: 0.0006 -0.0634 0.0514 -0.0988

11: number of model variables: 6 correlation: 0.043 percent: 0.1%
 variables: h 1 3 4 13 15
 coefficients: 0.0002 0.0061 -0.0126 0.0297 -0.0595 -0.0518

12: number of model variables: 5 correlation: 0.461 percent: 11.3%
 variables: h 1 9 11 13
 coefficients: -0.0006 0.0050 -0.0423 0.0641 -0.0818

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 5.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 66

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.690	0.578
2	0.766	0.646
3	0.748	0.569
4	0.708	0.501
5	0.736	0.503
6	0.699	0.437
7	0.733	0.516
8	0.751	0.522
9	0.777	0.605
10	0.771	0.595
11	0.729	0.574
12	0.711	0.596
MEAN	0.735	0.554

Table 5.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :	7.12	6.51	6.13	5.85	5.57	5.38	4.73	4.49	4.99	5.27	6.91	7.41
D _t :	0.91	1.14	0.95	0.81	0.87	0.76	0.81	0.93	1.07	1.09	0.95	0.87
S _s :	0.32	0.40	0.39	0.41	0.45	0.46	0.53	0.53	0.45	0.44	0.40	0.33

Table 5.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.482 percent: 12.4%
 variables: h 1 4 5 10 14
 coefficients: -0.0003 0.0066 0.0160 -0.0197 -0.0479 0.0482

2: number of model variables: 6 correlation: 0.628 percent: 22.2%
 variables: h 1 4 5 10 11
 coefficients: 0.0005 0.0039 0.0185 -0.0222 -0.0336 0.0155

3: number of model variables: 5 correlation: 0.638 percent: 23.0%
 variables: h 4 7 10 11
 coefficients: 0.0007 0.0173 -0.0294 -0.0358 -0.0113

4: number of model variables: 6 correlation: 0.630 percent: 22.3%
 variables: h 4 5 7 10 11
 coefficients: 0.0005 0.0215 -0.0167 -0.0323 -0.0587 -0.0207

5: number of model variables: 6 correlation: 0.694 percent: 28.0%
 variables: h 7 9 10 11 15
 coefficients: 0.0007 -0.0471 -0.0319 -0.0447 -0.0252 0.0558

6: number of model variables: 5 correlation: 0.721 percent: 30.7%
 variables: h 7 10 11 15
 coefficients: 0.0007 -0.0486 -0.0331 -0.0208 0.0519

7: number of model variables: 5 correlation: 0.742 percent: 33.0%
 variables: h 1 7 9 15
 coefficients: 0.0012 0.0041 -0.0423 -0.0412 0.0483

8: number of model variables: 5 correlation: 0.789 percent: 38.6%
 variables: h 1 7 9 15
 coefficients: 0.0012 0.0054 -0.0499 -0.0492 0.0563

9: number of model variables: 6 correlation: 0.785 percent: 38.0%
 variables: h 1 7 9 10 15
 coefficients: 0.0012 0.0066 -0.0499 -0.0465 -0.0290 0.0645

10: number of model variables: 6 correlation: 0.766 percent: 35.7%
 variables: h 1 7 9 10 15
 coefficients: 0.0010 0.0073 -0.0368 -0.0508 -0.0294 0.0662

11: number of model variables: 6 correlation: 0.471 percent: 11.8%
 variables: h 3 4 5 7 10
 coefficients: 0.0000 -0.0062 0.0198 -0.0227 -0.0271 -0.0449

12: number of model variables: 6 correlation: 0.494 percent: 13.0%
 variables: h 1 2 10 13 14
 coefficients: -0.0001 0.0095 -0.0173 -0.0478 -0.0307 0.0820

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 5.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 38

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.686	0.571
2	0.756	0.676
3	0.757	0.641
4	0.713	0.547
5	0.728	0.540
6	0.703	0.539
7	0.727	0.570
8	0.778	0.660
9	0.786	0.669
10	0.752	0.613
11	0.727	0.596
12	0.688	0.570
MEAN	0.733	0.599

Table 5.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.581	percent:	18.6%
variables:	h 3		8 9 13 14		
coefficients:	-0.0004 0.0070	0.0116 0.0130	0.0147	0.0223	
2: number of model variables:	6	correlation:	0.461	percent:	11.3%
variables:	h 2		3 7 11 14		
coefficients:	0.0001 -0.0029	0.0042 -0.0120	0.0135	0.0176	
3: number of model variables:	6	correlation:	0.689	percent:	27.5%
variables:	h 1		3 11 13 14		
coefficients:	0.0003 -0.0010	0.0035 0.0131	0.0132	0.0143	
4: number of model variables:	4	correlation:	0.719	percent:	30.5%
variables:	h 3		11 14		
coefficients:	0.0005 0.0041	0.0141	0.0129		
5: number of model variables:	3	correlation:	0.737	percent:	32.4%
variables:	h 3		11		
coefficients:	0.0006 0.0053	0.0176			
6: number of model variables:	4	correlation:	0.756	percent:	34.6%
variables:	h 3		8 14		
coefficients:	0.0008 0.0056	0.0113	0.0220		
7: number of model variables:	3	correlation:	0.734	percent:	32.1%
variables:	h 3		14		
coefficients:	0.0009 0.0048	0.0159			
8: number of model variables:	3	correlation:	0.700	percent:	28.6%
variables:	h 3		11		
coefficients:	0.0008 0.0042	0.0157			
9: number of model variables:	4	correlation:	0.706	percent:	29.2%
variables:	h 3		11 14		
coefficients:	0.0006 0.0059	0.0138	0.0127		
10: number of model variables:	6	correlation:	0.541	percent:	15.9%
variables:	h 2		3 11 12 14		
coefficients:	0.0003 -0.0034	0.0033 0.0162	-0.0132	0.0158	
11: number of model variables:	5	correlation:	0.393	percent:	8.1%
variables:	h 3		9 12 15		
coefficients:	-0.0001 0.0042	0.0065 -0.0130	0.0136		
12: number of model variables:	6	correlation:	0.600	percent:	20.0%
variables:	h 3		5 8 9 14		
coefficients:	-0.0004 0.0088	0.0061 0.0139	0.0145	0.0142	

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 5.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 110

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.726	0.575
2	0.763	0.649
3	0.749	0.619
4	0.716	0.546
5	0.738	0.538
6	0.699	0.465
7	0.721	0.482
8	0.767	0.562
9	0.792	0.660
10	0.765	0.630
11	0.738	0.582
12	0.713	0.558
MEAN	0.741	0.572

Table 5.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.785 percent: 38.0%
variables: h 1 2 4 6 9
coefficients: -0.0005 -0.0060 -0.0223 -0.0133 0.0234 0.0169

2: number of model variables: 4 correlation: 0.428 percent: 9.6%
variables: h 1 2 12
coefficients: -0.0001 -0.0022 -0.0058 0.0198

3: number of model variables: 2 correlation: 0.420 percent: 9.2%
variables: h 12
coefficients: 0.0004 0.0194

4: number of model variables: 4 correlation: 0.442 percent: 10.3%
variables: h 4 10 14
coefficients: 0.0008 0.0175 -0.0160 -0.0425

5: number of model variables: 4 correlation: 0.451 percent: 10.7%
variables: h 5 12 13
coefficients: 0.0005 -0.0188 0.0277 0.0288

6: number of model variables: 5 correlation: 0.472 percent: 11.8%
variables: h 1 5 12 13
coefficients: 0.0008 0.0033 -0.0184 0.0225 0.0249

7: number of model variables: 5 correlation: 0.502 percent: 13.5%
variables: h 1 3 5 13
coefficients: 0.0008 0.0040 0.0126 -0.0194 0.0339

8: number of model variables: 6 correlation: 0.500 percent: 13.4%
variables: h 2 3 5 12 13
coefficients: 0.0000 0.0160 0.0266 -0.0306 0.0423 0.0414

9: number of model variables: 3 correlation: 0.504 percent: 13.6%
variables: h 1 15
coefficients: 0.0009 0.0037 -0.0347

10: number of model variables: 6 correlation: 0.398 percent: 8.3%
variables: h 3 5 9 12 13
coefficients: -0.0001 0.0148 -0.0213 0.0238 0.0235 0.0251

11: number of model variables: 6 correlation: 0.694 percent: 28.0%
variables: h 2 4 8 9 12
coefficients: -0.0001 -0.0158 -0.0081 -0.0201 0.0236 0.0162

12: number of model variables: 6 correlation: 0.808 percent: 41.1%
variables: h 1 2 4 6 9
coefficients: -0.0004 -0.0049 -0.0228 -0.0110 0.0236 0.0293

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 5.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 50

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.721	0.595
2	0.748	0.649
3	0.714	0.548
4	0.703	0.492
5	0.723	0.459
6	0.697	0.399
7	0.704	0.416
8	0.677	0.393
9	0.748	0.588
10	0.752	0.611
11	0.710	0.582
12	0.693	0.558
MEAN	0.716	0.524

Table 5.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.589	percent:	19.2%
variables:	h 1		6 8 10 13		
coefficients:	-0.0007 -0.0019		0.0087 -0.0101 0.0133 0.0350		
2: number of model variables:	4	correlation:	0.472	percent:	11.8%
variables:	h 1		3 13		
coefficients:	-0.0002 -0.0023		0.0078 0.0252		
3: number of model variables:	6	correlation:	0.666	percent:	25.4%
variables:	h 3		6 7 8 13		
coefficients:	0.0005 0.0089		0.0111 -0.0188 0.0101 0.0236		
4: number of model variables:	6	correlation:	0.692	percent:	27.8%
variables:	h 2		6 7 8 13		
coefficients:	0.0007 0.0061		0.0159 -0.0307 0.0098 0.0360		
5: number of model variables:	6	correlation:	0.761	percent:	35.1%
variables:	h 2		6 7 8 13		
coefficients:	0.0009 0.0082		0.0201 -0.0276 0.0138 0.0338		
6: number of model variables:	6	correlation:	0.760	percent:	35.0%
variables:	h 2		6 7 8 13		
coefficients:	0.0009 0.0075		0.0218 -0.0295 0.0114 0.0331		
7: number of model variables:	6	correlation:	0.739	percent:	32.7%
variables:	h 3		6 7 8 14		
coefficients:	0.0012 0.0083		0.0210 -0.0398 0.0197 -0.0508		
8: number of model variables:	6	correlation:	0.719	percent:	30.5%
variables:	h 1		2 6 7 14		
coefficients:	0.0015 0.0042		0.0049 0.0255 -0.0504 -0.0510		
9: number of model variables:	5	correlation:	0.727	percent:	31.3%
variables:	h 2		6 7 13		
coefficients:	0.0007 0.0075		0.0219 -0.0405 0.0365		
10: number of model variables:	6	correlation:	0.604	percent:	20.3%
variables:	h 3		6 7 11 14		
coefficients:	0.0005 0.0054		0.0203 -0.0291 -0.0202 -0.0329		
11: number of model variables:	6	correlation:	0.412	percent:	8.9%
variables:	h 2		3 6 11 14		
coefficients:	0.0000 -0.0046		0.0077 0.0126 -0.0180 -0.0219		
12: number of model variables:	6	correlation:	0.609	percent:	20.7%
variables:	h 2		6 8 10 13		
coefficients:	-0.0005 -0.0048		0.0077 -0.0127 0.0166 0.0283		

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 5.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.649	0.474
2	0.716	0.583
3	0.679	0.498
4	0.683	0.451
5	0.690	0.453
6	0.657	0.375
7	0.704	0.439
8	0.644	0.348
9	0.715	0.526
10	0.724	0.574
11	0.640	0.457
12	0.656	0.507
MEAN	0.680	0.474

Table 5.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.536 percent: 15.6%
 variables: h 1 2 6 12 14
 coefficients: -0.0001 -0.0028 -0.0086 -0.0150 0.0238 -0.0525

2: number of model variables: 6 correlation: 0.515 percent: 14.3%
 variables: h 1 6 9 12 14
 coefficients: 0.0001 -0.0045 -0.0206 0.0168 0.0155 -0.0410

3: number of model variables: 6 correlation: 0.710 percent: 29.5%
 variables: h 1 4 11 13 15
 coefficients: -0.0001 -0.0025 0.0105 0.0212 0.0592 0.0256

4: number of model variables: 6 correlation: 0.752 percent: 34.1%
 variables: h 2 3 8 11 13
 coefficients: 0.0005 0.0114 -0.0179 0.0166 0.0431 0.0587

5: number of model variables: 5 correlation: 0.775 percent: 36.8%
 variables: h 2 9 11 13
 coefficients: 0.0006 0.0085 0.0131 0.0299 0.0537

6: number of model variables: 5 correlation: 0.725 percent: 31.2%
 variables: h 2 9 11 13
 coefficients: 0.0007 0.0071 0.0124 0.0280 0.0402

7: number of model variables: 6 correlation: 0.753 percent: 34.3%
 variables: h 2 3 11 13 15
 coefficients: 0.0005 0.0087 -0.0144 0.0451 0.0620 0.0349

8: number of model variables: 6 correlation: 0.794 percent: 39.2%
 variables: h 2 3 6 11 13
 coefficients: 0.0003 0.0154 -0.0207 0.0213 0.0363 0.0727

9: number of model variables: 6 correlation: 0.835 percent: 45.0%
 variables: h 2 3 6 7 13
 coefficients: 0.0003 0.0112 -0.0130 0.0236 -0.0161 0.0584

10: number of model variables: 6 correlation: 0.701 percent: 28.7%
 variables: h 3 9 10 13 14
 coefficients: 0.0003 -0.0062 0.0197 0.0144 0.0309 -0.0650

11: number of model variables: 6 correlation: 0.640 percent: 23.2%
 variables: h 2 6 12 14 15
 coefficients: 0.0003 -0.0104 -0.0105 0.0280 -0.0617 0.0293

12: number of model variables: 6 correlation: 0.623 percent: 21.8%
 variables: h 2 6 12 14 15
 coefficients: 0.0000 -0.0121 -0.0157 0.0339 -0.0665 0.0254

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 5.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 40

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.650	0.486
2	0.694	0.562
3	0.666	0.492
4	0.699	0.506
5	0.701	0.515
6	0.672	0.433
7	0.712	0.513
8	0.629	0.426
9	0.704	0.598
10	0.710	0.588
11	0.619	0.478
12	0.647	0.495
MEAN	0.675	0.508

Table 5.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.846	percent:	46.7%
variables:	h 3		12 15		
coefficients:	0.0007 -0.0139	0.0415 -0.0672			
2: number of model variables:	4	correlation:	0.813	percent:	41.8%
variables:	h 9		12 15		
coefficients:	0.0009 0.0202	0.0256 -0.0407			
3: number of model variables:	4	correlation:	0.861	percent:	49.2%
variables:	h 2		8 9		
coefficients:	0.0005 0.0254	0.0624 0.0672			
4: number of model variables:	4	correlation:	0.813	percent:	41.8%
variables:	h 2		5 9		
coefficients:	0.0006 0.0218	0.0236 0.0561			
5: number of model variables:	4	correlation:	0.798	percent:	39.8%
variables:	h 2		5 9		
coefficients:	0.0006 0.0193	0.0247 0.0502			
6: number of model variables:	4	correlation:	0.820	percent:	42.7%
variables:	h 2		5 9		
coefficients:	0.0007 0.0178	0.0321 0.0417			
7: number of model variables:	4	correlation:	0.781	percent:	37.6%
variables:	h 2		5 9		
coefficients:	0.0008 0.0160	0.0282 0.0498			
8: number of model variables:	4	correlation:	0.785	percent:	38.1%
variables:	h 2		6 9		
coefficients:	0.0004 0.0223	0.0287 0.0359			
9: number of model variables:	4	correlation:	0.824	percent:	43.3%
variables:	h 2		5 9		
coefficients:	0.0009 0.0160	0.0253 0.0565			
10: number of model variables:	4	correlation:	0.805	percent:	40.6%
variables:	h 5		9 12		
coefficients:	0.0009 0.0221	0.0361 0.0261			
11: number of model variables:	4	correlation:	0.831	percent:	44.4%
variables:	h 2		11 12		
coefficients:	0.0008 -0.0219	0.0393 0.0396			
12: number of model variables:	4	correlation:	0.757	percent:	34.6%
variables:	h 2		11 12		
coefficients:	0.0004 -0.0252	0.0378 0.0371			

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 5.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.609	0.468
2	0.689	0.595
3	0.675	0.564
4	0.701	0.525
5	0.716	0.554
6	0.665	0.461
7	0.747	0.592
8	0.662	0.466
9	0.718	0.565
10	0.718	0.597
11	0.618	0.482
12	0.611	0.493
MEAN	0.677	0.530

Annex 7. Surface air pressure

Table 7.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.988	percent:	84.6%
variables:	h 1		3 6		
coefficients:	-0.0922 0.6099		0.2567 -0.9350		
2: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0910 0.6063		0.2534 -0.9238		
3: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0888 0.5993		0.2564 -0.9091		
4: number of model variables:	4	correlation:	0.989	percent:	84.9%
variables:	h 1		3 6		
coefficients:	-0.0864 0.5848		0.2479 -0.8860		
5: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0846 0.5749		0.2399 -0.8622		
6: number of model variables:	4	correlation:	0.988	percent:	84.7%
variables:	h 1		3 6		
coefficients:	-0.0841 0.5694		0.2352 -0.8552		
7: number of model variables:	4	correlation:	0.988	percent:	84.7%
variables:	h 1		3 6		
coefficients:	-0.0834 0.5638		0.2381 -0.8629		
8: number of model variables:	4	correlation:	0.988	percent:	84.6%
variables:	h 1		3 6		
coefficients:	-0.0837 0.5656		0.2326 -0.8565		
9: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0855 0.5768		0.2388 -0.8849		
10: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0883 0.5895		0.2344 -0.8907		
11: number of model variables:	4	correlation:	0.988	percent:	84.7%
variables:	h 1		3 6		
coefficients:	-0.0907 0.5978		0.2446 -0.9169		
12: number of model variables:	4	correlation:	0.988	percent:	84.8%
variables:	h 1		3 6		
coefficients:	-0.0921 0.6085		0.2448 -0.9304		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 7.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 41

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.965	0.402
2	0.962	0.329
3	0.956	0.195
4	0.934	-0.212
5	0.937	-0.215
6	0.919	-0.545
7	0.903	-0.703
8	0.910	-0.768
9	0.935	-0.203
10	0.954	0.088
11	0.951	0.093
12	0.962	0.371
MEAN	0.941	-0.097

Table 7.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :1000.1	997.9	996.4	993.8	995.0	995.3	995.7	996.1	998.0	999.6	998.2	999.0	
D _t :	4.9	4.7	3.6	2.3	2.3	1.8	1.6	1.5	2.3	3.2	3.3	4.7
S _s :	17.6	17.5	17.3	16.8	16.5	16.3	16.2	16.2	16.6	16.9	17.2	17.5

Table 7.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation: 1.000	percent: 97.9%
variables:	h		
coefficients:	-0.1167		
2: number of model variables:	1	correlation: 1.000	percent: 97.9%
variables:	h		
coefficients:	-0.1159		
3: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1145		
4: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1123		
5: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1104		
6: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1091		
7: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1083		
8: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1085		
9: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1101		
10: number of model variables:	1	correlation: 1.000	percent: 97.5%
variables:	h		
coefficients:	-0.1121		
11: number of model variables:	1	correlation: 1.000	percent: 97.6%
variables:	h		
coefficients:	-0.1141		
12: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1161		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 7.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 25

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.952	0.856
2	0.947	0.845
3	0.940	0.797
4	0.921	0.712
5	0.931	0.725
6	0.921	0.637
7	0.903	0.604
8	0.900	0.640
9	0.928	0.699
10	0.942	0.769
11	0.923	0.748
12	0.948	0.847
MEAN	0.930	0.740

Table 7.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation: 0.996	percent: 91.2%
variables:	h		
coefficients:	-0.113		
2: number of model variables:	1	correlation: 0.996	percent: 91.2%
variables:	h		
coefficients:	-0.112		
3: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.111		
4: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.109		
5: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.107		
6: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.106		
7: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.105		
8: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.105		
9: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.107		
10: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.109		
11: number of model variables:	1	correlation: 0.996	percent: 91.3%
variables:	h		
coefficients:	-0.110		
12: number of model variables:	1	correlation: 0.996	percent: 91.2%
variables:	h		
coefficients:	-0.112		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 7.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 137

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.953	0.632
2	0.949	0.638
3	0.941	0.537
4	0.917	0.281
5	0.928	0.315
6	0.919	0.178
7	0.901	0.057
8	0.901	0.004
9	0.931	0.318
10	0.941	0.449
11	0.929	0.441
12	0.953	0.602
MEAN	0.930	0.371

Table 7.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.935 percent: 64.5%
variables: h 2 4 7 10
coefficients: -0.0880 -0.6213 -0.7771 -2.2992 -1.2564

2: number of model variables: 5 correlation: 0.935 percent: 64.6%
variables: h 2 4 7 10
coefficients: -0.0876 -0.6153 -0.7774 -2.2945 -1.2565

3: number of model variables: 5 correlation: 0.935 percent: 64.6%
variables: h 2 4 7 10
coefficients: -0.0865 -0.6011 -0.7680 -2.2728 -1.2498

4: number of model variables: 5 correlation: 0.935 percent: 64.5%
variables: h 2 4 7 10
coefficients: -0.0845 -0.5877 -0.7566 -2.2292 -1.2230

5: number of model variables: 5 correlation: 0.935 percent: 64.5%
variables: h 2 4 7 10
coefficients: -0.0829 -0.5784 -0.7423 -2.1945 -1.2007

6: number of model variables: 5 correlation: 0.935 percent: 64.4%
variables: h 2 4 7 10
coefficients: -0.0821 -0.5710 -0.7352 -2.1685 -1.1863

7: number of model variables: 5 correlation: 0.934 percent: 64.4%
variables: h 2 4 7 10
coefficients: -0.0815 -0.5657 -0.7268 -2.1536 -1.1788

8: number of model variables: 5 correlation: 0.935 percent: 64.4%
variables: h 2 4 7 10
coefficients: -0.0818 -0.5685 -0.7321 -2.1565 -1.1800

9: number of model variables: 5 correlation: 0.935 percent: 64.5%
variables: h 2 4 7 10
coefficients: -0.0832 -0.5772 -0.7393 -2.1904 -1.2000

10: number of model variables: 5 correlation: 0.935 percent: 64.5%
variables: h 2 4 7 10
coefficients: -0.0847 -0.5910 -0.7535 -2.2249 -1.2149

11: number of model variables: 5 correlation: 0.935 percent: 64.6%
variables: h 2 4 7 10
coefficients: -0.0862 -0.6055 -0.7629 -2.2537 -1.2323

12: number of model variables: 5 correlation: 0.935 percent: 64.6%
variables: h 2 4 7 10
coefficients: -0.0875 -0.6167 -0.7755 -2.2874 -1.2505

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 7.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 47

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.962	-0.778
2	0.958	-0.874
3	0.950	-1.413
4	0.936	-2.685
5	0.942	-2.375
6	0.934	-2.906
7	0.934	-3.230
8	0.924	-3.755
9	0.945	-2.222
10	0.950	-1.449
11	0.947	-1.632
12	0.965	-0.791
MEAN	0.946	-2.009

Table 7.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	5	correlation:	0.984	percent:	82.3%
variables:	h 2	3	4	14	
coefficients:	-0.1013 -0.7342	1.1094 -1.1606	5.8407		
2: number of model variables:	5	correlation:	0.984	percent:	82.3%
variables:	h 2	3	4	14	
coefficients:	-0.1008 -0.7245	1.1020 -1.1545	5.8343		
3: number of model variables:	5	correlation:	0.984	percent:	82.4%
variables:	h 2	3	4	14	
coefficients:	-0.0994 -0.7155	1.0894 -1.1394	5.8218		
4: number of model variables:	5	correlation:	0.985	percent:	82.5%
variables:	h 2	3	4	14	
coefficients:	-0.0973 -0.6957	1.0623 -1.1108	5.7146		
5: number of model variables:	5	correlation:	0.985	percent:	82.6%
variables:	h 2	3	4	14	
coefficients:	-0.0959 -0.6815	1.0436 -1.0956	5.6182		
6: number of model variables:	5	correlation:	0.984	percent:	82.5%
variables:	h 2	3	4	14	
coefficients:	-0.0949 -0.6732	1.0293 -1.0778	5.5515		
7: number of model variables:	5	correlation:	0.984	percent:	82.4%
variables:	h 2	3	4	14	
coefficients:	-0.0942 -0.6686	1.0216 -1.0649	5.5032		
8: number of model variables:	5	correlation:	0.985	percent:	82.5%
variables:	h 2	3	4	14	
coefficients:	-0.0944 -0.6693	1.0221 -1.0726	5.5232		
9: number of model variables:	5	correlation:	0.984	percent:	82.5%
variables:	h 2	3	4	14	
coefficients:	-0.0960 -0.6858	1.0465 -1.0986	5.6060		
10: number of model variables:	5	correlation:	0.984	percent:	82.4%
variables:	h 2	3	4	14	
coefficients:	-0.0976 -0.7027	1.0661 -1.1238	5.6833		
11: number of model variables:	5	correlation:	0.984	percent:	82.4%
variables:	h 2	3	4	14	
coefficients:	-0.0995 -0.7156	1.0819 -1.1423	5.7141		
12: number of model variables:	5	correlation:	0.984	percent:	82.3%
variables:	h 2	3	4	14	
coefficients:	-0.1009 -0.7318	1.1043 -1.1604	5.8033		

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 7.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 26

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.950	-0.747
2	0.950	-0.750
3	0.942	-1.225
4	0.926	-2.476
5	0.929	-2.385
6	0.914	-3.321
7	0.914	-3.714
8	0.904	-3.902
9	0.930	-2.382
10	0.943	-1.373
11	0.936	-1.510
12	0.954	-0.720
MEAN	0.933	-2.042

Table 7.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation:	0.999	percent:	96.5%
variables:	h				
coefficients:	-0.1137				
2: number of model variables:	1	correlation:	0.999	percent:	96.6%
variables:	h				
coefficients:	-0.1133				
3: number of model variables:	1	correlation:	0.999	percent:	96.8%
variables:	h				
coefficients:	-0.1121				
4: number of model variables:	1	correlation:	1.000	percent:	96.9%
variables:	h				
coefficients:	-0.1101				
5: number of model variables:	1	correlation:	1.000	percent:	96.9%
variables:	h				
coefficients:	-0.1084				
6: number of model variables:	1	correlation:	1.000	percent:	96.9%
variables:	h				
coefficients:	-0.1071				
7: number of model variables:	1	correlation:	1.000	percent:	97.0%
variables:	h				
coefficients:	-0.1063				
8: number of model variables:	1	correlation:	1.000	percent:	97.0%
variables:	h				
coefficients:	-0.1066				
9: number of model variables:	1	correlation:	1.000	percent:	96.9%
variables:	h				
coefficients:	-0.1082				
10: number of model variables:	1	correlation:	0.999	percent:	96.8%
variables:	h				
coefficients:	-0.1099				
11: number of model variables:	1	correlation:	0.999	percent:	96.7%
variables:	h				
coefficients:	-0.1116				
12: number of model variables:	1	correlation:	0.999	percent:	96.5%
variables:	h				
coefficients:	-0.1131				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 7.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 22

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.947	0.702
2	0.944	0.702
3	0.940	0.663
4	0.929	0.516
5	0.930	0.542
6	0.920	0.388
7	0.924	0.438
8	0.908	0.381
9	0.933	0.526
10	0.945	0.626
11	0.935	0.575
12	0.955	0.694
MEAN	0.934	0.563

Table 7.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation: 1.000	percent: 97.5%
variables:	h		
coefficients:	-0.1180		
2: number of model variables:	1	correlation: 1.000	percent: 97.9%
variables:	h		
coefficients:	-0.1174		
3: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1155		
4: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1129		
5: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1113		
6: number of model variables:	1	correlation: 1.000	percent: 97.7%
variables:	h		
coefficients:	-0.1104		
7: number of model variables:	1	correlation: 1.000	percent: 97.6%
variables:	h		
coefficients:	-0.1094		
8: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1095		
9: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1115		
10: number of model variables:	1	correlation: 1.000	percent: 97.8%
variables:	h		
coefficients:	-0.1136		
11: number of model variables:	1	correlation: 1.000	percent: 97.6%
variables:	h		
coefficients:	-0.1158		
12: number of model variables:	1	correlation: 1.000	percent: 97.6%
variables:	h		
coefficients:	-0.1176		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 7.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 10

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.938	0.704
2	0.932	0.738
3	0.931	0.689
4	0.919	0.552
5	0.919	0.584
6	0.907	0.435
7	0.910	0.316
8	0.895	0.397
9	0.918	0.577
10	0.939	0.668
11	0.916	0.632
12	0.939	0.723
MEAN	0.922	0.585

Annex 8. Sunshine duration

Table 8.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.437	percent:	10.0%
variables:	h 2	7	9	11	15
coefficients:	0.0003	0.0106	0.0347	-0.0216	-0.0367 -0.0362
2: number of model variables:	5	correlation:	0.285	percent:	4.1%
variables:	h 2	6	9	14	
coefficients:	-0.0003	0.0191	-0.0161	-0.0228	0.0511
3: number of model variables:	3	correlation:	0.489	percent:	12.8%
variables:	h 7	14			
coefficients:	-0.0006	-0.0699	0.0452		
4: number of model variables:	5	correlation:	0.598	percent:	19.9%
variables:	h 1	4	14	15	
coefficients:	-0.0021	0.0092	0.0375	0.0871	-0.0797
5: number of model variables:	6	correlation:	0.701	percent:	28.7%
variables:	h 1	2	4	14	15
coefficients:	-0.0024	0.0138	0.0171	0.0437	0.1354 -0.1126
6: number of model variables:	4	correlation:	0.684	percent:	27.1%
variables:	h 1	9	15		
coefficients:	-0.0052	0.0119	-0.0487	-0.1295	
7: number of model variables:	5	correlation:	0.699	percent:	28.5%
variables:	h 1	4	14	15	
coefficients:	-0.0045	0.0142	0.0466	0.0928	-0.1443
8: number of model variables:	3	correlation:	0.691	percent:	27.8%
variables:	h 1	15			
coefficients:	-0.0047	0.0101	-0.0965		
9: number of model variables:	5	correlation:	0.606	percent:	20.5%
variables:	h 1	2	14	15	
coefficients:	-0.0019	0.0100	0.0209	0.0745	-0.0849
10: number of model variables:	4	correlation:	0.491	percent:	12.9%
variables:	h 2	6	12		
coefficients:	-0.0023	0.0128	-0.0228	0.0512	
11: number of model variables:	5	correlation:	0.365	percent:	6.9%
variables:	h 2	6	7	15	
coefficients:	-0.0016	0.0233	-0.0232	0.0408	-0.0274
12: number of model variables:	5	correlation:	0.482	percent:	12.4%
variables:	h 2	7	11	15	
coefficients:	0.0000	0.0096	0.0311	-0.0278	-0.0402

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 8.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 50

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.674	0.563
2	0.781	0.675
3	0.797	0.680
4	0.768	0.642
5	0.781	0.657
6	0.737	0.537
7	0.740	0.541
8	0.781	0.623
9	0.805	0.694
10	0.784	0.673
11	0.746	0.621
12	0.688	0.566
MEAN	0.757	0.623

Table 8.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E :	62.7	93.1	143.4	186.9	239.6	250.3	275.3	257.5	191.8	148.8	73.8	50.1
D _t :	21.1	29.4	34.1	32.7	39.6	35.5	34.9	37.5	36.3	32.7	24.1	18.7
S _s :	6.5	8.4	11.8	14.1	18.1	22.9	24.9	21.4	15.5	13.3	10.1	6.6

Table 8.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	5	correlation:	0.634	percent:	22.7%
variables:	h 4		10 13		14
coefficients:	-0.0001 -0.0288		0.0240 0.0760		0.0640
2: number of model variables:	5	correlation:	0.522	percent:	14.7%
variables:	h 4		6 10		15
coefficients:	-0.0003 -0.0284		-0.0122 0.0290		0.0384
3: number of model variables:	5	correlation:	0.770	percent:	36.2%
variables:	h 1		4 8		10
coefficients:	-0.0007 -0.0062		-0.0253 0.0321		0.0392
4: number of model variables:	5	correlation:	0.852	percent:	47.6%
variables:	h 1		4 10		15
coefficients:	-0.0013 -0.0057		-0.0349 0.0442		0.0640
5: number of model variables:	5	correlation:	0.815	percent:	42.1%
variables:	h 1		4 10		13
coefficients:	-0.0018 -0.0140		-0.0323 0.0375		0.0877
6: number of model variables:	5	correlation:	0.851	percent:	47.4%
variables:	h 1		4 10		13
coefficients:	-0.0016 -0.0130		-0.0540 0.0869		0.1170
7: number of model variables:	5	correlation:	0.676	percent:	26.3%
variables:	h 1		4 10		13
coefficients:	-0.0013 -0.0088		-0.0400 0.0411		0.1496
8: number of model variables:	5	correlation:	0.647	percent:	23.7%
variables:	h 1		9 10		14
coefficients:	-0.0002 -0.0200		0.1381 0.0571		-0.2340
9: number of model variables:	5	correlation:	0.740	percent:	32.7%
variables:	h 1		4 10		13
coefficients:	-0.0009 -0.0055		-0.0329 0.0419		0.0873
10: number of model variables:	5	correlation:	0.624	percent:	21.8%
variables:	h 3		4 6		10
coefficients:	-0.0011 0.0196		-0.0461 -0.0402		0.0671
11: number of model variables:	5	correlation:	0.397	percent:	8.2%
variables:	h 1		4 7		13
coefficients:	-0.0002 -0.0043		-0.0235 -0.0241		0.0534
12: number of model variables:	5	correlation:	0.696	percent:	28.2%
variables:	h 4		10 13		14
coefficients:	-0.0001 -0.0316		0.0239 0.0868		0.0719

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 8.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 28

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.680	0.553
2	0.765	0.672
3	0.791	0.710
4	0.760	0.681
5	0.768	0.634
6	0.732	0.607
7	0.722	0.511
8	0.786	0.623
9	0.796	0.674
10	0.759	0.588
11	0.738	0.580
12	0.652	0.517
MEAN	0.746	0.613

Table 8.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.717 percent: 30.3%
variables: h 2 3 4 15
coefficients: 0.0006 -0.0047 -0.0073 -0.0107 0.0236

2: number of model variables: 6 correlation: 0.537 percent: 15.6%
variables: h 3 4 7 13 15
coefficients: 0.0000 -0.0054 -0.0092 0.0103 0.0095 0.0227

3: number of model variables: 6 correlation: 0.745 percent: 33.3%
variables: h 1 4 10 12 15
coefficients: -0.0003 0.0016 -0.0131 -0.0170 0.0189 0.0345

4: number of model variables: 4 correlation: 0.856 percent: 48.4%
variables: h 1 4 15
coefficients: -0.0013 -0.0037 -0.0149 0.0268

5: number of model variables: 4 correlation: 0.865 percent: 49.9%
variables: h 1 10 11
coefficients: -0.0017 -0.0052 -0.0243 0.0227

6: number of model variables: 4 correlation: 0.855 percent: 48.1%
variables: h 1 10 11
coefficients: -0.0021 -0.0064 -0.0418 0.0287

7: number of model variables: 3 correlation: 0.823 percent: 43.2%
variables: h 1 10
coefficients: -0.0021 -0.0070 -0.0293

8: number of model variables: 3 correlation: 0.817 percent: 42.4%
variables: h 1 11
coefficients: -0.0018 -0.0060 0.0302

9: number of model variables: 5 correlation: 0.821 percent: 43.0%
variables: h 1 4 10 15
coefficients: -0.0012 -0.0037 -0.0143 -0.0141 0.0345

10: number of model variables: 6 correlation: 0.611 percent: 20.8%
variables: h 4 7 10 12 15
coefficients: -0.0002 -0.0138 0.0096 -0.0111 0.0250 0.0305

11: number of model variables: 6 correlation: 0.613 percent: 21.0%
variables: h 2 3 4 12 15
coefficients: 0.0003 -0.0037 -0.0045 -0.0172 0.0209 0.0225

12: number of model variables: 5 correlation: 0.731 percent: 31.7%
variables: h 2 3 4 15
coefficients: 0.0006 -0.0043 -0.0083 -0.0117 0.0217

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 8.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 112

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.700	0.558
2	0.744	0.637
3	0.764	0.650
4	0.750	0.627
5	0.774	0.626
6	0.729	0.499
7	0.719	0.472
8	0.764	0.570
9	0.790	0.671
10	0.761	0.635
11	0.735	0.586
12	0.661	0.505
MEAN	0.741	0.586

Table 8.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0006				
2: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0003				
3: number of model variables:	1	correlation:	0.541	percent:	15.9%
variables:	h				
coefficients:	-0.0008				
4: number of model variables:	1	correlation:	0.735	percent:	32.2%
variables:	h				
coefficients:	-0.0015				
5: number of model variables:	1	correlation:	0.769	percent:	36.0%
variables:	h				
coefficients:	-0.0021				
6: number of model variables:	1	correlation:	0.733	percent:	32.0%
variables:	h				
coefficients:	-0.0022				
7: number of model variables:	1	correlation:	0.764	percent:	35.5%
variables:	h				
coefficients:	-0.0023				
8: number of model variables:	1	correlation:	0.803	percent:	40.4%
variables:	h				
coefficients:	-0.0021				
9: number of model variables:	1	correlation:	0.633	percent:	22.6%
variables:	h				
coefficients:	-0.0015				
10: number of model variables:	1	correlation:	0.036	percent:	0.1%
variables:	h				
coefficients:	-0.0003				
11: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0000				
12: number of model variables:	1	correlation:	0.093	percent:	0.4%
variables:	h				
coefficients:	0.0005				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 8.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 22

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.616	0.382
2	0.676	0.481
3	0.715	0.554
4	0.714	0.547
5	0.738	0.510
6	0.715	0.457
7	0.700	0.456
8	0.699	0.482
9	0.769	0.550
10	0.717	0.568
11	0.614	0.397
12	0.562	0.283
MEAN	0.686	0.472

Table 8.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 4 correlation: 0.918 percent: 60.3%
variables: h 3 9 11
coefficients: 0.0006 -0.0058 -0.0205 -0.0577

2: number of model variables: 5 correlation: 0.708 percent: 29.3%
variables: h 3 8 9 11
coefficients: 0.0000 -0.0112 -0.0129 -0.0387 -0.0833

3: number of model variables: 5 correlation: 0.766 percent: 35.7%
variables: h 3 8 9 11
coefficients: -0.0006 -0.0186 -0.0273 -0.0354 -0.0518

4: number of model variables: 5 correlation: 0.834 percent: 44.9%
variables: h 3 7 8 9
coefficients: -0.0011 -0.0192 -0.0455 -0.0331 -0.0385

5: number of model variables: 5 correlation: 0.872 percent: 51.0%
variables: h 2 5 9 13
coefficients: -0.0013 -0.0346 0.0246 -0.0477 0.0833

6: number of model variables: 5 correlation: 0.884 percent: 53.3%
variables: h 2 9 10 13
coefficients: -0.0022 -0.0296 -0.0579 -0.0416 0.0877

7: number of model variables: 5 correlation: 0.887 percent: 53.8%
variables: h 6 8 12 15
coefficients: -0.0016 -0.0588 -0.0735 0.0510 -0.1378

8: number of model variables: 5 correlation: 0.904 percent: 57.3%
variables: h 3 4 6 8
coefficients: -0.0015 -0.0156 0.0361 -0.0323 -0.0673

9: number of model variables: 5 correlation: 0.800 percent: 40.0%
variables: h 3 7 8 9
coefficients: -0.0011 -0.0268 -0.0715 -0.0495 -0.0567

10: number of model variables: 5 correlation: 0.715 percent: 30.0%
variables: h 3 6 8 9
coefficients: -0.0004 -0.0110 -0.0225 -0.0233 -0.0281

11: number of model variables: 5 correlation: 0.812 percent: 41.7%
variables: h 3 7 9 11
coefficients: 0.0002 -0.0079 -0.0191 -0.0389 -0.0637

12: number of model variables: 3 correlation: 0.880 percent: 52.5%
variables: h 5 6
coefficients: 0.0004 -0.0124 -0.0072

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 8.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 27

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.583	0.388
2	0.689	0.514
3	0.700	0.508
4	0.717	0.506
5	0.738	0.552
6	0.686	0.431
7	0.698	0.450
8	0.705	0.519
9	0.742	0.530
10	0.712	0.584
11	0.616	0.442
12	0.595	0.370
MEAN	0.682	0.483

Table 8.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.954	percent:	70.1%
variables:	h 1 5 14				
coefficients:	0.0010 0.0051 -0.0313 0.0686				
2: number of model variables:	4	correlation:	0.978	percent:	79.4%
variables:	h 1 5 10				
coefficients:	0.0009 0.0068 -0.0217 -0.0110				
3: number of model variables:	4	correlation:	0.797	percent:	39.7%
variables:	h 3 14 15				
coefficients:	-0.0005 -0.0085 -0.0900 0.0951				
4: number of model variables:	4	correlation:	0.785	percent:	38.1%
variables:	h 7 12 14				
coefficients:	-0.0007 -0.0731 -0.0257 -0.1815				
5: number of model variables:	4	correlation:	0.920	percent:	60.7%
variables:	h 7 8 14				
coefficients:	-0.0015 -0.0951 -0.0181 -0.2496				
6: number of model variables:	4	correlation:	0.949	percent:	68.3%
variables:	h 7 8 14				
coefficients:	-0.0018 -0.1151 -0.0223 -0.2713				
7: number of model variables:	4	correlation:	0.956	percent:	70.8%
variables:	h 7 8 14				
coefficients:	-0.0016 -0.0887 -0.0245 -0.1766				
8: number of model variables:	4	correlation:	0.943	percent:	66.8%
variables:	h 8 9 14				
coefficients:	-0.0012 -0.0299 0.0422 -0.1133				
9: number of model variables:	4	correlation:	0.764	percent:	35.5%
variables:	h 8 9 14				
coefficients:	-0.0005 -0.0200 0.0393 -0.1330				
10: number of model variables:	4	correlation:	0.832	percent:	44.5%
variables:	h 3 5 15				
coefficients:	-0.0001 -0.0028 -0.0141 0.0650				
11: number of model variables:	4	correlation:	0.907	percent:	57.9%
variables:	h 2 7 9				
coefficients:	0.0003 0.0062 0.0800 0.0489				
12: number of model variables:	4	correlation:	0.947	percent:	68.0%
variables:	h 2 5 9				
coefficients:	0.0003 0.0087 -0.0271 0.0160				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 8.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.548	0.411
2	0.625	0.547
3	0.638	0.505
4	0.726	0.585
5	0.719	0.576
6	0.690	0.542
7	0.742	0.604
8	0.700	0.574
9	0.730	0.590
10	0.696	0.602
11	0.554	0.438
12	0.564	0.390
MEAN	0.661	0.530

Table 8.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0002				
2: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0003				
3: number of model variables:	1	correlation:	0.473	percent:	11.9%
variables:	h				
coefficients:	-0.0008				
4: number of model variables:	1	correlation:	0.520	percent:	14.6%
variables:	h				
coefficients:	-0.0010				
5: number of model variables:	1	correlation:	0.612	percent:	20.9%
variables:	h				
coefficients:	-0.0014				
6: number of model variables:	1	correlation:	0.736	percent:	32.3%
variables:	h				
coefficients:	-0.0018				
7: number of model variables:	1	correlation:	0.713	percent:	29.9%
variables:	h				
coefficients:	-0.0018				
8: number of model variables:	1	correlation:	0.746	percent:	33.4%
variables:	h				
coefficients:	-0.0013				
9: number of model variables:	1	correlation:	0.455	percent:	11.0%
variables:	h				
coefficients:	-0.0008				
10: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0003				
11: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0001				
12: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0002				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 8.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 10

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.481	0.314
2	0.628	0.533
3	0.665	0.536
4	0.713	0.606
5	0.746	0.626
6	0.698	0.556
7	0.744	0.595
8	0.727	0.647
9	0.741	0.660
10	0.688	0.576
11	0.536	0.323
12	0.501	0.276
MEAN	0.656	0.521

Annex 9. Global radiation

Table 9.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.266	percent:	3.6%
variables:	h 5		12 15		
coefficients:	-0.0005 -0.0167	0.0193	-0.0272		
2: number of model variables:	5	correlation:	0.340	percent:	5.9%
variables:	h 2		3 6 14		
coefficients:	0.0001 0.0230	0.0081	-0.0186 0.0595		
3: number of model variables:	4	correlation:	0.459	percent:	11.2%
variables:	h 7		13 14		
coefficients:	-0.0013 -0.0611	0.0616	0.0458		
4: number of model variables:	5	correlation:	0.661	percent:	25.0%
variables:	h 1		4 14 15		
coefficients:	-0.0033 0.0121	0.0460	0.1077 -0.1098		
5: number of model variables:	6	correlation:	0.746	percent:	33.4%
variables:	h 1		2 4 14 15		
coefficients:	-0.0037 0.0192	0.0251	0.0585 0.1826 -0.1685		
6: number of model variables:	4	correlation:	0.714	percent:	29.9%
variables:	h 1		9 15		
coefficients:	-0.0075 0.0165	-0.0661	-0.1874		
7: number of model variables:	5	correlation:	0.735	percent:	32.2%
variables:	h 1		2 14 15		
coefficients:	-0.0063 0.0190	0.0391	0.1098 -0.2249		
8: number of model variables:	3	correlation:	0.693	percent:	27.9%
variables:	h 1		15		
coefficients:	-0.0063 0.0128	-0.1201			
9: number of model variables:	4	correlation:	0.629	percent:	22.2%
variables:	h 1		13 15		
coefficients:	-0.0046 0.0077	0.0873	-0.0836		
10: number of model variables:	4	correlation:	0.516	percent:	14.4%
variables:	h 2		6 12		
coefficients:	-0.0028 0.0149	-0.0280	0.0504		
11: number of model variables:	6	correlation:	0.376	percent:	7.4%
variables:	h 2		3 6 7 15		
coefficients:	-0.0012 0.0182	0.0075	-0.0168 0.0304 -0.0263		
12: number of model variables:	2	correlation:	0.385	percent:	7.7%
variables:	h 15				
coefficients:	-0.0005 -0.0257				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 9.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 50

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.677	0.566
2	0.783	0.677
3	0.800	0.691
4	0.771	0.641
5	0.781	0.655
6	0.740	0.534
7	0.744	0.540
8	0.783	0.616
9	0.806	0.671
10	0.790	0.662
11	0.747	0.596
12	0.684	0.553
MEAN	0.759	0.617

Table 9.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E:	123.4	189.5	335.2	471.8	614.7	645.3	672.6	589.1	408.7	270.8	138.5	100.27
D _t :	13.3	24.2	35.3	39.8	51.8	47.2	45.9	46.6	40.1	28.9	16.0	10.6
S _s :	7.8	10.3	14.1	19.3	25.7	32.4	37.6	29.4	21.1	16.5	11.1	7.7

Table 9.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.507 percent: 13.8%
 variables: h 4 7 9 13
 coefficients: 0.0003 -0.0129 -0.0158 0.0282 0.0518

2: number of model variables: 5 correlation: 0.287 percent: 4.2%
 variables: h 4 9 13 15
 coefficients: -0.0002 -0.0181 0.0332 0.0314 0.0281

3: number of model variables: 5 correlation: 0.651 percent: 24.1%
 variables: h 2 4 9 15
 coefficients: -0.0004 -0.0180 -0.0213 0.0619 0.0364

4: number of model variables: 5 correlation: 0.816 percent: 42.2%
 variables: h 1 4 10 13
 coefficients: -0.0015 -0.0091 -0.0350 0.0525 0.0701

5: number of model variables: 5 correlation: 0.793 percent: 39.0%
 variables: h 1 4 10 13
 coefficients: -0.0022 -0.0163 -0.0435 0.0451 0.1249

6: number of model variables: 5 correlation: 0.761 percent: 35.1%
 variables: h 1 4 10 13
 coefficients: -0.0019 -0.0149 -0.0572 0.0957 0.1620

7: number of model variables: 4 correlation: 0.634 percent: 22.6%
 variables: h 1 4 13
 coefficients: -0.0020 -0.0116 -0.0383 0.1948

8: number of model variables: 5 correlation: 0.602 percent: 20.1%
 variables: h 1 5 9 14
 coefficients: -0.0005 -0.0122 -0.0496 0.1554 -0.1956

9: number of model variables: 5 correlation: 0.614 percent: 21.1%
 variables: h 1 9 10 14
 coefficients: 0.0000 -0.0152 0.1133 0.0532 -0.2143

10: number of model variables: 5 correlation: 0.431 percent: 9.8%
 variables: h 2 4 9 11
 coefficients: 0.0001 -0.0240 -0.0271 0.0948 -0.0461

11: number of model variables: 5 correlation: 0.271 percent: 3.7%
 variables: h 8 9 12 14
 coefficients: 0.0002 -0.0466 0.0729 0.0448 -0.0366

12: number of model variables: 5 correlation: 0.569 percent: 17.8%
 variables: h 3 4 7 13
 coefficients: 0.0003 -0.0035 -0.0140 -0.0186 0.0591

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 9.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 28

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.683	0.539
2	0.769	0.649
3	0.796	0.713
4	0.766	0.673
5	0.770	0.640
6	0.734	0.590
7	0.725	0.499
8	0.789	0.630
9	0.801	0.662
10	0.775	0.611
11	0.742	0.561
12	0.660	0.492
MEAN	0.751	0.605

Table 9.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.618 percent: 21.4%
 variables: h 2 3 4 15
 coefficients: 0.0004 -0.0033 -0.0044 -0.0077 0.0168

2: number of model variables: 6 correlation: 0.431 percent: 9.8%
 variables: h 3 4 7 13 15
 coefficients: 0.0000 -0.0040 -0.0083 0.0091 0.0078 0.0199

3: number of model variables: 5 correlation: 0.711 percent: 29.6%
 variables: h 4 10 12 15
 coefficients: -0.0005 -0.0141 -0.0157 0.0168 0.0345

4: number of model variables: 4 correlation: 0.846 percent: 46.7%
 variables: h 1 4 15
 coefficients: -0.0017 -0.0048 -0.0187 0.0331

5: number of model variables: 4 correlation: 0.862 percent: 49.3%
 variables: h 1 10 11
 coefficients: -0.0023 -0.0070 -0.0327 0.0308

6: number of model variables: 4 correlation: 0.853 percent: 47.8%
 variables: h 1 10 11
 coefficients: -0.0029 -0.0088 -0.0557 0.0400

7: number of model variables: 3 correlation: 0.818 percent: 42.5%
 variables: h 1 10
 coefficients: -0.0028 -0.0096 -0.0395

8: number of model variables: 3 correlation: 0.808 percent: 41.0%
 variables: h 1 11
 coefficients: -0.0024 -0.0079 0.0392

9: number of model variables: 4 correlation: 0.785 percent: 38.0%
 variables: h 1 4 15
 coefficients: -0.0015 -0.0052 -0.0185 0.0344

10: number of model variables: 6 correlation: 0.552 percent: 16.6%
 variables: h 4 7 10 12 15
 coefficients: -0.0002 -0.0131 0.0086 -0.0110 0.0229 0.0286

11: number of model variables: 5 correlation: 0.503 percent: 13.6%
 variables: h 2 4 12 15
 coefficients: 0.0002 -0.0029 -0.0131 0.0202 0.0170

12: number of model variables: 5 correlation: 0.627 percent: 22.1%
 variables: h 2 3 4 15
 coefficients: 0.0004 -0.0028 -0.0045 -0.0076 0.0142

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 9.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 112

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.701	0.549
2	0.748	0.635
3	0.768	0.652
4	0.752	0.626
5	0.775	0.625
6	0.729	0.504
7	0.719	0.470
8	0.765	0.569
9	0.791	0.667
10	0.765	0.637
11	0.737	0.578
12	0.663	0.495
MEAN	0.743	0.584

Table 9.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation:	0.080	percent:	0.3%
variables:	h				
coefficients:	0.0002				
2: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0000				
3: number of model variables:	1	correlation:	0.430	percent:	9.7%
variables:	h				
coefficients:	-0.0008				
4: number of model variables:	1	correlation:	0.691	percent:	27.7%
variables:	h				
coefficients:	-0.0017				
5: number of model variables:	1	correlation:	0.732	percent:	31.8%
variables:	h				
coefficients:	-0.0026				
6: number of model variables:	1	correlation:	0.752	percent:	34.1%
variables:	h				
coefficients:	-0.0029				
7: number of model variables:	1	correlation:	0.758	percent:	34.8%
variables:	h				
coefficients:	-0.0030				
8: number of model variables:	1	correlation:	0.776	percent:	36.9%
variables:	h				
coefficients:	-0.0025				
9: number of model variables:	1	correlation:	0.576	percent:	18.2%
variables:	h				
coefficients:	-0.0015				
10: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0002				
11: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	0.0001				
12: number of model variables:	1	correlation:	0.144	percent:	1.0%
variables:	h				
coefficients:	0.0002				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 9.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 22

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.630	0.349
2	0.681	0.462
3	0.725	0.555
4	0.726	0.562
5	0.741	0.502
6	0.712	0.466
7	0.702	0.478
8	0.703	0.488
9	0.774	0.551
10	0.722	0.547
11	0.616	0.339
12	0.576	0.196
MEAN	0.692	0.458

Table 9.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 5 correlation: 0.734 percent: 32.1%
 variables: h 5 9 11 13
 coefficients: 0.0001 -0.0099 -0.0131 -0.0436 -0.0206

2: number of model variables: 5 correlation: 0.689 percent: 27.6%
 variables: h 3 8 9 11
 coefficients: -0.0002 -0.0105 -0.0140 -0.0377 -0.0699

3: number of model variables: 5 correlation: 0.780 percent: 37.5%
 variables: h 3 8 9 11
 coefficients: -0.0008 -0.0188 -0.0297 -0.0520 -0.0953

4: number of model variables: 5 correlation: 0.735 percent: 32.2%
 variables: h 2 7 9 15
 coefficients: -0.0007 -0.0189 -0.0841 -0.0461 -0.0813

5: number of model variables: 5 correlation: 0.830 percent: 44.2%
 variables: h 2 7 9 11
 coefficients: -0.0017 -0.0306 -0.1110 -0.1101 -0.0989

6: number of model variables: 5 correlation: 0.834 percent: 44.8%
 variables: h 2 7 9 11
 coefficients: -0.0022 -0.0336 -0.1153 -0.1211 -0.1564

7: number of model variables: 5 correlation: 0.846 percent: 46.6%
 variables: h 7 8 11 15
 coefficients: -0.0011 -0.1062 -0.0615 -0.0936 -0.2384

8: number of model variables: 5 correlation: 0.839 percent: 45.6%
 variables: h 2 7 9 11
 coefficients: -0.0016 -0.0294 -0.1094 -0.0966 -0.1135

9: number of model variables: 5 correlation: 0.779 percent: 37.3%
 variables: h 3 7 8 9
 coefficients: -0.0013 -0.0349 -0.1309 -0.0612 -0.0858

10: number of model variables: 5 correlation: 0.715 percent: 30.1%
 variables: h 2 7 9 11
 coefficients: -0.0002 -0.0142 -0.0305 -0.0531 -0.0647

11: number of model variables: 5 correlation: 0.668 percent: 25.6%
 variables: h 6 9 11 13
 coefficients: 0.0001 -0.0097 -0.0205 -0.0381 -0.0403

12: number of model variables: 5 correlation: 0.704 percent: 28.9%
 variables: h 5 10 11 13
 coefficients: 0.0002 -0.0056 0.0171 -0.0378 -0.0273

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 9.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 29

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.589	0.358
2	0.693	0.494
3	0.705	0.502
4	0.729	0.503
5	0.737	0.519
6	0.692	0.392
7	0.696	0.367
8	0.707	0.408
9	0.750	0.479
10	0.729	0.536
11	0.622	0.344
12	0.583	0.337
MEAN	0.686	0.437

Table 9.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.972	percent:	76.3%
variables:	h 1 5 14				
coefficients:	0.0008 0.0046 -0.0228 0.0475				
2: number of model variables:	4	correlation:	0.966	percent:	74.2%
variables:	h 1 5 15				
coefficients:	0.0007 0.0061 -0.0206 0.0192				
3: number of model variables:	4	correlation:	0.790	percent:	38.7%
variables:	h 5 11 15				
coefficients:	-0.0003 -0.0286 -0.0473 0.0537				
4: number of model variables:	4	correlation:	0.781	percent:	37.5%
variables:	h 2 14 15				
coefficients:	-0.0008 -0.0116 -0.0738 0.0954				
5: number of model variables:	4	correlation:	0.920	percent:	60.7%
variables:	h 7 8 14				
coefficients:	-0.0018 -0.1253 -0.0218 -0.3135				
6: number of model variables:	4	correlation:	0.948	percent:	68.1%
variables:	h 7 8 14				
coefficients:	-0.0023 -0.1533 -0.0288 -0.3544				
7: number of model variables:	4	correlation:	0.956	percent:	70.6%
variables:	h 7 8 14				
coefficients:	-0.0020 -0.1172 -0.0317 -0.2268				
8: number of model variables:	4	correlation:	0.947	percent:	67.9%
variables:	h 8 9 14				
coefficients:	-0.0013 -0.0400 0.0533 -0.1219				
9: number of model variables:	4	correlation:	0.751	percent:	34.0%
variables:	h 8 9 14				
coefficients:	-0.0004 -0.0216 0.0450 -0.1395				
10: number of model variables:	4	correlation:	0.874	percent:	51.5%
variables:	h 1 5 15				
coefficients:	0.0001 0.0027 -0.0227 0.0501				
11: number of model variables:	4	correlation:	0.926	percent:	62.4%
variables:	h 1 7 9				
coefficients:	0.0006 0.0028 0.0470 0.0279				
12: number of model variables:	4	correlation:	0.958	percent:	71.3%
variables:	h 1 5 14				
coefficients:	0.0006 0.0030 -0.0188 0.0393				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 9.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.546	0.412
2	0.624	0.536
3	0.649	0.493
4	0.727	0.608
5	0.719	0.583
6	0.687	0.545
7	0.740	0.603
8	0.703	0.575
9	0.734	0.592
10	0.700	0.601
11	0.557	0.419
12	0.557	0.405
MEAN	0.662	0.531

Table 9.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0001				
2: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0004				
3: number of model variables:	1	correlation:	0.411	percent:	8.8%
variables:	h				
coefficients:	-0.0010				
4: number of model variables:	1	correlation:	0.475	percent:	12.0%
variables:	h				
coefficients:	-0.0013				
5: number of model variables:	1	correlation:	0.584	percent:	18.8%
variables:	h				
coefficients:	-0.0019				
6: number of model variables:	1	correlation:	0.710	percent:	29.6%
variables:	h				
coefficients:	-0.0025				
7: number of model variables:	1	correlation:	0.683	percent:	27.0%
variables:	h				
coefficients:	-0.0024				
8: number of model variables:	1	correlation:	0.682	percent:	26.8%
variables:	h				
coefficients:	-0.0017				
9: number of model variables:	1	correlation:	0.412	percent:	8.9%
variables:	h				
coefficients:	-0.0011				
10: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0004				
11: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0003				
12: number of model variables:	1	correlation:	0.000	percent:	0.0%
variables:	h				
coefficients:	-0.0001				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 9.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 10

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.481	0.285
2	0.624	0.495
3	0.672	0.511
4	0.710	0.564
5	0.747	0.616
6	0.699	0.545
7	0.743	0.585
8	0.728	0.632
9	0.742	0.649
10	0.689	0.553
11	0.527	0.284
12	0.486	0.253
MEAN	0.654	0.498

Annex 10. Wind speed

Table 10.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.720 percent: 30.6%
 variables: h 1 2 3 5 13
 coefficients: -0.0015 0.6413 0.2440 -0.0134 -0.0095 0.0868

2: number of model variables: 6 correlation: 0.679 percent: 26.6%
 variables: h 1 2 3 10 13
 coefficients: -0.0012 0.5795 0.2515 -0.0109 0.0179 0.0747

3: number of model variables: 6 correlation: 0.636 percent: 22.8%
 variables: h 1 2 3 11 13
 coefficients: -0.0011 0.5370 0.2662 -0.0100 -0.0240 0.0625

4: number of model variables: 6 correlation: 0.586 percent: 19.0%
 variables: h 1 2 3 5 13
 coefficients: -0.0014 0.5245 0.1642 -0.0102 -0.0091 0.0635

5: number of model variables: 6 correlation: 0.546 percent: 16.2%
 variables: h 1 2 3 5 13
 coefficients: -0.0015 0.5039 0.1911 -0.0102 -0.0100 0.0654

6: number of model variables: 6 correlation: 0.465 percent: 11.5%
 variables: h 1 2 3 5 13
 coefficients: -0.0017 0.4138 0.1928 -0.0102 -0.0125 0.0596

7: number of model variables: 6 correlation: 0.516 percent: 14.3%
 variables: h 1 2 3 6 13
 coefficients: -0.0008 0.3800 0.2535 -0.0068 0.0230 0.0617

8: number of model variables: 6 correlation: 0.512 percent: 14.1%
 variables: h 1 2 3 6 13
 coefficients: -0.0007 0.4482 0.2738 -0.0068 0.0190 0.0540

9: number of model variables: 6 correlation: 0.549 percent: 16.4%
 variables: h 1 2 3 5 13
 coefficients: -0.0015 0.4803 0.2094 -0.0119 -0.0117 0.0798

10: number of model variables: 6 correlation: 0.646 percent: 23.6%
 variables: h 1 2 3 6 13
 coefficients: -0.0007 0.4421 0.2460 -0.0088 0.0233 0.0697

11: number of model variables: 6 correlation: 0.693 percent: 27.9%
 variables: h 1 2 3 6 13
 coefficients: -0.0009 0.5663 0.2823 -0.0100 0.0220 0.0673

12: number of model variables: 6 correlation: 0.712 percent: 29.8%
 variables: h 1 2 3 5 13
 coefficients: -0.0016 0.6299 0.2856 -0.0138 -0.0081 0.0866

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 66

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.473	-0.144
2	0.489	-0.098
3	0.441	-0.327
4	0.444	-0.395
5	0.408	-0.507
6	0.349	-0.773
7	0.381	-0.644
8	0.322	-0.747
9	0.387	-0.597
10	0.465	-0.360
11	0.442	-0.233
12	0.447	-0.244
MEAN	0.421	-0.422

Table 9.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E:	2.8	3.1	3.3	3.5	3.1	2.9	2.8	2.5	2.6	2.6	2.9	2.8
D _t :	0.6	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.6	0.6
S _s :	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9	0.9

Table 10.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.730 percent: 31.6%
variables: h 3 7 8 10 13
coefficients: -0.0003 -0.0079 -0.0281 -0.0300 -0.0497 -0.0495

2: number of model variables: 6 correlation: 0.704 percent: 29.0%
variables: h 3 5 8 10 13
coefficients: -0.0005 -0.0065 0.0090 -0.0246 -0.0306 -0.0359

3: number of model variables: 6 correlation: 0.793 percent: 39.1%
variables: h 1 3 5 8 13
coefficients: -0.0002 0.6629 -0.0071 0.0085 -0.0262 -0.0348

4: number of model variables: 6 correlation: 0.811 percent: 41.5%
variables: h 1 3 5 8 13
coefficients: -0.0001 0.7171 -0.0068 0.0097 -0.0291 -0.0398

5: number of model variables: 6 correlation: 0.843 percent: 46.1%
variables: h 3 5 8 9 13
coefficients: -0.0001 -0.0063 0.0083 -0.0278 0.0282 -0.0553

6: number of model variables: 6 correlation: 0.834 percent: 44.8%
variables: h 3 8 9 10 13
coefficients: -0.0002 -0.0060 -0.0244 0.0236 -0.0278 -0.0553

7: number of model variables: 6 correlation: 0.809 percent: 41.2%
variables: h 3 8 9 10 13
coefficients: -0.0002 -0.0055 -0.0249 0.0168 -0.0356 -0.0591

8: number of model variables: 6 correlation: 0.815 percent: 42.1%
variables: h 3 5 8 9 13
coefficients: 0.0000 -0.0062 0.0087 -0.0309 0.0257 -0.0624

9: number of model variables: 6 correlation: 0.748 percent: 33.6%
variables: h 3 6 8 10 13
coefficients: -0.0001 -0.0106 0.0204 -0.0145 -0.0476 -0.0384

10: number of model variables: 6 correlation: 0.794 percent: 39.2%
variables: h 1 3 5 8 13
coefficients: -0.0001 0.7934 -0.0093 0.0125 -0.0322 -0.0473

11: number of model variables: 6 correlation: 0.737 percent: 32.4%
variables: h 1 3 5 8 13
coefficients: -0.0003 0.9540 -0.0089 0.0135 -0.0308 -0.0365

12: number of model variables: 6 correlation: 0.808 percent: 41.1%
variables: h 1 3 8 10 13
coefficients: -0.0004 0.7851 -0.0096 -0.0204 -0.0338 -0.0541

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 40

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.420	-0.141
2	0.403	-0.151
3	0.396	-0.176
4	0.398	-0.195
5	0.329	-0.373
6	0.303	-0.443
7	0.313	-0.331
8	0.273	-0.504
9	0.328	-0.323
10	0.416	-0.224
11	0.400	-0.272
12	0.350	-0.302
MEAN	0.361	-0.286

Table 10.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 5 correlation: 0.807 percent: 40.9%
 variables: h 3 8 10 15
 coefficients: -0.0001 -0.0092 0.0131 0.0148 0.0193

2: number of model variables: 5 correlation: 0.782 percent: 37.7%
 variables: h 3 8 10 17
 coefficients: -0.0001 -0.0090 0.0172 0.0151 -0.0214

3: number of model variables: 5 correlation: 0.792 percent: 38.9%
 variables: h 3 8 10 17
 coefficients: -0.0001 -0.0082 0.0148 0.0149 -0.0166

4: number of model variables: 5 correlation: 0.771 percent: 36.3%
 variables: h 1 3 8 10
 coefficients: -0.0001 0.1836 -0.0062 0.0116 0.0160

5: number of model variables: 5 correlation: 0.750 percent: 33.9%
 variables: h 3 5 8 10
 coefficients: -0.0001 -0.0058 0.0030 0.0095 0.0135

6: number of model variables: 5 correlation: 0.711 percent: 29.7%
 variables: h 3 8 10 14
 coefficients: 0.0000 -0.0051 0.0064 0.0097 -0.0107

7: number of model variables: 6 correlation: 0.693 percent: 27.9%
 variables: h 3 4 8 10 11
 coefficients: 0.0000 -0.0050 -0.0042 0.0083 0.0133 0.0102

8: number of model variables: 5 correlation: 0.660 percent: 24.9%
 variables: h 3 4 8 10
 coefficients: 0.0000 -0.0051 -0.0041 0.0102 0.0137

9: number of model variables: 4 correlation: 0.733 percent: 32.0%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0053 0.0110 0.0134

10: number of model variables: 4 correlation: 0.765 percent: 35.6%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0065 0.0149 0.0159

11: number of model variables: 4 correlation: 0.801 percent: 40.1%
 variables: h 3 8 10
 coefficients: 0.0000 -0.0082 0.0150 0.0185

12: number of model variables: 5 correlation: 0.809 percent: 41.3%
 variables: h 3 8 10 15
 coefficients: -0.0002 -0.0099 0.0136 0.0168 0.0231

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 119

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.457	-0.159
2	0.459	-0.148
3	0.425	-0.222
4	0.389	-0.274
5	0.390	-0.277
6	0.336	-0.376
7	0.374	-0.292
8	0.350	-0.352
9	0.328	-0.447
10	0.417	-0.262
11	0.451	-0.150
12	0.400	-0.278
MEAN	0.398	-0.270

Table 10.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.874 percent: 51.5%
 variables: h 1 3 6 8 10
 coefficients: 0.0002 0.5879 -0.0114 -0.0105 0.0271 0.0306

2: number of model variables: 5 correlation: 0.886 percent: 53.7%
 variables: h 1 3 5 6
 coefficients: 0.0002 0.8054 -0.0070 -0.0088 -0.0089

3: number of model variables: 4 correlation: 0.860 percent: 49.0%
 variables: h 1 3 10
 coefficients: 0.0000 0.7250 -0.0067 0.0130

4: number of model variables: 4 correlation: 0.848 percent: 47.0%
 variables: h 1 3 5
 coefficients: -0.0001 0.7979 -0.0053 -0.0064

5: number of model variables: 4 correlation: 0.841 percent: 45.9%
 variables: h 1 3 5
 coefficients: 0.0000 0.7567 -0.0055 -0.0074

6: number of model variables: 4 correlation: 0.830 percent: 44.3%
 variables: h 1 3 5
 coefficients: 0.0000 0.7256 -0.0056 -0.0098

7: number of model variables: 4 correlation: 0.834 percent: 44.9%
 variables: h 1 3 5
 coefficients: 0.0000 0.7378 -0.0060 -0.0089

8: number of model variables: 4 correlation: 0.807 percent: 41.0%
 variables: h 1 3 5
 coefficients: 0.0000 0.7616 -0.0055 -0.0096

9: number of model variables: 4 correlation: 0.853 percent: 47.8%
 variables: h 1 3 5
 coefficients: 0.0002 0.7966 -0.0060 -0.0117

10: number of model variables: 5 correlation: 0.865 percent: 49.8%
 variables: h 1 3 8 10
 coefficients: 0.0001 0.6717 -0.0098 0.0203 0.0275

11: number of model variables: 4 correlation: 0.866 percent: 50.0%
 variables: h 1 3 10
 coefficients: 0.0001 0.7770 -0.0086 0.0201

12: number of model variables: 6 correlation: 0.859 percent: 48.8%
 variables: h 1 3 6 8 10
 coefficients: 0.0002 0.6497 -0.0100 -0.0086 0.0220 0.0268

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.465	-0.100
2	0.478	-0.040
3	0.414	-0.169
4	0.445	-0.121
5	0.437	-0.183
6	0.393	-0.318
7	0.419	-0.201
8	0.391	-0.309
9	0.390	-0.301
10	0.452	-0.143
11	0.478	-0.057
12	0.448	-0.178
MEAN	0.434	-0.177

Table 10.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.788 percent: 38.4%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.4679 -0.0085 0.0252 0.0197 0.0393

2: number of model variables: 6 correlation: 0.789 percent: 38.6%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.5664 -0.0077 0.0205 0.0182 0.0341

3: number of model variables: 6 correlation: 0.799 percent: 39.9%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.4921 -0.0075 0.0194 0.0182 0.0379

4: number of model variables: 6 correlation: 0.787 percent: 38.3%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5597 -0.0071 0.0161 0.0135 0.0294

5: number of model variables: 6 correlation: 0.778 percent: 37.2%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5456 -0.0070 0.0154 0.0128 0.0288

6: number of model variables: 6 correlation: 0.737 percent: 32.4%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5365 -0.0067 0.0202 0.0197 0.0292

7: number of model variables: 6 correlation: 0.770 percent: 36.2%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.4458 -0.0076 0.0206 0.0232 0.0379

8: number of model variables: 6 correlation: 0.774 percent: 36.6%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.6347 -0.0078 0.0223 0.0219 0.0346

9: number of model variables: 6 correlation: 0.772 percent: 36.4%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.6547 -0.0076 0.0215 0.0150 0.0302

10: number of model variables: 6 correlation: 0.781 percent: 37.6%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.5275 -0.0084 0.0236 0.0224 0.0373

11: number of model variables: 6 correlation: 0.806 percent: 40.8%
variables: h 3 11 12 14 15
coefficients: -0.0003 -0.0098 0.0234 0.0226 -0.0177 0.0388

12: number of model variables: 6 correlation: 0.783 percent: 37.7%
variables: h 3 11 12 14 15
coefficients: -0.0003 -0.0104 0.0259 0.0191 -0.0168 0.0422

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 53

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.378	-0.453
2	0.391	-0.350
3	0.302	-0.469
4	0.337	-0.324
5	0.294	-0.512
6	0.253	-0.748
7	0.259	-0.666
8	0.241	-0.637
9	0.295	-0.544
10	0.346	-0.492
11	0.339	-0.619
12	0.348	-0.708
MEAN	0.315	-0.544

Table 10.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.796 percent: 39.4%
 variables: h 1 3 9 11 15
 coefficients: -0.0003 0.7811 -0.0064 0.0325 0.0226 0.0279

2: number of model variables: 6 correlation: 0.810 percent: 41.3%
 variables: h 1 3 9 11 15
 coefficients: -0.0002 0.7826 -0.0057 0.0294 0.0171 0.0238

3: number of model variables: 6 correlation: 0.836 percent: 45.1%
 variables: h 1 3 9 15 16
 coefficients: -0.0005 0.5963 -0.0086 0.0207 0.0333 0.0528

4: number of model variables: 6 correlation: 0.811 percent: 41.4%
 variables: h 1 3 4 9 11
 coefficients: -0.0001 0.7004 -0.0045 0.0041 0.0281 0.0235

5: number of model variables: 6 correlation: 0.793 percent: 39.0%
 variables: h 1 3 9 11 15
 coefficients: -0.0002 0.6247 -0.0052 0.0226 0.0152 0.0149

6: number of model variables: 6 correlation: 0.735 percent: 32.2%
 variables: h 1 3 9 10 11
 coefficients: 0.0000 0.6303 -0.0042 0.0218 -0.0071 0.0179

7: number of model variables: 6 correlation: 0.794 percent: 39.2%
 variables: h 1 3 12 15 16
 coefficients: -0.0005 0.4023 -0.0094 0.0137 0.0385 0.0547

8: number of model variables: 6 correlation: 0.796 percent: 39.5%
 variables: h 1 3 9 11 15
 coefficients: -0.0002 0.7112 -0.0059 0.0230 0.0174 0.0158

9: number of model variables: 6 correlation: 0.787 percent: 38.3%
 variables: h 1 3 9 10 11
 coefficients: 0.0000 0.7562 -0.0048 0.0326 -0.0105 0.0264

10: number of model variables: 6 correlation: 0.787 percent: 38.3%
 variables: h 1 3 4 9 11
 coefficients: -0.0001 0.9089 -0.0052 0.0059 0.0303 0.0278

11: number of model variables: 6 correlation: 0.821 percent: 42.9%
 variables: h 1 3 4 9 11
 coefficients: -0.0001 0.8329 -0.0054 0.0059 0.0332 0.0288

12: number of model variables: 6 correlation: 0.799 percent: 39.9%
 variables: h 1 3 9 15 16
 coefficients: -0.0006 0.6696 -0.0101 0.0254 0.0334 0.0663

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 10.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 42

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.389	-0.753
2	0.377	-0.696
3	0.313	-0.815
4	0.330	-0.658
5	0.298	-0.949
6	0.258	-1.050
7	0.264	-0.996
8	0.293	-0.952
9	0.307	-0.771
10	0.357	-0.901
11	0.355	-0.742
12	0.362	-0.831
MEAN	0.325	-0.843

Table 10.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables:	4	correlation:	0.909	percent:	58.3%
variables:	h 3		14 17		
coefficients:	-0.0003 -0.0102		0.0259 -0.0487		
2: number of model variables:	4	correlation:	0.912	percent:	59.0%
variables:	h 3		13 16		
coefficients:	-0.0011 -0.0162		0.0209 -0.0282		
3: number of model variables:	4	correlation:	0.920	percent:	60.7%
variables:	h 3		11 16		
coefficients:	-0.0012 -0.0167		0.0206 -0.0410		
4: number of model variables:	4	correlation:	0.898	percent:	56.1%
variables:	h 3		11 16		
coefficients:	-0.0011 -0.0155		0.0232 -0.0503		
5: number of model variables:	4	correlation:	0.876	percent:	51.7%
variables:	h 3		14 17		
coefficients:	0.0002 -0.0064		0.0236 -0.0703		
6: number of model variables:	4	correlation:	0.869	percent:	50.6%
variables:	h 6		12 17		
coefficients:	0.0008 0.0211		0.0608 -0.0997		
7: number of model variables:	4	correlation:	0.891	percent:	54.6%
variables:	h 3		14 17		
coefficients:	0.0000 -0.0079		0.0260 -0.0768		
8: number of model variables:	4	correlation:	0.889	percent:	54.2%
variables:	h 3		12 17		
coefficients:	0.0004 -0.0067		0.0589 -0.0911		
9: number of model variables:	4	correlation:	0.895	percent:	55.4%
variables:	h 3		8 17		
coefficients:	-0.0006 -0.0130		0.0198 -0.0424		
10: number of model variables:	4	correlation:	0.906	percent:	57.7%
variables:	h 3		12 17		
coefficients:	0.0002 -0.0086		0.0632 -0.0838		
11: number of model variables:	4	correlation:	0.913	percent:	59.2%
variables:	h 1		3 17		
coefficients:	-0.0005 0.2408		-0.0112 -0.0379		
12: number of model variables:	4	correlation:	0.888	percent:	54.0%
variables:	h 3		12 17		
coefficients:	0.0001 -0.0098		0.0406 -0.0721		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 10.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.377	-0.420
2	0.358	-0.443
3	0.276	-0.660
4	0.274	-0.586
5	0.253	-0.933
6	0.199	-0.960
7	0.214	-0.921
8	0.255	-0.956
9	0.300	-0.835
10	0.366	-0.549
11	0.323	-0.686
12	0.268	-0.715
MEAN	0.289	-0.722

Annex 11. Wind direction, component U

Table 11.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.727	percent:	31.4%
variables:	h 2	8	11	12	13
coefficients:	0.0018	0.0278	0.0542	0.0616	0.0539 -0.0641
2: number of model variables:	6	correlation:	0.611	percent:	20.8%
variables:	h 2	3	8	11	13
coefficients:	0.0008	0.0257	-0.0141	0.0444	0.0812 -0.0931
3: number of model variables:	6	correlation:	0.505	percent:	13.7%
variables:	h 1	3	8	12	14
coefficients:	-0.0008	-0.0084	-0.0134	0.0618	0.0556 -0.0581
4: number of model variables:	6	correlation:	0.540	percent:	15.8%
variables:	h 5	8	11	12	13
coefficients:	-0.0003	-0.0458	0.0708	0.0696	0.0660 -0.1060
5: number of model variables:	6	correlation:	0.505	percent:	13.7%
variables:	h 3	4	8	9	12
coefficients:	-0.0006	-0.0157	0.0549	0.0957	0.0640 0.0650
6: number of model variables:	6	correlation:	0.448	percent:	10.6%
variables:	h 4	5	8	11	13
coefficients:	-0.0009	0.0393	-0.0305	0.0590	0.0875 -0.1671
7: number of model variables:	6	correlation:	0.420	percent:	9.3%
variables:	h 4	5	8	11	13
coefficients:	-0.0007	0.0373	-0.0267	0.0511	0.0831 -0.1442
8: number of model variables:	6	correlation:	0.407	percent:	8.7%
variables:	h 4	5	8	12	13
coefficients:	-0.0002	0.0234	-0.0250	0.0556	0.0528 -0.0791
9: number of model variables:	6	correlation:	0.548	percent:	16.3%
variables:	h 3	4	8	9	12
coefficients:	-0.0002	-0.0194	0.0458	0.0751	0.0433 0.0627
10: number of model variables:	6	correlation:	0.697	percent:	28.3%
variables:	h 2	3	8	12	13
coefficients:	0.0005	0.0236	-0.0157	0.0555	0.0458 -0.0648
11: number of model variables:	6	correlation:	0.778	percent:	37.2%
variables:	h 1	2	3	8	12
coefficients:	-0.0001	-0.0086	0.0150	-0.0156	0.0875 0.1054
12: number of model variables:	6	correlation:	0.777	percent:	37.1%
variables:	h 3	4	8	9	12
coefficients:	0.0011	-0.0141	0.0487	0.1086	0.0601 0.1169

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 11.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
Number of stations: 66

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.559	0.299
2	0.571	0.340
3	0.562	0.331
4	0.502	0.192
5	0.507	0.168
6	0.444	-0.031
7	0.488	0.047
8	0.421	-0.001
9	0.482	0.037
10	0.532	0.313
11	0.541	0.248
12	0.512	0.171
MEAN	0.510	0.176

Table 11.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.706	percent:	29.2%
variables:	h 3 4 5 6 11				
coefficients:	0.0009 -0.0340 -0.0184 0.0247 0.0267 0.0258				
2: number of model variables:	5	correlation:	0.786	percent:	38.2%
variables:	h 3 6 12 15				
coefficients:	0.0009 -0.0449 0.0180 0.0360 -0.0561				
3: number of model variables:	6	correlation:	0.795	percent:	39.4%
variables:	h 1 3 4 12 15				
coefficients:	0.0004 0.0093 -0.0481 -0.0256 0.0469 -0.0565				
4: number of model variables:	6	correlation:	0.806	percent:	40.8%
variables:	h 1 3 4 12 15				
coefficients:	0.0002 0.0056 -0.0396 -0.0182 0.0383 -0.0555				
5: number of model variables:	5	correlation:	0.758	percent:	34.7%
variables:	h 3 12 14 15				
coefficients:	0.0003 -0.0265 0.0282 -0.0275 -0.0437				
6: number of model variables:	6	correlation:	0.636	percent:	22.8%
variables:	h 1 3 12 14 15				
coefficients:	0.0000 -0.0036 -0.0206 0.0362 -0.0446 -0.0321				
7: number of model variables:	4	correlation:	0.618	percent:	21.4%
variables:	h 3 12 15				
coefficients:	-0.0004 -0.0168 0.0264 -0.0361				
8: number of model variables:	4	correlation:	0.787	percent:	38.3%
variables:	h 3 12 15				
coefficients:	-0.0002 -0.0224 0.0255 -0.0247				
9: number of model variables:	6	correlation:	0.739	percent:	32.6%
variables:	h 1 3 6 12 15				
coefficients:	0.0002 0.0038 -0.0280 0.0173 0.0374 -0.0493				
10: number of model variables:	6	correlation:	0.811	percent:	41.5%
variables:	h 1 3 6 12 15				
coefficients:	0.0009 0.0122 -0.0526 0.0342 0.0520 -0.0905				
11: number of model variables:	6	correlation:	0.777	percent:	37.1%
variables:	h 1 3 6 12 15				
coefficients:	0.0014 0.0097 -0.0607 0.0362 0.0673 -0.1021				
12: number of model variables:	6	correlation:	0.732	percent:	31.8%
variables:	h 2 3 4 6 12				
coefficients:	0.0007 0.0166 -0.0395 -0.0278 0.0237 0.0505				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 11.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 40

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.609	0.263
2	0.608	0.347
3	0.629	0.390
4	0.530	0.290
5	0.499	0.215
6	0.446	0.086
7	0.423	-0.020
8	0.338	-0.058
9	0.480	0.159
10	0.560	0.200
11	0.547	0.186
12	0.502	0.133
MEAN	0.514	0.183

Table 11.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.847 percent: 46.8%
 variables: h 1 3 4 5 8
 coefficients: 0.0005 -0.0139 -0.0154 0.0287 0.0434 0.0444

2: number of model variables: 6 correlation: 0.816 percent: 42.2%
 variables: h 1 3 4 5 8
 coefficients: 0.0005 -0.0119 -0.0156 0.0269 0.0425 0.0373

3: number of model variables: 6 correlation: 0.827 percent: 43.8%
 variables: h 1 3 4 5 8
 coefficients: 0.0005 -0.0106 -0.0128 0.0261 0.0399 0.0338

4: number of model variables: 6 correlation: 0.746 percent: 33.4%
 variables: h 1 3 4 5 6
 coefficients: 0.0003 -0.0072 -0.0151 0.0149 0.0188 0.0193

5: number of model variables: 6 correlation: 0.622 percent: 21.7%
 variables: h 1 3 4 5 6
 coefficients: 0.0001 -0.0048 -0.0100 0.0110 0.0117 0.0130

6: number of model variables: 6 correlation: 0.709 percent: 29.4%
 variables: h 1 3 4 5 8
 coefficients: 0.0000 -0.0069 -0.0065 0.0193 0.0215 0.0221

7: number of model variables: 6 correlation: 0.641 percent: 23.3%
 variables: h 1 3 4 5 8
 coefficients: 0.0000 -0.0064 -0.0075 0.0168 0.0217 0.0198

8: number of model variables: 6 correlation: 0.602 percent: 20.1%
 variables: h 1 3 4 5 8
 coefficients: 0.0001 -0.0043 -0.0050 0.0121 0.0167 0.0148

9: number of model variables: 6 correlation: 0.767 percent: 35.8%
 variables: h 1 3 5 6 11
 coefficients: 0.0003 -0.0079 -0.0150 0.0247 0.0188 -0.0308

10: number of model variables: 6 correlation: 0.809 percent: 41.2%
 variables: h 1 3 5 6 11
 coefficients: 0.0006 -0.0093 -0.0202 0.0342 0.0266 -0.0382

11: number of model variables: 6 correlation: 0.863 percent: 49.5%
 variables: h 1 3 4 5 6
 coefficients: 0.0006 -0.0140 -0.0234 0.0234 0.0370 0.0295

12: number of model variables: 6 correlation: 0.845 percent: 46.5%
 variables: h 1 3 5 6 11
 coefficients: 0.0006 -0.0163 -0.0282 0.0452 0.0339 -0.0604

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 11.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 119

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.520	-0.170
2	0.522	-0.081
3	0.541	0.035
4	0.474	-0.032
5	0.467	-0.034
6	0.426	-0.113
7	0.437	-0.089
8	0.362	-0.182
9	0.433	-0.114
10	0.509	-0.118
11	0.524	-0.157
12	0.443	-0.561
MEAN	0.472	-0.135

Table 11.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.829 percent: 44.1%
variables: h 1 4 5 10 11
coefficients: 0.0003 -0.0114 -0.0422 -0.0562 -0.0550 -0.0951

2: number of model variables: 6 correlation: 0.846 percent: 46.7%
variables: h 1 5 8 10 11
coefficients: 0.0009 -0.0104 -0.0454 0.0599 -0.0534 -0.0727

3: number of model variables: 6 correlation: 0.828 percent: 43.9%
variables: h 1 5 8 10 11
coefficients: 0.0006 -0.0081 -0.0378 0.0478 -0.0397 -0.0523

4: number of model variables: 6 correlation: 0.637 percent: 22.9%
variables: h 1 5 8 10 13
coefficients: 0.0002 -0.0039 -0.0226 0.0253 -0.0152 0.0224

5: number of model variables: 5 correlation: 0.608 percent: 20.6%
variables: h 1 7 8 10
coefficients: 0.0003 -0.0041 -0.0129 0.0288 -0.0215

6: number of model variables: 6 correlation: 0.735 percent: 32.2%
variables: h 1 5 8 10 11
coefficients: -0.0004 -0.0077 -0.0160 0.0333 -0.0243 -0.0349

7: number of model variables: 6 correlation: 0.710 percent: 29.6%
variables: h 1 7 8 10 11
coefficients: -0.0002 -0.0082 -0.0187 0.0306 -0.0327 -0.0240

8: number of model variables: 6 correlation: 0.624 percent: 21.9%
variables: h 1 5 8 10 11
coefficients: -0.0002 -0.0047 -0.0176 0.0260 -0.0223 -0.0280

9: number of model variables: 6 correlation: 0.784 percent: 38.0%
variables: h 1 5 8 10 11
coefficients: 0.0002 -0.0076 -0.0251 0.0316 -0.0367 -0.0432

10: number of model variables: 6 correlation: 0.847 percent: 46.8%
variables: h 1 4 5 10 11
coefficients: 0.0005 -0.0066 -0.0248 -0.0318 -0.0353 -0.0537

11: number of model variables: 6 correlation: 0.860 percent: 48.9%
variables: h 1 4 5 10 11
coefficients: 0.0008 -0.0092 -0.0385 -0.0383 -0.0444 -0.0653

12: number of model variables: 6 correlation: 0.840 percent: 45.7%
variables: h 1 4 5 10 11
coefficients: 0.0003 -0.0113 -0.0397 -0.0551 -0.0532 -0.0920

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 11.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.524	-0.156
2	0.536	0.029
3	0.535	0.068
4	0.469	0.155
5	0.439	0.063
6	0.433	-0.004
7	0.438	-0.079
8	0.423	-0.101
9	0.455	-0.134
10	0.508	-0.071
11	0.533	-0.034
12	0.476	-0.382
MEAN	0.481	-0.054

Table 11.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.761 percent: 35.2%
 variables: h 1 4 5 11 14
 coefficients: 0.0007 -0.0051 -0.0107 0.0132 0.0429 0.0499

2: number of model variables: 6 correlation: 0.754 percent: 34.3%
 variables: h 1 2 8 11 14
 coefficients: 0.0002 -0.0042 0.0051 0.0158 0.0391 0.0431

3: number of model variables: 5 correlation: 0.696 percent: 28.2%
 variables: h 1 11 14 15
 coefficients: 0.0003 -0.0028 0.0312 0.0372 0.0162

4: number of model variables: 6 correlation: 0.694 percent: 28.0%
 variables: h 2 5 8 11 14
 coefficients: -0.0001 0.0078 -0.0137 0.0194 0.0478 0.0280

5: number of model variables: 6 correlation: 0.617 percent: 21.3%
 variables: h 5 8 9 11 14
 coefficients: -0.0002 -0.0095 0.0135 -0.0155 0.0398 0.0314

6: number of model variables: 6 correlation: 0.510 percent: 14.0%
 variables: h 1 2 4 11 14
 coefficients: -0.0003 -0.0021 0.0041 0.0063 0.0288 0.0329

7: number of model variables: 6 correlation: 0.544 percent: 16.1%
 variables: h 1 3 4 11 14
 coefficients: -0.0002 -0.0037 0.0067 0.0063 0.0210 0.0355

8: number of model variables: 6 correlation: 0.559 percent: 17.1%
 variables: h 1 2 7 11 14
 coefficients: -0.0002 -0.0029 0.0037 -0.0116 0.0294 0.0281

9: number of model variables: 5 correlation: 0.597 percent: 19.8%
 variables: h 1 2 11 14
 coefficients: 0.0001 -0.0019 0.0042 0.0287 0.0305

10: number of model variables: 6 correlation: 0.734 percent: 32.1%
 variables: h 1 4 5 8 10
 coefficients: 0.0005 -0.0030 -0.0101 0.0097 0.0123 0.0131

11: number of model variables: 6 correlation: 0.803 percent: 40.4%
 variables: h 1 4 5 7 15
 coefficients: 0.0008 -0.0066 -0.0096 0.0153 -0.0281 0.0184

12: number of model variables: 6 correlation: 0.800 percent: 40.1%
 variables: h 1 4 5 11 14
 coefficients: 0.0007 -0.0057 -0.0089 0.0131 0.0292 0.0417

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 11.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 53

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.434	-0.087
2	0.443	0.009
3	0.459	0.066
4	0.363	0.001
5	0.352	-0.085
6	0.346	-0.139
7	0.386	-0.065
8	0.347	-0.075
9	0.391	-0.065
10	0.417	-0.055
11	0.411	-0.110
12	0.360	-0.225
MEAN	0.392	-0.069

Table 11.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	5	correlation:	0.613	percent:	21.0%
variables:	h 1	5	7	9	
coefficients:	0.0003 -0.0087	0.0313	0.0248	0.0379	
2: number of model variables:	6	correlation:	0.614	percent:	21.1%
variables:	h 1	5	8	11	14
coefficients:	0.0000 -0.0076	0.0148	0.0173	0.0284	0.0566
3: number of model variables:	6	correlation:	0.601	percent:	20.1%
variables:	h 1	2	10	11	14
coefficients:	0.0001 -0.0044	0.0062	-0.0166	0.0220	0.0378
4: number of model variables:	6	correlation:	0.725	percent:	31.1%
variables:	h 2	5	6	8	15
coefficients:	0.0000 0.0054	-0.0075	0.0192	0.0188	-0.0217
5: number of model variables:	6	correlation:	0.663	percent:	25.1%
variables:	h 2	5	6	8	15
coefficients:	0.0000 0.0049	-0.0047	0.0189	0.0139	-0.0173
6: number of model variables:	6	correlation:	0.555	percent:	16.8%
variables:	h 2	4	6	10	11
coefficients:	-0.0001 0.0056	0.0125	0.0142	-0.0168	0.0143
7: number of model variables:	6	correlation:	0.546	percent:	16.2%
variables:	h 1	2	4	6	14
coefficients:	-0.0004 -0.0047	0.0067	0.0080	0.0178	0.0502
8: number of model variables:	6	correlation:	0.569	percent:	17.8%
variables:	h 1	2	4	6	9
coefficients:	-0.0002 -0.0022	0.0042	0.0066	0.0148	0.0105
9: number of model variables:	6	correlation:	0.558	percent:	17.0%
variables:	h 2	4	6	7	10
coefficients:	-0.0001 0.0045	0.0113	0.0180	0.0237	-0.0169
10: number of model variables:	5	correlation:	0.611	percent:	20.8%
variables:	h 1	5	8	15	
coefficients:	0.0001 -0.0055	0.0120	0.0148	0.0253	
11: number of model variables:	6	correlation:	0.651	percent:	24.1%
variables:	h 1	5	8	14	15
coefficients:	0.0000 -0.0106	0.0192	0.0206	0.0444	0.0475
12: number of model variables:	6	correlation:	0.678	percent:	26.5%
variables:	h 1	5	8	14	15
coefficients:	-0.0002 -0.0125	0.0233	0.0190	0.0707	0.0387

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 11.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 42

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.465	-0.054
2	0.493	0.053
3	0.510	0.120
4	0.438	0.119
5	0.425	0.036
6	0.409	-0.034
7	0.428	-0.042
8	0.389	-0.019
9	0.441	0.015
10	0.460	0.054
11	0.444	-0.042
12	0.417	-0.064
MEAN	0.443	0.012

Table 11.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.880	percent:	52.4%
variables:	h 2 3 8				
coefficients:	0.0007 0.1120 -0.0637 0.1658				
2: number of model variables:	4	correlation:	0.910	percent:	58.6%
variables:	h 2 3 8				
coefficients:	0.0007 0.0852 -0.0508 0.1191				
3: number of model variables:	4	correlation:	0.851	percent:	47.5%
variables:	h 2 3 8				
coefficients:	0.0008 0.0685 -0.0427 0.0895				
4: number of model variables:	4	correlation:	0.768	percent:	35.9%
variables:	h 3 9 10				
coefficients:	0.0005 -0.0154 -0.0542 0.1084				
5: number of model variables:	4	correlation:	0.755	percent:	34.5%
variables:	h 3 9 10				
coefficients:	0.0005 -0.0134 -0.0570 0.1040				
6: number of model variables:	4	correlation:	0.749	percent:	33.7%
variables:	h 9 10 15				
coefficients:	0.0009 -0.0394 0.1302 -0.0518				
7: number of model variables:	4	correlation:	0.838	percent:	45.5%
variables:	h 9 10 15				
coefficients:	0.0012 -0.0407 0.1478 -0.0607				
8: number of model variables:	4	correlation:	0.829	percent:	44.1%
variables:	h 9 10 11				
coefficients:	0.0008 -0.0375 0.0942 0.0375				
9: number of model variables:	4	correlation:	0.843	percent:	46.2%
variables:	h 1 2 3				
coefficients:	-0.0002 -0.0072 0.0343 -0.0305				
10: number of model variables:	4	correlation:	0.848	percent:	47.0%
variables:	h 2 3 5				
coefficients:	0.0009 0.0511 -0.0301 0.0369				
11: number of model variables:	4	correlation:	0.885	percent:	53.5%
variables:	h 2 5 13				
coefficients:	0.0012 0.0350 0.0579 -0.0758				
12: number of model variables:	4	correlation:	0.862	percent:	49.4%
variables:	h 2 3 8				
coefficients:	0.0010 0.1033 -0.0611 0.1597				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 11.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.537	0.041
2	0.524	0.129
3	0.565	0.218
4	0.452	0.077
5	0.432	-0.037
6	0.380	-0.129
7	0.442	0.008
8	0.419	0.032
9	0.472	-0.040
10	0.494	0.066
11	0.472	0.116
12	0.455	-0.117
MEAN	0.470	0.030

Annex 12. Wind direction, component V

Table 12.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.560	percent:	17.2%
variables:	h 3		7 11 12 14		
coefficients:	0.0007 0.0337	0.0599 -0.0674 -0.0617 -0.0791			
2: number of model variables:	6	correlation:	0.538	percent:	15.7%
variables:	h 3		7 11 12 14		
coefficients:	0.0006 0.0310	0.0579 -0.0450 -0.0668 -0.0978			
3: number of model variables:	5	correlation:	0.538	percent:	15.7%
variables:	h 3		7 12 14		
coefficients:	0.0004 0.0227	0.0512 -0.0859 -0.0788			
4: number of model variables:	5	correlation:	0.568	percent:	17.7%
variables:	h 3		7 12 14		
coefficients:	0.0005 0.0224	0.0569 -0.1003 -0.0939			
5: number of model variables:	6	correlation:	0.542	percent:	16.0%
variables:	h 3		4 7 12 14		
coefficients:	0.0006 0.0193	-0.0233 0.0473 -0.0890 -0.0974			
6: number of model variables:	6	correlation:	0.517	percent:	14.4%
variables:	h 3		4 8 12 14		
coefficients:	0.0006 0.0109	-0.0353 -0.0388 -0.1120 -0.0711			
7: number of model variables:	6	correlation:	0.672	percent:	25.9%
variables:	h 4		8 9 12 14		
coefficients:	0.0004 -0.0670	-0.0784 -0.0603 -0.1670 -0.0621			
8: number of model variables:	6	correlation:	0.561	percent:	17.2%
variables:	h 4		8 9 12 14		
coefficients:	0.0005 -0.0333	-0.0443 -0.0317 -0.1137 -0.0568			
9: number of model variables:	6	correlation:	0.490	percent:	12.8%
variables:	h 3		7 11 12 14		
coefficients:	0.0005 0.0159	0.0359 -0.0432 -0.0820 -0.0686			
10: number of model variables:	6	correlation:	0.606	percent:	20.4%
variables:	h 2		3 7 11 12		
coefficients:	0.0014 0.0230	0.0313 0.0366 -0.0534 -0.0344			
11: number of model variables:	6	correlation:	0.581	percent:	18.6%
variables:	h 2		3 7 11 12		
coefficients:	0.0014 0.0306	0.0387 0.0400 -0.0506 -0.0502			
12: number of model variables:	6	correlation:	0.566	percent:	17.5%
variables:	h 2		3 7 11 12		
coefficients:	0.0005 0.0305	0.0330 0.0554 -0.0776 -0.0554			

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 12.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
Number of stations: 66

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.517	0.163
2	0.543	0.247
3	0.535	0.207
4	0.573	0.291
5	0.552	0.207
6	0.501	0.112
7	0.456	0.049
8	0.440	0.014
9	0.531	0.173
10	0.539	0.251
11	0.539	0.262
12	0.528	0.248
MEAN	0.521	0.185

Table 12.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables: 6 correlation: 0.593 percent: 19.5%
 variables: h 5 6 8 11 13
 coefficients: 0.0008 -0.0538 -0.0486 -0.1137 -0.1003 0.0990

2: number of model variables: 6 correlation: 0.545 percent: 16.2%
 variables: h 5 6 8 11 13
 coefficients: 0.0004 -0.0543 -0.0428 -0.1030 -0.0979 0.0837

3: number of model variables: 6 correlation: 0.494 percent: 13.1%
 variables: h 5 6 10 11 12
 coefficients: 0.0006 -0.0920 -0.0512 -0.0740 -0.0710 -0.0888

4: number of model variables: 6 correlation: 0.559 percent: 17.1%
 variables: h 5 6 8 11 13
 coefficients: 0.0005 -0.0443 -0.0466 -0.1045 -0.0849 0.0883

5: number of model variables: 6 correlation: 0.523 percent: 14.8%
 variables: h 5 6 8 11 13
 coefficients: 0.0004 -0.0332 -0.0327 -0.0734 -0.0578 0.0502

6: number of model variables: 6 correlation: 0.436 percent: 10.0%
 variables: h 3 5 6 11 12
 coefficients: 0.0004 0.0096 -0.0193 -0.0216 -0.0195 -0.0425

7: number of model variables: 6 correlation: 0.291 percent: 4.3%
 variables: h 3 5 6 11 12
 coefficients: 0.0004 0.0055 -0.0134 -0.0179 -0.0166 -0.0378

8: number of model variables: 6 correlation: 0.376 percent: 7.3%
 variables: h 3 5 6 11 12
 coefficients: 0.0001 0.0070 -0.0185 -0.0222 -0.0289 -0.0473

9: number of model variables: 6 correlation: 0.468 percent: 11.6%
 variables: h 5 6 8 9 11
 coefficients: -0.0002 -0.0358 -0.0276 -0.0484 0.0298 -0.0463

10: number of model variables: 6 correlation: 0.517 percent: 14.4%
 variables: h 5 6 8 11 13
 coefficients: 0.0000 -0.0649 -0.0578 -0.1200 -0.1115 0.0780

11: number of model variables: 6 correlation: 0.527 percent: 15.0%
 variables: h 5 6 8 11 13
 coefficients: 0.0007 -0.0719 -0.0626 -0.1485 -0.1374 0.1111

12: number of model variables: 6 correlation: 0.609 percent: 20.7%
 variables: h 5 6 8 11 13
 coefficients: 0.0012 -0.0630 -0.0473 -0.1270 -0.1256 0.1095

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 12.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 40

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.371	-0.165
2	0.432	0.078
3	0.477	0.095
4	0.438	0.097
5	0.366	0.015
6	0.281	-0.112
7	0.298	-0.113
8	0.310	-0.167
9	0.386	-0.082
10	0.453	-0.084
11	0.394	-0.181
12	0.401	-0.125
MEAN	0.384	-0.062

Table 12.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.618	percent:	21.4%
variables:	h 1 2 8 11 14				
coefficients:	-0.0003 0.0054 0.0162 -0.0195 0.0344 0.0471				
2: number of model variables:	6	correlation:	0.631	percent:	22.4%
variables:	h 1 2 3 11 14				
coefficients:	-0.0001 0.0048 0.0142 0.0062 0.0333 0.0580				
3: number of model variables:	6	correlation:	0.594	percent:	19.6%
variables:	h 1 2 3 11 14				
coefficients:	0.0000 0.0030 0.0121 0.0069 0.0269 0.0477				
4: number of model variables:	6	correlation:	0.686	percent:	27.2%
variables:	h 1 2 3 5 15				
coefficients:	0.0003 0.0021 0.0124 0.0071 0.0126 0.0345				
5: number of model variables:	6	correlation:	0.617	percent:	21.3%
variables:	h 1 2 3 5 15				
coefficients:	0.0002 0.0027 0.0089 0.0052 0.0101 0.0330				
6: number of model variables:	6	correlation:	0.547	percent:	16.3%
variables:	h 1 2 7 8 15				
coefficients:	-0.0001 0.0038 0.0096 0.0128 -0.0136 0.0347				
7: number of model variables:	6	correlation:	0.644	percent:	23.5%
variables:	h 1 2 8 11 15				
coefficients:	-0.0002 0.0044 0.0090 -0.0184 0.0211 0.0445				
8: number of model variables:	6	correlation:	0.638	percent:	23.0%
variables:	h 1 2 5 8 15				
coefficients:	0.0002 0.0043 0.0083 0.0068 -0.0130 0.0383				
9: number of model variables:	6	correlation:	0.693	percent:	27.9%
variables:	h 1 2 3 11 15				
coefficients:	0.0000 0.0034 0.0102 0.0067 0.0184 0.0445				
10: number of model variables:	6	correlation:	0.664	percent:	25.2%
variables:	h 1 2 3 14 15				
coefficients:	0.0002 0.0038 0.0125 0.0070 0.0248 0.0359				
11: number of model variables:	6	correlation:	0.713	percent:	29.9%
variables:	h 2 3 6 7 14				
coefficients:	0.0001 0.0166 0.0065 0.0120 0.0188 0.0425				
12: number of model variables:	6	correlation:	0.607	percent:	20.6%
variables:	h 1 2 3 11 14				
coefficients:	0.0000 0.0030 0.0136 0.0072 0.0325 0.0444				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 12.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 119

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.417	-0.403
2	0.437	-0.174
3	0.444	-0.017
4	0.402	-0.035
5	0.382	-0.018
6	0.321	-0.146
7	0.369	-0.121
8	0.348	-0.086
9	0.375	-0.120
10	0.444	-0.079
11	0.442	-0.194
12	0.418	-0.260
MEAN	0.400	-0.138

Table 12.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.860	percent:	49.0%
variables:	h 1 2 3 5 8				
coefficients:	0.0005 -0.0082 0.0286 0.0500 -0.0220 0.0707				
2: number of model variables:	6	correlation:	0.839	percent:	45.5%
variables:	h 2 3 5 6 11				
coefficients:	0.0003 0.0303 0.0321 -0.0238 -0.0549 -0.0414				
3: number of model variables:	6	correlation:	0.824	percent:	43.3%
variables:	h 2 3 5 6 11				
coefficients:	0.0001 0.0298 0.0301 -0.0229 -0.0608 -0.0423				
4: number of model variables:	6	correlation:	0.754	percent:	34.3%
variables:	h 2 3 5 6 14				
coefficients:	-0.0001 0.0250 0.0256 -0.0132 -0.0562 -0.0283				
5: number of model variables:	6	correlation:	0.737	percent:	32.5%
variables:	h 2 3 6 14 15				
coefficients:	-0.0002 0.0234 0.0290 -0.0431 -0.0268 -0.0276				
6: number of model variables:	6	correlation:	0.712	percent:	29.8%
variables:	h 2 3 6 8 14				
coefficients:	-0.0002 0.0213 0.0343 -0.0328 0.0194 -0.0223				
7: number of model variables:	6	correlation:	0.739	percent:	32.7%
variables:	h 2 3 6 14 15				
coefficients:	-0.0003 0.0264 0.0309 -0.0407 -0.0446 -0.0426				
8: number of model variables:	6	correlation:	0.746	percent:	33.4%
variables:	h 2 3 6 14 15				
coefficients:	-0.0003 0.0239 0.0263 -0.0375 -0.0251 -0.0377				
9: number of model variables:	6	correlation:	0.818	percent:	42.5%
variables:	h 2 3 5 6 11				
coefficients:	-0.0001 0.0193 0.0269 -0.0185 -0.0309 -0.0337				
10: number of model variables:	6	correlation:	0.845	percent:	46.5%
variables:	h 1 2 3 8 11				
coefficients:	0.0004 -0.0057 0.0184 0.0363 0.0380 -0.0282				
11: number of model variables:	6	correlation:	0.891	percent:	54.5%
variables:	h 1 3 4 5 11				
coefficients:	0.0007 -0.0071 0.0159 -0.0306 -0.0412 -0.0652				
12: number of model variables:	6	correlation:	0.849	percent:	47.2%
variables:	h 2 3 5 6 11				
coefficients:	0.0006 0.0189 0.0273 -0.0267 -0.0370 -0.0505				

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 12.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.476	0.072
2	0.494	0.170
3	0.501	0.167
4	0.495	0.191
5	0.488	0.181
6	0.398	-0.034
7	0.477	0.112
8	0.413	0.048
9	0.441	0.167
10	0.500	0.163
11	0.475	0.166
12	0.464	0.136
MEAN	0.468	0.128

Table 12.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.532	percent:	15.3%
variables:	h 1 2 3 6 9				
coefficients:	0.0001 -0.0057 0.0052 0.0076 -0.0281 0.0272				
2: number of model variables:	5	correlation:	0.556	percent:	16.9%
variables:	h 1 3 6 9				
coefficients:	0.0003 -0.0041 0.0088 -0.0293 0.0157				
3: number of model variables:	5	correlation:	0.572	percent:	18.0%
variables:	h 3 5 6 11				
coefficients:	0.0004 0.0058 -0.0086 -0.0233 0.0204				
4: number of model variables:	4	correlation:	0.594	percent:	19.6%
variables:	h 3 6 7				
coefficients:	0.0007 0.0049 -0.0169 0.0141				
5: number of model variables:	4	correlation:	0.514	percent:	14.2%
variables:	h 6 7 12				
coefficients:	0.0005 -0.0148 0.0135 -0.0154				
6: number of model variables:	6	correlation:	0.412	percent:	8.9%
variables:	h 1 6 7 10 13				
coefficients:	0.0005 0.0029 -0.0198 0.0141 -0.0132 -0.0186				
7: number of model variables:	4	correlation:	0.425	percent:	9.5%
variables:	h 1 3 6				
coefficients:	0.0004 0.0027 -0.0060 -0.0189				
8: number of model variables:	2	correlation:	0.446	percent:	10.5%
variables:	h 6				
coefficients:	0.0004 -0.0143				
9: number of model variables:	2	correlation:	0.570	percent:	17.8%
variables:	h 6				
coefficients:	0.0006 -0.0137				
10: number of model variables:	6	correlation:	0.766	percent:	35.7%
variables:	h 1 3 6 9 10				
coefficients:	0.0003 -0.0085 0.0128 -0.0130 0.0297 0.0215				
11: number of model variables:	6	correlation:	0.777	percent:	37.0%
variables:	h 1 3 9 10 15				
coefficients:	0.0005 -0.0084 0.0152 0.0301 0.0274 0.0224				
12: number of model variables:	6	correlation:	0.731	percent:	31.8%
variables:	h 1 2 6 9 11				
coefficients:	0.0007 -0.0041 0.0106 -0.0151 0.0175 0.0363				

(percent=(1-RMSE/ (Standard Deviation))*100%)

Table 12.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 53

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.383	-0.183
2	0.435	-0.048
3	0.424	-0.090
4	0.445	0.047
5	0.454	0.061
6	0.419	-0.025
7	0.388	-0.137
8	0.361	-0.116
9	0.409	-0.123
10	0.386	-0.153
11	0.392	-0.240
12	0.367	-0.172
MEAN	0.405	-0.098

Table 12.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	6	correlation:	0.565	percent:	17.5%
variables:	h 1 2 6 13 14				
coefficients:	-0.0013 -0.0126 0.0069 -0.0130 0.0466 0.0555				
2: number of model variables:	6	correlation:	0.546	percent:	16.2%
variables:	h 1 2 6 13 14				
coefficients:	-0.0009 -0.0106 0.0076 -0.0145 0.0273 0.0571				
3: number of model variables:	6	correlation:	0.573	percent:	18.0%
variables:	h 1 2 6 13 14				
coefficients:	-0.0006 -0.0087 0.0072 -0.0118 0.0319 0.0479				
4: number of model variables:	6	correlation:	0.672	percent:	26.0%
variables:	h 1 2 6 13 14				
coefficients:	-0.0002 -0.0053 0.0082 -0.0086 0.0223 0.0310				
5: number of model variables:	6	correlation:	0.630	percent:	22.4%
variables:	h 2 3 12 13 15				
coefficients:	0.0001 0.0111 -0.0110 -0.0473 0.0172 -0.0384				
6: number of model variables:	6	correlation:	0.497	percent:	13.2%
variables:	h 4 6 8 10 12				
coefficients:	-0.0002 -0.0109 -0.0068 0.0246 0.0223 -0.0151				
7: number of model variables:	6	correlation:	0.606	percent:	20.5%
variables:	h 3 4 6 8 10				
coefficients:	-0.0003 -0.0056 -0.0129 -0.0134 0.0111 0.0144				
8: number of model variables:	6	correlation:	0.491	percent:	12.9%
variables:	h 1 4 5 6 9				
coefficients:	-0.0001 -0.0047 -0.0052 0.0079 -0.0160 0.0083				
9: number of model variables:	6	correlation:	0.727	percent:	31.3%
variables:	h 1 3 5 6 9				
coefficients:	0.0000 -0.0079 0.0034 0.0119 -0.0194 0.0175				
10: number of model variables:	6	correlation:	0.706	percent:	29.2%
variables:	h 1 2 9 10 13				
coefficients:	-0.0004 -0.0099 0.0074 0.0339 0.0325 0.0432				
11: number of model variables:	6	correlation:	0.699	percent:	28.5%
variables:	h 1 5 9 13 15				
coefficients:	-0.0005 -0.0128 0.0225 0.0139 0.0319 0.0465				
12: number of model variables:	6	correlation:	0.724	percent:	31.0%
variables:	h 1 2 4 5 8				
coefficients:	-0.0006 -0.0119 0.0068 -0.0159 0.0132 0.0179				

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 12.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 42

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.380	-0.053
2	0.407	0.058
3	0.417	0.053
4	0.432	0.148
5	0.424	0.145
6	0.398	0.053
7	0.367	0.006
8	0.365	0.038
9	0.370	0.020
10	0.385	-0.070
11	0.418	0.011
12	0.394	0.000
MEAN	0.396	0.034

Table 12.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

1: number of model variables:	4	correlation:	0.749	percent:	33.8%
variables:	h 2 10 12				
coefficients:	-0.0004 0.0636 -0.1579 0.0867				
2: number of model variables:	4	correlation:	0.788	percent:	38.4%
variables:	h 2 10 12				
coefficients:	-0.0002 0.0595 -0.1114 0.0549				
3: number of model variables:	4	correlation:	0.880	percent:	52.6%
variables:	h 2 8 14				
coefficients:	0.0000 0.0482 0.0685 0.0426				
4: number of model variables:	4	correlation:	0.849	percent:	47.2%
variables:	h 2 10 14				
coefficients:	-0.0001 0.0317 -0.0677 0.0634				
5: number of model variables:	4	correlation:	0.668	percent:	25.6%
variables:	h 2 10 14				
coefficients:	-0.0006 0.0281 -0.0889 0.0703				
6: number of model variables:	4	correlation:	0.627	percent:	22.1%
variables:	h 2 10 15				
coefficients:	-0.0011 0.0235 -0.1119 0.0830				
7: number of model variables:	4	correlation:	0.530	percent:	15.2%
variables:	h 1 2 8				
coefficients:	0.0006 0.0109 0.0368 0.1001				
8: number of model variables:	4	correlation:	0.601	percent:	20.1%
variables:	h 3 5 14				
coefficients:	0.0001 0.0231 0.0254 0.0762				
9: number of model variables:	4	correlation:	0.866	percent:	50.1%
variables:	h 2 7 10				
coefficients:	0.0005 0.0305 -0.0934 -0.0739				
10: number of model variables:	4	correlation:	0.906	percent:	57.6%
variables:	h 2 7 10				
coefficients:	0.0008 0.0397 -0.1541 -0.0858				
11: number of model variables:	4	correlation:	0.864	percent:	49.6%
variables:	h 3 7 13				
coefficients:	0.0011 0.0381 -0.1219 -0.0403				
12: number of model variables:	4	correlation:	0.768	percent:	35.9%
variables:	h 2 7 11				
coefficients:	-0.0001 0.0555 -0.1233 -0.0679				

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 12.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.457	-0.118
2	0.520	0.108
3	0.483	0.206
4	0.497	0.182
5	0.496	0.047
6	0.435	-0.005
7	0.430	-0.121
8	0.379	-0.095
9	0.456	0.040
10	0.430	-0.155
11	0.430	-0.071
12	0.453	-0.001
MEAN	0.455	0.001

**Annex 13. Report on extra wind variables provided
for the Digital Climate Atlas**

Besides the variables listed in Table 1 (5.2.1) we had also two extra wind variables to be provided for the Digital Climate Atlas. The description of their gridded datasets is included by the deliverable D2.8 while the statistical results are detailed here in Annex 13.

I. Daily maximum wind speed

The station systems and the hourly data series for calculation of daily maximum values were the same that were used for providing the daily mean wind series described in D1.12.

The statistical result tables with the same structure that was given in the deliverables D1.12 and D2.5 are in Annex 13.A-C:

- Annex 13A: Report on quality control and homogenization in accordance with D1.12.
- Annex 13B: Report on the harmonization results in accordance with D2.5.
- Annex 13C: Report on statistical results of gridding procedure in accordance with the former part of D2.9.

II. Daily mean wind speed at height 2m with roughness 0.1

The gridded daily mean wind speed series at 2m were calculated from the gridded daily mean wind speed series at 10m (VV, 5.2.2) series by using the logarithmic wind profile model according to the following formula:

$$z_2(t) = \frac{\ln(2/0.1)}{\ln(10/0.1)} z_{10}(t) \quad (3)$$

where

$z_{10}(t)$: daily mean wind speed series at 10m with roughness 0.1

$z_2(t)$: daily mean wind speed series at 2m with roughness 0.1

Remark

At formula (3) the multiplier can be rewritten as,

$$\frac{\ln(2/0.1)}{\ln(10/0.1)} = 0.65 \approx \left(\frac{2}{10}\right)^{0.27}$$

Consequently the formula (3) is equivalent with the formula (1) used at 5.2.2 with power $\alpha = 0.27$, moreover this power is in accordance with results obtained at the modelling procedures.

**Annex 13A. Report on quality control and homogenization
of maximum wind speed**

(The station systems are the same as for mean wind speed in Annex 10 of D1.12)

Table 13A.1a. Statistics after and before homogenization for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

I. TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
54306	31	56.98	38605	18	55.97	33638	59	53.49
KIK	52	47.72	55706	33	44.65	61709	38	38.47
36500	17	35.83	daruv	44	33.62	36100	15	32.31
11978	66	31.86	slavo	48	31.09	53521	30	30.78
PAL	50	30.59	17306	6	30.51	26505	11	30.26
608121	54	29.89	bjelo	43	29.66	56300	34	29.54
11927	63	28.93	58300	37	28.91	SOM	51	28.37
11946	64	28.12	17809	7	27.19	11968	65	26.01
64704	40	25.04	46303	24	24.70	48101	26	24.36
16414	5	24.26	44527	23	24.18	57311	35	24.01
14706	2	23.42	11803	60	23.32	33631	57	22.92
16204	4	22.86	55502	32	22.37	23201	8	22.05
44121	21	22.01	34211	14	22.01	28700	13	21.72
51705	27	21.70	703156	55	21.05	53101	29	20.99
748253	56	19.94	604037	53	19.59	13704	1	19.33
47106	25	19.26	donji	46	18.99	11858	62	18.06
63411	39	18.00	25212	10	17.91	osije	47	17.39
52819	28	16.85	valpo	49	16.85	15310	3	16.59
djur	45	16.35	73302	42	16.28	36407	16	16.26
43613	20	15.69	23703	9	15.56	66519	41	14.47
58113	36	13.50	11813	61	13.08	33634	58	12.94
39113	19	12.33	44214	22	12.19	27815	12	11.50
AVERAGE:		24.89						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
38605	18	5427.04	52819	28	1886.72	57311	35	1840.82
bjelo	43	1778.53	33634	58	1603.35	55502	32	1534.73
608121	54	1415.37	27815	12	1411.69	73302	42	1184.61
54306	31	1133.18	58300	37	1035.53	46303	24	832.04
13704	1	779.49	61709	38	707.85	56300	34	672.75
44527	23	661.00	44121	21	649.99	11946	64	629.36
PAL	50	577.53	66519	41	569.18	28700	13	564.61
36500	17	555.85	osije	47	520.04	25212	10	486.84
11927	63	486.46	53101	29	463.62	17809	7	447.95
36407	16	446.92	34211	14	414.48	23703	9	381.83
23201	8	373.38	11968	65	373.26	valpo	49	361.79
63411	39	361.51	17306	6	354.93	KIK	52	349.74
64704	40	341.80	53521	30	325.09	16414	5	317.71
11858	62	298.18	47106	25	286.45	11803	60	259.80
16204	4	249.00	748253	56	243.28	48101	26	241.72
slavo	48	235.28	51705	27	232.20	44214	22	178.50
daruv	44	172.70	33631	57	163.99	604037	53	159.14
donji	46	157.39	55706	33	145.39	33638	59	143.30
15310	3	134.04	703156	55	117.39	11978	66	115.60
39113	19	115.45	58113	36	114.38	43613	20	110.52
14706	2	108.59	26505	11	93.42	36100	15	73.21
SOM	51	65.79	djur	45	65.67	11813	61	59.71
AVERAGE:		584.83						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
PAL	50	3.41	46303	24	2.54	16414	5	2.12
donji	46	1.94	55502	32	1.81	38605	18	1.77
63411	39	1.69	27815	12	1.62	bjelo	43	1.53

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54306	31	1.52	52819	28	1.52	33638	59	1.51
36500	17	1.49	17306	6	1.44	11946	64	1.35
73302	42	1.31	23201	8	1.30	13704	1	1.25
daruv	44	1.17	66519	41	1.17	osije	47	1.16
748253	56	1.14	57311	35	1.13	16204	4	1.12
33631	57	1.11	djurd	45	1.10	valpo	49	1.08
55706	33	1.06	56300	34	1.06	48101	26	1.03
64704	40	1.01	61709	38	0.98	53521	30	0.94
44121	21	0.92	608121	54	0.92	43613	20	0.90
28700	13	0.90	11803	60	0.87	11927	63	0.86
58300	37	0.84	17809	7	0.84	47106	25	0.83
36407	16	0.79	slavo	48	0.78	34211	14	0.78
33634	58	0.77	53101	29	0.76	51705	27	0.75
44214	22	0.74	703156	55	0.71	11858	62	0.70
25212	10	0.69	39113	19	0.65	23703	9	0.63
36100	15	0.63	44527	23	0.63	11978	66	0.59
15310	3	0.56	604037	53	0.52	14706	2	0.41
26505	11	0.41	SOM	51	0.38	11813	61	0.37
KIK	52	0.37	11968	65	0.34	58113	36	0.32
AVERAGE:		1.05						

Table 13A.1b. Quality Control results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

Number of days with error(s): 70
Total number of errors: 71
Maximal positive error: 107.81
Minimal negative error: 0.00

Table 13A.2a. Quality Control results for the series system of Serbia and near border series from Croatia, Hungary, Romania

Number of days with error(s): 32
Total number of errors: 32
Maximal positive error: 35.46
Minimal negative error: 0.00

Table 13A.2b. Statistics after and before homogenization for the series system of Serbia and near border series from Croatia, Hungary, Romania**I. TEST STATISTICS FOR SERIES INHOMOGENEITY**

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
ORA	37	111.96	NEG	23	105.49	TIM	39	100.78
ZAG	22	96.93	ZLA	25	94.00	BPT	10	92.60
ALE	32	77.41	VBA	28	75.61	VLJ	19	70.08
OSI	1	65.16	LOZ	14	64.58	KIK	9	64.37
BEC	7	62.06	LJU	18	60.02	BBA	24	59.62
PAL	5	59.27	REK	29	57.68	BAN	38	57.63
BCL	35	55.17	SRM	15	51.69	NSA	11	51.66
KRG	21	49.21	CUP	31	48.66	POZ	26	44.39
SZE	4	42.29	ZAJ	33	39.50	BAJ	3	38.81
KRS	30	38.16	VRS	13	36.69	SEN	8	35.79
VGR	17	34.63	SNM	40	32.34	ZRE	12	30.38
KRV	27	30.22	SOM	6	29.34	DTS	36	27.10
SPL	20	25.89	BGD	16	25.75	VAL	2	23.87
CAL	34	18.77						
AVERAGE:		54.64						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
BPT	10	1524.42	KIK	9	883.68	ZLA	25	686.53
ZRE	12	686.37	PAL	5	677.95	ZAG	22	628.39
TIM	39	472.41	VLJ	19	457.53	OSI	1	436.10
BEC	7	426.01	POZ	26	347.93	VBA	28	341.87
NEG	23	329.26	BAN	38	311.98	VAL	2	281.54
ALE	32	279.68	SEN	8	264.64	CAL	34	264.47
KRG	21	231.16	BGD	16	229.43	KRV	27	217.04
ORA	37	212.20	ZAJ	33	187.91	SOM	6	174.88
SRM	15	173.72	LOZ	14	161.74	KRS	30	141.82
BBA	24	126.90	BAJ	3	125.08	NSA	11	116.57
SNM	40	113.11	BCL	35	112.82	VGR	17	110.54
SZE	4	109.44	SPL	20	91.49	LJU	18	88.81
REK	29	70.46	VRS	13	69.50	CUP	31	67.20
DTS	36	53.60						
AVERAGE:		307.15						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
PAL	5	2.90	VBA	28	2.24	CAL	34	1.38
VLJ	19	1.24	OSI	1	1.10	VAL	2	1.09
ZAG	22	1.07	BPT	10	1.05	SEN	8	0.97
KIK	9	0.95	BAN	38	0.78	KRV	27	0.77
ZRE	12	0.72	SRM	15	0.68	BEC	7	0.65
ZLA	25	0.62	POZ	26	0.59	SPL	20	0.54
LOZ	14	0.53	BAJ	3	0.52	TIM	39	0.51
ALE	32	0.51	BGD	16	0.48	KRS	30	0.47
LJU	18	0.38	NEG	23	0.37	VGR	17	0.35
BBA	24	0.34	ZAJ	33	0.30	SOM	6	0.28
ORA	37	0.27	CUP	31	0.22	VRS	13	0.22
SNM	40	0.20	NSA	11	0.19	REK	29	0.13
SZE	4	0.13	KRG	21	0.11	DTS	36	0.09
BCL	35	0.07						
AVERAGE:		0.65						

Table 13A.3a. Statistics after and before homogenization for the series system of Romania and near border series from Serbia, Hungary, Ukraine

I. TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
611355	71	174.61	710736	93	141.68	740330	99	132.98
614740	73	125.77	64704	106	119.56	546115	60	116.08
347357	2	110.99	407500	9	109.50	656621	89	105.33
57311	107	102.67	33634	115	102.47	523108	44	101.86
557334	66	98.46	604037	68	95.46	614436	72	91.88
346452	1	87.94	541154	57	87.42	758355	104	86.84
618518	75	86.21	525323	49	85.82	502141	33	85.80
33638	117	85.47	444417	25	84.61	13174	110	84.41
525215	48	83.93	739615	98	82.55	523530	46	82.38
66519	105	82.17	741640	100	81.51	352557	4	80.93
523703	47	79.62	13295	111	77.42	708430	91	76.93
359257	5	76.70	722657	96	75.43	528518	52	74.33
548409	61	72.41	551459	62	69.78	655650	87	68.38
414352	13	67.64	506422	35	67.50	515231	42	67.08
632229	78	65.68	33657	119	64.96	401321	7	64.60
444127	24	63.59	541601	58	62.14	13285	112	62.11
412721	11	61.44	436447	19	61.14	13173	114	59.98
525358	50	58.81	711305	94	58.77	622544	76	58.36
457600	30	56.74	747356	101	56.42	714623	95	55.66
441757	22	55.33	748253	102	55.19	33548	120	54.71
445718	26	53.77	58300	109	53.69	509441	37	53.60
502317	34	52.09	530801	54	51.89	527527	51	51.58
13183	113	50.98	509940	39	50.95	456526	29	50.87
600608	67	50.82	542532	59	50.68	642540	83	50.44
617637	74	49.85	349835	3	49.69	439534	21	48.30
511849	41	47.97	539357	56	47.72	553254	65	47.40
406421	8	46.84	33658	116	45.53	632432	79	45.51
551716	64	45.19	73302	108	45.16	415816	14	45.04
608121	70	44.82	452452	27	44.75	656555	88	44.38
33647	118	43.67	647334	85	43.59	413838	12	43.30
425606	16	41.87	646247	84	41.11	632130	77	39.54
408800	10	39.43	417530	15	38.80	751555	103	38.79
634322	80	38.79	639744	82	38.54	551621	63	37.78
703156	90	37.67	500432	31	37.42	428307	17	37.19
443639	23	37.13	501252	32	36.60	430608	18	35.45
737439	97	35.28	655522	86	35.27	523328	45	32.82
511349	40	30.78	509649	38	29.00	359521	6	28.58
453344	28	28.36	606705	69	25.94	530535	53	25.85
538416	55	25.36	709352	92	24.80	635658	81	24.74
438238	20	24.58	507158	36	23.15	517507	43	22.87

AVERAGE: 61.58

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
57311	107	2015.28	741640	100	1744.10	58300	109	1560.76
33634	115	1178.76	614740	73	1168.28	655650	87	1132.32
530801	54	1036.95	73302	108	868.59	346452	1	793.87
444127	24	705.11	66519	105	697.14	509649	38	659.83
347357	2	629.98	525323	49	582.21	359257	5	552.08
639744	82	549.97	13174	110	523.65	445718	26	515.63
539357	56	511.72	542532	59	475.76	439534	21	457.74
611355	71	455.95	608121	70	455.29	13295	111	438.91
407500	9	419.88	13173	114	408.46	523108	44	403.34
614436	72	395.99	506422	35	369.31	740330	99	347.78
452452	27	346.55	523703	47	341.98	528518	52	340.49
456526	29	330.32	553254	65	330.21	457600	30	309.08

606705	69	297.73	33638	117	286.92	635658	81	284.83
739615	98	284.71	415816	14	282.56	509940	39	280.83
751555	103	273.61	748253	102	262.36	64704	106	258.52
714623	95	255.64	33647	118	253.45	632130	77	247.38
722657	96	244.44	747356	101	238.61	525358	50	234.74
13285	112	225.96	758355	104	222.80	500432	31	212.95
413838	12	212.83	33658	116	209.85	551716	64	209.25
401321	7	208.96	523530	46	208.01	406421	8	207.23
656621	89	195.55	444417	25	193.16	453344	28	193.09
412721	11	183.84	352557	4	179.51	541154	57	172.95
618518	75	171.24	349835	3	170.69	710736	93	159.76
502141	33	157.27	632229	78	154.69	501252	32	151.31
551459	62	150.08	511349	40	147.54	430608	18	146.81
436447	19	144.05	557334	66	142.52	711305	94	140.91
517507	43	138.47	530535	53	137.28	443639	23	135.06
708430	91	132.45	33657	119	130.51	634322	80	130.38
425606	16	128.14	515231	42	126.24	525215	48	122.68
655522	86	118.13	600608	67	116.67	541601	58	114.93
527527	51	112.89	502317	34	110.20	548409	61	108.04
441757	22	107.07	511849	41	107.03	551621	63	106.83
414352	13	103.34	13183	113	102.73	546115	60	101.21
33548	120	98.14	622544	76	91.50	604037	68	89.68
617637	74	84.79	642540	83	80.94	417530	15	80.92
703156	90	76.02	408800	10	72.47	656555	88	64.14
737439	97	62.34	646247	84	61.51	509441	37	59.96
428307	17	58.81	538416	55	52.55	647334	85	48.91
438238	20	45.04	523328	45	43.71	359521	6	41.84
507158	36	39.10	632432	79	34.76	709352	92	30.65

AVERAGE: 306.00

2. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
655650	87	1.68	456526	29	1.30	359257	5	1.30
722657	96	1.28	415816	14	1.28	73302	108	1.25
33647	118	1.16	509649	38	1.16	57311	107	1.12
527527	51	1.09	439534	21	1.04	436447	19	1.03
741640	100	1.02	542532	59	1.00	457600	30	0.94
66519	105	0.94	347357	2	0.93	13174	110	0.87
525323	49	0.87	33548	120	0.86	506422	35	0.84
523108	44	0.83	64704	106	0.82	748253	102	0.82
655522	86	0.80	33658	116	0.76	528518	52	0.75
58300	109	0.74	614436	72	0.71	346452	1	0.70
632229	78	0.69	606705	69	0.69	444127	24	0.68
445718	26	0.66	33634	115	0.65	406421	8	0.65
611355	71	0.64	539357	56	0.64	359521	6	0.63
557334	66	0.63	453344	28	0.61	614740	73	0.60
551716	64	0.58	739615	98	0.57	642540	83	0.56
646247	84	0.56	608121	70	0.56	639744	82	0.55
13295	111	0.54	622544	76	0.54	525358	50	0.53
13173	114	0.53	548409	61	0.53	401321	7	0.52
500432	31	0.50	407500	9	0.50	523530	46	0.49
33638	117	0.48	511349	40	0.47	414352	13	0.45
515231	42	0.44	714623	95	0.44	758355	104	0.44
349835	3	0.44	530801	54	0.42	553254	65	0.42
352557	4	0.42	525215	48	0.42	417530	15	0.42
33657	119	0.41	634322	80	0.40	425606	16	0.40
656621	89	0.39	546115	60	0.37	509940	39	0.37
541154	57	0.36	635658	81	0.36	501252	32	0.35
452452	27	0.35	551621	63	0.35	710736	93	0.35
656555	88	0.34	430608	18	0.34	747356	101	0.34
13183	113	0.33	507158	36	0.33	632130	77	0.32
617637	74	0.31	413838	12	0.31	538416	55	0.30
502317	34	0.30	443639	23	0.30	711305	94	0.30
523328	45	0.28	737439	97	0.28	751555	103	0.27
444417	25	0.27	618518	75	0.26	412721	11	0.25
517507	43	0.24	13285	112	0.22	530535	53	0.22
604037	68	0.21	438238	20	0.20	441757	22	0.19
502141	33	0.16	408800	10	0.16	551459	62	0.15

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428307	17	0.15	632432	79	0.15	708430	91	0.14
511849	41	0.14	703156	90	0.13	541601	58	0.13
509441	37	0.12	740330	99	0.09	647334	85	0.09
709352	92	0.08	600608	67	0.08	523703	47	0.01
AVERAGE:		0.53						

Table 13A.3b. Quality Control results for the series system of Romania and near border series from Serbia, Hungary, Ukraine

Number of days with error(s): 240
 Total number of errors: 248
 Maximal positive error: 107.44
 Minimal negative error: 0.00

Table 13A.4a. Statistics after and before homogenization for the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

I. TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
20	20	62.77	2	2	49.84	36	36	45.38
33	33	43.61	10	10	42.31	49	49	42.16
34	34	35.89	37	37	33.47	31	31	32.69
52	52	32.09	26	26	31.24	44	44	30.48
23	23	30.02	22	22	29.41	51	51	29.01
8	8	28.99	19	19	28.81	48	48	28.46
29	29	27.80	11	11	27.74	13	13	27.60
24	24	25.92	14	14	25.67	28	28	23.94
30	30	23.74	38	38	23.50	7	7	22.96
43	43	20.57	25	25	19.84	9	9	19.21
40	40	19.10	41	41	18.83	16	16	18.56
42	42	17.43	35	35	16.97	6	6	16.61
47	47	16.52	46	46	16.44	53	53	16.13
18	18	16.04	5	5	15.85	39	39	15.76
12	12	15.36	45	45	15.03	21	21	14.89
3	3	14.68	15	15	13.76	17	17	13.63
4	4	13.53	32	32	13.20	50	50	12.63
1	1	12.40	27	27	8.60			
AVERAGE:		24.47						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
11	11	3125.87	1	1	2806.63	8	8	1602.67
35	35	1513.07	45	45	1287.25	47	47	1090.26
18	18	1005.21	10	10	908.26	42	42	889.39
5	5	698.69	22	22	614.81	7	7	590.86
15	15	514.39	46	46	500.68	23	23	403.46
17	17	377.28	19	19	364.79	40	40	359.82
34	34	358.85	30	30	349.33	14	14	329.58
52	52	319.96	36	36	318.69	12	12	311.27
31	31	275.82	28	28	274.97	27	27	273.59
50	50	269.10	38	38	256.96	3	3	253.21
33	33	235.18	20	20	200.94	9	9	186.46
51	51	184.93	39	39	181.95	49	49	177.27
53	53	170.32	16	16	167.67	6	6	138.66
29	29	136.07	41	41	132.27	21	21	131.30
25	25	119.66	43	43	117.43	32	32	114.95
48	48	90.97	13	13	85.95	24	24	82.51
26	26	81.72	44	44	80.42	4	4	77.07
2	2	65.16	37	37	58.48			
AVERAGE:		476.64						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
12	12	2.54	46	46	1.86	38	38	1.79
7	7	1.71	40	40	1.70	8	8	1.67
47	47	1.44	15	15	1.43	22	22	1.39
36	36	1.36	50	50	1.33	29	29	1.33
23	23	1.31	42	42	1.23	43	43	1.23
34	34	1.12	45	45	1.11	9	9	1.06
1	1	1.01	41	41	0.97	6	6	0.96
27	27	0.91	13	13	0.87	11	11	0.79
25	25	0.79	14	14	0.78	18	18	0.77
10	10	0.77	44	44	0.76	35	35	0.76
30	30	0.76	3	3	0.72	21	21	0.72
39	39	0.71	33	33	0.70	2	2	0.67

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17	17	0.66	5	5	0.65	31	31	0.63
52	52	0.59	16	16	0.56	48	48	0.55
53	53	0.49	19	19	0.48	28	28	0.45
26	26	0.41	20	20	0.40	32	32	0.40
4	4	0.39	51	51	0.38	24	24	0.31
49	49	0.24	37	37	0.22			
AVERAGE:		0.92						

Table 13A.4b. Quality Control results for the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

Number of days with error(s): 59
 Total number of errors: 59
 Maximal positive error: 208.64
 Minimal negative error: 0.00

Table 13A.5a. Statistics after and before homogenization for the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic**I. TEST STATISTICS FOR SERIES INHOMOGENEITY**

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
33511	23	129.15	33631	26	107.67	650	36	106.96
53101	31	103.51	61709	33	97.24	33517	25	96.83
11946	17	90.35	11782	53	85.85	23201	32	80.61
11977	20	78.37	44121	28	69.77	11766	50	68.57
11968	19	67.05	11866	6	58.56	11876	10	57.77
6507	39	56.86	660	37	56.31	11910	13	55.17
51705	30	53.70	11803	1	52.93	6513	40	52.45
11927	14	52.01	33514	24	50.14	23703	29	49.99
11819	4	49.29	6809	47	48.63	600	34	48.09
11938	16	47.81	11774	48	47.51	11874	9	46.59
11978	21	46.14	33634	27	46.00	6605	42	43.65
6618	43	42.19	11806	2	42.04	11902	11	42.03
11779	49	41.70	11867	7	40.47	11858	5	40.34
6628	44	39.76	6702	45	37.57	11785	51	36.98
690	38	36.39	11903	12	35.08	6707	46	33.02
11993	22	32.51	11787	52	31.48	11868	8	29.36
11961	18	28.30	625	35	28.12	11813	3	18.99
11931	15	17.81	6518	41	15.08			
AVERAGE:		54.17						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
6618	43	2883.39	11819	4	1387.04	11779	49	1193.33
11946	17	1028.36	53101	31	762.41	23201	32	716.39
11977	20	712.84	33634	27	641.84	11858	5	551.97
33631	26	541.57	44121	28	504.87	23703	29	492.29
660	37	439.38	61709	33	392.09	33511	23	358.41
11774	48	353.65	11766	50	348.45	11868	8	340.32
650	36	338.23	6628	44	322.56	11866	6	310.37
6513	40	303.91	6507	39	282.04	11910	13	245.05
11785	51	238.72	11787	52	237.71	51705	30	227.43
11782	53	226.95	11927	14	211.90	11968	19	211.01
11961	18	210.33	11867	7	199.51	11806	2	192.38
33514	24	180.65	690	38	154.43	6518	41	151.16
11876	10	146.25	11803	1	145.88	6707	46	145.82
33517	25	144.74	600	34	135.44	11902	11	125.89
11938	16	124.54	6605	42	121.26	6809	47	83.57
11874	9	81.22	11978	21	79.61	6702	45	67.71
11903	12	64.80	11993	22	59.51	11813	3	58.24
625	35	50.36	11931	15	27.40			
AVERAGE:		368.97						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
6618	43	1.56	11819	4	1.24	23703	29	1.10
11785	51	1.10	33631	26	1.04	11946	17	1.01
11787	52	0.96	61709	33	0.95	11779	49	0.92
23201	32	0.81	11910	13	0.81	6809	47	0.77
6513	40	0.75	11927	14	0.71	11774	48	0.71
660	37	0.70	11868	8	0.66	11961	18	0.65
11806	2	0.64	33514	24	0.63	11977	20	0.61
11858	5	0.59	33634	27	0.59	11766	50	0.59
11902	11	0.58	11876	10	0.56	11968	19	0.56
51705	30	0.55	6628	44	0.54	53101	31	0.54
11803	1	0.52	44121	28	0.51	6507	39	0.49
6707	46	0.49	11978	21	0.46	6605	42	0.46

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33517	25	0.42	11866	6	0.41	11867	7	0.40
6518	41	0.39	11938	16	0.37	11813	3	0.31
11993	22	0.28	650	36	0.28	690	38	0.26
6702	45	0.24	11782	53	0.24	11931	15	0.21
11874	9	0.20	600	34	0.20	33511	23	0.19
625	35	0.14	11903	12	0.10			
AVERAGE:		0.59						

Table 13A.5b. Quality Control results for the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

Number of days with error(s): 11
Total number of errors: 11
Maximal positive error: 117.39
Minimal negative error: 0.00

Table 13A.6a. Quality Control results for the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

Number of days with error(s): 10
Total number of errors: 10
Maximal positive error: 55.84
Minimal negative error: 0.00

Table 13A.6b. Statistics after and before homogenization for the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic**I. TEST STATISTICS FOR SERIES INHOMOGENEITY**

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
00650	7	143.21	33392	38	134.99	33511	41	108.09
33391	39	105.62	00600	5	76.64	00660	8	74.57
11ysa	26	70.93	1hole	22	65.16	06809	21	64.30
33398	40	62.98	06605	16	60.06	1strn	23	58.84
11876	31	55.36	05511	12	54.73	00540	1	52.92
05508	11	52.19	11866	28	50.74	33287	37	50.24
1mosn	27	48.86	06618	17	48.70	06628	18	45.76
11938	33	45.63	11874	30	45.33	11993	36	42.65
11977	35	42.00	06507	13	41.29	1fren	25	40.42
33514	42	38.85	11868	29	36.45	06707	20	36.36
00575	3	35.13	00566	2	32.74	1cerv	24	32.48
05409	10	30.47	06513	14	27.93	11961	34	25.75
00625	6	24.31	00580	4	24.20	00690	9	23.03
06702	19	22.10	06518	15	22.01	11931	32	18.71
AVERAGE:		51.73						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
06618	17	3343.37	1strn	23	1510.24	00540	1	1068.47
33391	39	809.79	33392	38	621.43	11977	35	435.23
33398	40	397.55	1cerv	24	360.10	06628	18	344.09
11ysa	26	314.68	11868	29	314.56	1hole	22	313.53
00650	7	303.93	06513	14	303.91	33511	41	303.36
00660	8	302.85	11866	28	272.95	06507	13	266.03
1fren	25	262.15	06605	16	256.69	05508	11	207.13
33514	42	202.10	11961	34	198.55	11876	31	184.44
11874	30	181.93	05511	12	179.85	00580	4	177.01
06707	20	145.82	11993	36	143.91	1mosn	27	137.24
06518	15	136.88	05409	10	115.61	00690	9	114.93
00566	2	112.87	00575	3	99.05	33287	37	89.29
11938	33	81.00	06809	21	80.00	06702	19	79.35
00600	5	59.00	00625	6	54.74	11931	32	27.24
AVERAGE:		355.07						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
00580	4	1.66	06618	17	1.54	00540	1	1.47
1fren	25	1.17	33392	38	1.09	11ysa	26	1.04
05508	11	0.82	1strn	23	0.80	06513	14	0.78
00566	2	0.71	06809	21	0.69	11868	29	0.65
33391	39	0.63	11961	34	0.62	00660	8	0.59
11977	35	0.59	06707	20	0.58	06628	18	0.58
33398	40	0.57	1cerv	24	0.57	11876	31	0.54
1hole	22	0.53	33514	42	0.53	06507	13	0.50
05511	12	0.49	05409	10	0.43	06605	16	0.43
00650	7	0.42	1mosn	27	0.35	11866	28	0.35
00575	3	0.34	00690	9	0.33	33511	41	0.27
11874	30	0.27	11938	33	0.22	06518	15	0.21
06702	19	0.21	00625	6	0.20	11931	32	0.20
33287	37	0.19	00600	5	0.14	11993	36	0.12
AVERAGE:		0.58						

Table 13A.7a. Statistics after and before homogenization for the series system of Czech Republic and near border series from Slovakia, Poland

I. TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
12	12	88.35	11	11	78.44	6	6	71.55
15	15	57.44	16	16	47.57	3	3	46.10
17	17	43.77	14	14	43.48	7	7	41.76
8	8	36.73	4	4	36.15	5	5	36.04
2	2	34.98	10	10	33.76	1	1	32.08
13	13	29.14	9	9	26.85			
AVERAGE:		46.13						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
10	10	1315.14	2	2	1202.50	15	15	1199.87
11	11	623.42	12	12	429.81	14	14	402.45
3	3	359.79	1	1	325.74	5	5	315.67
4	4	257.75	17	17	202.32	6	6	166.89
8	8	163.82	7	7	151.19	13	13	89.88
16	16	82.96	9	9	54.15			
AVERAGE:		431.96						

II. Relative Modification of Series

Series	Index	RI2	Series	Index	RI2	Series	Index	RI2
15	15	1.38	10	10	1.27	4	4	0.98
2	2	0.95	5	5	0.93	11	11	0.88
1	1	0.73	3	3	0.68	8	8	0.61
14	14	0.60	13	13	0.53	7	7	0.52
12	12	0.47	17	17	0.43	16	16	0.24
6	6	0.23	9	9	0.20			
AVERAGE:		0.68						

Table 13A.7b. Quality Control results for the series system of Czech Republic and near border series from Slovakia, Poland

Number of days with error(s): 2
Total number of errors: 2
Maximal positive error: 5.28
Minimal negative error: 0.00

**Annex 13B. Report on the harmonization results
of maximum wind speed**

Table 13B.1a. Test statistics for harmonization control of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
608121	54	155.14	11858	62	127.73	11946	64	127.47
604037	53	123.94	33631	57	92.66	11803	60	92.20
54306	31	80.66	57311	35	65.26	55706	33	64.36
748253	56	61.76	SOM	51	57.29	11978	66	50.73
703156	55	49.02	33638	59	46.92	61709	38	44.39
64704	40	41.96	daruv	44	40.96	11968	65	40.67
PAL	50	37.17	KIK	52	36.57	34211	14	36.04
valpo	49	35.77	38605	18	35.71	donji	46	35.48
55502	32	35.44	11927	63	35.21	73302	42	35.07
44121	21	32.91	36407	16	32.27	23201	8	31.87
66519	41	31.14	58300	37	31.01	63411	39	30.21
56300	34	29.02	17306	6	28.70	47106	25	28.50
16204	4	28.07	slavo	48	27.12	23703	9	25.90
bjelo	43	25.56	26505	11	25.07	36100	15	24.87
53521	30	24.53	53101	29	24.35	52819	28	23.59
17809	7	23.40	osije	47	23.34	13704	1	23.04
48101	26	22.60	djurd	45	22.23	28700	13	21.94
51705	27	20.78	11813	61	20.70	14706	2	20.36
46303	24	19.93	25212	10	18.60	58113	36	18.03
27815	12	17.33	16414	5	16.47	43613	20	16.30
15310	3	15.88	36500	17	14.05	44527	23	12.81
44214	22	10.48	39113	19	8.47	33634	58	7.39
AVERAGE:		38.85						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
38605	18	5427.04	52819	28	1886.72	57311	35	1840.82
bjelo	43	1778.53	33634	58	1603.35	55502	32	1534.73
608121	54	1415.37	27815	12	1411.69	73302	42	1184.61
54306	31	1133.18	58300	37	1035.53	46303	24	832.04
13704	1	779.49	61709	38	707.85	56300	34	672.75
44527	23	661.00	44121	21	649.99	11946	64	629.36
PAL	50	577.53	66519	41	569.18	28700	13	564.61
36500	17	555.85	osije	47	520.04	25212	10	486.84
11927	63	486.46	53101	29	463.62	17809	7	447.95
36407	16	446.92	34211	14	414.48	23703	9	381.83
23201	8	373.38	11968	65	373.26	valpo	49	361.79
63411	39	361.51	17306	6	354.93	KIK	52	349.74
64704	40	341.80	53521	30	325.09	16414	5	317.71
11858	62	298.18	47106	25	286.45	11803	60	259.80
16204	4	249.00	748253	56	243.28	48101	26	241.72
slavo	48	235.28	51705	27	232.20	44214	22	178.50
daruv	44	172.70	33631	57	163.99	604037	53	159.14
donji	46	157.39	55706	33	145.39	33638	59	143.30
15310	3	134.04	703156	55	117.39	11978	66	115.60
39113	19	115.45	58113	36	114.38	43613	20	110.52
14706	2	108.59	26505	11	93.42	36100	15	73.21
SOM	51	65.79	djurd	45	65.67	11813	61	59.71
AVERAGE:		584.83						

Table 13B.1b. Representativity statistics for the annual series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
34211	14	0.20	valpo	49	0.21	donji	46	0.24
osije	47	0.27	slavo	48	0.29	11803	60	0.30
46303	24	0.32	43613	20	0.32	17306	6	0.33
28700	13	0.35	11946	64	0.36	27815	12	0.36
11813	61	0.38	11978	66	0.39	39113	19	0.40
26505	11	0.41	73302	42	0.41	bjelo	43	0.43
djurd	45	0.43	54306	31	0.45	daruv	44	0.45
53101	29	0.45	36500	17	0.45	KIK	52	0.46
48101	26	0.46	57311	35	0.46	36407	16	0.46
15310	3	0.48	47106	25	0.48	36100	15	0.48
58113	36	0.49	51705	27	0.49	44121	21	0.49
55502	32	0.50	16414	5	0.51	SOM	51	0.51
PAL	50	0.51	53521	30	0.52	16204	4	0.53
33634	58	0.55	38605	18	0.55	11927	63	0.56
55706	33	0.56	61709	38	0.56	63411	39	0.56
17809	7	0.56	13704	1	0.56	703156	55	0.57
23201	8	0.57	748253	56	0.57	608121	54	0.57
52819	28	0.58	25212	10	0.58	66519	41	0.58
14706	2	0.58	33631	57	0.60	33638	59	0.60
604037	53	0.60	58300	37	0.61	44214	22	0.62
23703	9	0.63	11858	62	0.64	56300	34	0.64
44527	23	0.65	64704	40	0.66	11968	65	0.67
AVERAGE:		0.48						

Table 13B.2a. Test statistics for harmonization control of the series system of Serbia and near border series from Croatia, Hungary, Romania

TEST STATISTICS FOR SERIES INHOMOGENEITY								
Null hypothesis: the examined series are homogeneous.								
Critical value (significance level 0.05): 20.86								
Test statistics (TS) can be compared to the critical value.								
The larger TS values are more suspicious!								
1. Test Statistics After Homogenization								
Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
TIM	39	183.16	ORA	37	126.46	NEG	23	92.56
REK	29	86.88	ZLA	25	81.86	OSI	1	79.53
VBA	28	79.40	BPT	10	79.19	LOZ	14	75.00
ALE	32	68.91	BEC	7	68.75	ZAG	22	67.60
BCL	35	64.73	VAL	2	64.70	LJU	18	59.25
NSA	11	58.88	ZAJ	33	58.54	SRM	15	57.63
KRG	21	56.67	BBA	24	55.26	SZE	4	54.69
KIK	9	54.67	BAN	38	50.58	ZRE	12	49.77
POZ	26	48.44	CUP	31	46.31	SNM	40	45.73
VRS	13	44.92	SEN	8	43.88	BAJ	3	43.87
PAL	5	41.83	KRS	30	38.21	VLJ	19	36.98
DTS	36	32.40	CAL	34	31.84	VGR	17	31.61
KRV	27	30.79	SOM	6	24.45	SPL	20	21.24
BGD	16	21.23						
AVERAGE:		58.96						
2. Test Statistics Before Homogenization								
Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
BPT	10	1524.42	KIK	9	883.68	ZLA	25	686.53
ZRE	12	686.37	PAL	5	677.95	ZAG	22	628.39
TIM	39	472.41	VLJ	19	457.53	OSI	1	436.10
BEC	7	426.01	POZ	26	347.93	VBA	28	341.87
NEG	23	329.26	BAN	38	311.98	VAL	2	281.54
ALE	32	279.68	SEN	8	264.64	CAL	34	264.47
KRG	21	231.16	BGD	16	229.43	KRV	27	217.04
ORA	37	212.20	ZAJ	33	187.91	SOM	6	174.88
SRM	15	173.72	LOZ	14	161.74	KRS	30	141.82
BBA	24	126.90	BAJ	3	125.08	NSA	11	116.57
SNM	40	113.11	BCL	35	112.82	VGR	17	110.54
SZE	4	109.44	SPL	20	91.49	LJU	18	88.81
REK	29	70.46	VRS	13	69.50	CUP	31	67.20
DTS	36	53.60						
AVERAGE:		307.15						

Table 13B.2b. Representativity statistics for the annual series system of Serbia and near border series from Croatia, Hungary, Romania (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
VAL	2	0.18	OSI	1	0.34	BGD	16	0.35
SPL	20	0.36	KRS	30	0.38	VLJ	19	0.39
LOZ	14	0.40	LJU	18	0.43	CAL	34	0.43
PAL	5	0.43	SRM	15	0.46	SEN	8	0.46
KRV	27	0.47	SZE	4	0.48	ZAJ	33	0.49
BPT	10	0.49	ALE	32	0.50	SOM	6	0.52
BAJ	3	0.53	VBA	28	0.53	POZ	26	0.54
BBA	24	0.54	ZRE	12	0.54	ZAG	22	0.55
VGR	17	0.56	KRG	21	0.56	NSA	11	0.56
REK	29	0.58	ZLA	25	0.59	BEC	7	0.59
BAN	38	0.59	DTS	36	0.60	BCL	35	0.61
ORA	37	0.62	KIK	9	0.62	VRS	13	0.62
CUP	31	0.64	NEG	23	0.66	TIM	39	0.68
SNM	40	0.68						
AVERAGE:		0.51						

Table 13B.3a. Test statistics for harmonization control of the series system of Romania and near border series from Serbia, Hungary, Ukraine

TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
611355	71	225.57	66519	105	192.29	413838	12	152.91
741640	100	145.46	747356	101	132.89	740330	99	132.12
655650	87	127.66	502141	33	122.63	546115	60	120.92
407500	9	120.08	528518	52	118.72	722657	96	115.80
346452	1	112.87	444417	25	107.42	359257	5	105.77
710736	93	101.69	347357	2	100.63	414352	13	98.14
557334	66	97.27	13295	111	97.07	618518	75	95.72
523108	44	93.91	639744	82	93.45	604037	68	89.41
748253	102	88.71	632130	77	86.91	656621	89	86.56
608121	70	85.19	349835	3	84.94	525215	48	83.60
541154	57	82.45	525323	49	81.03	352557	4	79.58
632229	78	74.26	708430	91	73.78	452452	27	72.77
646247	84	70.12	551459	62	68.65	523703	47	68.52
509940	39	68.17	506422	35	66.87	614436	72	66.58
739615	98	66.34	33658	116	65.86	502317	34	65.40
445718	26	64.71	523530	46	64.44	515231	42	64.39
57311	107	63.77	711305	94	62.88	530801	54	60.79
412721	11	59.89	634322	80	59.82	548409	61	59.29
622544	76	59.23	647334	85	57.99	401321	7	56.79
436447	19	56.50	751555	103	56.43	542532	59	56.10
600608	67	55.71	33638	117	54.36	525358	50	53.18
511849	41	53.07	439534	21	51.92	430608	18	51.92
551716	64	51.17	457600	30	50.86	443639	23	50.24
441757	22	49.69	758355	104	49.63	617637	74	48.45
632432	79	47.88	425606	16	47.20	539357	56	46.65
703156	90	46.41	541601	58	45.77	13174	110	45.67
417530	15	44.74	408800	10	43.53	444127	24	43.39
13183	113	42.86	13173	114	42.79	737439	97	41.77
553254	65	41.12	642540	83	40.80	509441	37	40.60
656555	88	40.54	456526	29	40.49	428307	17	39.04
527527	51	38.82	438238	20	37.90	614740	73	37.14
500432	31	37.04	406421	8	36.87	415816	14	35.90
501252	32	35.70	606705	69	35.51	13285	112	35.18
58300	109	33.21	511349	40	33.04	523328	45	32.87
33548	120	32.68	714623	95	32.13	538416	55	30.95
453344	28	30.92	551621	63	30.39	530535	53	30.30
509649	38	29.86	517507	43	29.44	73302	108	28.47
655522	86	28.13	709352	92	26.63	507158	36	24.56
359521	6	24.30	635658	81	22.90	33657	119	22.07
33634	115	19.24	64704	106	16.54	33647	118	13.81
AVERAGE:		64.11						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
57311	107	2015.28	741640	100	1744.10	58300	109	1560.76
33634	115	1178.76	614740	73	1168.28	655650	87	1132.32
530801	54	1036.95	73302	108	868.59	346452	1	793.87
444127	24	705.11	66519	105	697.14	509649	38	659.83
347357	2	629.98	525323	49	582.21	359257	5	552.08
639744	82	549.97	13174	110	523.65	445718	26	515.63
539357	56	511.72	542532	59	475.76	439534	21	457.74
611355	71	455.95	608121	70	455.29	13295	111	438.91
407500	9	419.88	13173	114	408.46	523108	44	403.34
614436	72	395.99	506422	35	369.31	740330	99	347.78
452452	27	346.55	523703	47	341.98	528518	52	340.49
456526	29	330.32	553254	65	330.21	457600	30	309.08
606705	69	297.73	33638	117	286.92	635658	81	284.83
739615	98	284.71	415816	14	282.56	509940	39	280.83
751555	103	273.61	748253	102	262.36	64704	106	258.52
714623	95	255.64	33647	118	253.45	632130	77	247.38
722657	96	244.44	747356	101	238.61	525358	50	234.74
13285	112	225.96	758355	104	222.80	500432	31	212.95
413838	12	212.83	33658	116	209.85	551716	64	209.25
401321	7	208.96	523530	46	208.01	406421	8	207.23
656621	89	195.55	444417	25	193.16	453344	28	193.09
412721	11	183.84	352557	4	179.51	541154	57	172.95

618518	75	171.24	349835	3	170.69	710736	93	159.76
502141	33	157.27	632229	78	154.69	501252	32	151.31
551459	62	150.08	511349	40	147.54	430608	18	146.81
436447	19	144.05	557334	66	142.52	711305	94	140.91
517507	43	138.47	530535	53	137.28	443639	23	135.06
708430	91	132.45	33657	119	130.51	634322	80	130.38
425606	16	128.14	515231	42	126.24	525215	48	122.68
655522	86	118.13	600608	67	116.67	541601	58	114.93
527527	51	112.89	502317	34	110.20	548409	61	108.04
441757	22	107.07	511849	41	107.03	551621	63	106.83
414352	13	103.34	13183	113	102.73	546115	60	101.21
33548	120	98.14	622544	76	91.50	604037	68	89.68
617637	74	84.79	642540	83	80.94	417530	15	80.92
703156	90	76.02	408800	10	72.47	656555	88	64.14
737439	97	62.34	646247	84	61.51	509441	37	59.96
428307	17	58.81	538416	55	52.55	647334	85	48.91
438238	20	45.04	523328	45	43.71	359521	6	41.84
507158	36	39.10	632432	79	34.76	709352	92	30.65
AVERAGE:		306.00						

Table 13B.3b. Representativity statistics for the annual series system of Romania and near border series from Serbia, Hungary, Ukraine (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
614436	72	0.38	618518	75	0.38	632432	79	0.40
646247	84	0.40	538416	55	0.41	733302	108	0.42
655522	86	0.42	33647	118	0.42	507158	36	0.42
515231	42	0.44	33638	117	0.44	656555	88	0.45
430608	18	0.46	525358	50	0.46	425606	16	0.47
553254	65	0.48	525323	49	0.48	347357	2	0.49
501252	32	0.49	523328	45	0.49	453344	28	0.49
748253	102	0.49	359257	5	0.50	57311	107	0.50
758355	104	0.50	509441	37	0.51	548409	61	0.51
414352	13	0.51	622544	76	0.51	541601	58	0.51
703156	90	0.52	739615	98	0.52	642540	83	0.53
557334	66	0.53	747356	101	0.53	611355	71	0.53
417530	15	0.53	709352	92	0.53	551459	62	0.54
439534	21	0.55	502317	34	0.55	406421	8	0.55
436447	19	0.56	13285	112	0.56	632229	78	0.56
708430	91	0.56	511349	40	0.56	33657	119	0.57
600608	67	0.57	452452	27	0.57	541154	57	0.57
456526	29	0.57	527527	51	0.58	428307	17	0.58
740330	99	0.59	525215	48	0.59	632130	77	0.59
64704	106	0.59	352557	4	0.59	13174	110	0.59
737439	97	0.59	438238	20	0.59	408800	10	0.60
617637	74	0.60	656621	89	0.60	58300	109	0.60
506422	35	0.61	415816	14	0.61	523703	47	0.61
711305	94	0.61	523108	44	0.62	13183	113	0.62
401321	7	0.62	444417	25	0.62	634322	80	0.62
443639	23	0.62	511849	41	0.62	551621	63	0.62
539357	56	0.62	441757	22	0.62	349835	3	0.62
606705	69	0.63	551716	64	0.63	647334	85	0.63
346452	1	0.63	502141	33	0.63	509940	39	0.63
500432	31	0.63	457600	30	0.63	33548	120	0.63
13173	114	0.63	655650	87	0.63	13295	111	0.64
523530	46	0.65	444127	24	0.65	66519	105	0.65
412721	11	0.66	509649	38	0.66	359521	6	0.66
542532	59	0.66	722657	96	0.67	33634	115	0.67
33658	116	0.68	530535	53	0.69	517507	43	0.69
445718	26	0.69	714623	95	0.70	604037	68	0.70
608121	70	0.71	407500	9	0.72	413838	12	0.73
751555	103	0.73	546115	60	0.74	635658	81	0.74
528518	52	0.76	614740	73	0.77	530801	54	0.78
710736	93	0.78	741640	100	0.78	639744	82	0.78
AVERAGE:		0.58						

Table 13B.4a. Test statistics for harmonization control of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
29	29	209.44	51	51	132.89	42	42	105.50
41	41	85.87	50	50	78.04	43	43	76.28
44	44	69.36	53	53	58.15	2	2	57.83
49	49	52.30	48	48	51.89	20	20	50.34
52	52	48.56	47	47	46.19	22	22	45.38
30	30	34.93	33	33	33.44	36	36	33.20
37	37	30.32	25	25	29.12	46	46	28.92
34	34	27.92	31	31	25.76	23	23	25.60
19	19	25.57	40	40	25.52	7	7	24.96
28	28	24.86	26	26	23.99	8	8	23.58
11	11	23.33	24	24	22.96	10	10	22.82
12	12	22.47	13	13	20.49	14	14	20.13
32	32	20.12	39	39	19.35	4	4	18.98
16	16	18.17	9	9	17.26	17	17	16.46
5	5	16.30	18	18	15.98	21	21	15.84
6	6	14.59	1	1	14.58	45	45	13.97
38	38	13.81	15	15	13.23	3	3	12.57
35	35	9.76	27	27	6.95			
AVERAGE:		37.28						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
11	11	3125.87	1	1	2806.63	8	8	1602.67
35	35	1513.07	45	45	1287.25	47	47	1090.26
18	18	1005.21	10	10	908.26	42	42	889.39
5	5	698.69	22	22	614.81	7	7	590.86
15	15	514.39	46	46	500.68	23	23	403.46
17	17	377.28	19	19	364.79	40	40	359.82
34	34	358.85	30	30	349.33	14	14	329.58
52	52	319.96	36	36	318.69	12	12	311.27
31	31	275.82	28	28	274.97	27	27	273.59
50	50	269.10	38	38	256.96	3	3	253.21
33	33	235.18	20	20	200.94	9	9	186.46
51	51	184.93	39	39	181.95	49	49	177.27
53	53	170.32	16	16	167.67	6	6	138.66
29	29	136.07	41	41	132.27	21	21	131.30
25	25	119.66	43	43	117.43	32	32	114.95
48	48	90.97	13	13	85.95	24	24	82.51
26	26	81.72	44	44	80.42	4	4	77.07
2	2	65.16	37	37	58.48			
AVERAGE:		476.64						

Table 13B.4b. Representativity statistics for the annual series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
21	21	0.32	38	38	0.41	43	43	0.43
37	37	0.44	44	44	0.45	48	48	0.46
45	45	0.47	42	42	0.49	31	31	0.49
53	53	0.50	47	47	0.50	4	4	0.51
26	26	0.52	16	16	0.53	23	23	0.54
36	36	0.54	6	6	0.55	51	51	0.55
17	17	0.56	32	32	0.56	8	8	0.56
41	41	0.56	1	1	0.57	40	40	0.57
14	14	0.58	3	3	0.58	9	9	0.59
39	39	0.59	28	28	0.59	25	25	0.60
50	50	0.60	30	30	0.60	35	35	0.60
24	24	0.60	13	13	0.60	5	5	0.61
19	19	0.62	18	18	0.62	20	20	0.63
27	27	0.64	22	22	0.64	52	52	0.65
7	7	0.66	46	46	0.67	33	33	0.67
15	15	0.68	10	10	0.69	12	12	0.71
11	11	0.71	49	49	0.71	34	34	0.73
2	2	0.76	29	29	0.77			
AVERAGE:		0.58						

Table 13B.5a. Test statistics for harmonization control of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

I. TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
23201	32	187.55	11946	17	154.06	11774	48	122.17
33511	23	119.50	11782	53	105.83	61709	33	99.30
11803	1	96.29	11927	14	85.47	11938	16	85.03
33631	26	84.37	33517	25	79.60	11977	20	72.84
6507	39	68.17	11910	13	67.19	44121	28	67.03
650	36	66.99	53101	31	61.26	6618	43	59.82
11876	10	58.21	600	34	57.69	11866	6	57.05
660	37	55.32	6702	45	55.03	11766	50	53.11
11978	21	52.90	11819	4	51.27	23703	29	50.81
11902	11	49.15	33514	24	48.98	51705	30	48.43
11874	9	48.03	11968	19	44.08	6628	44	40.95
6605	42	40.44	6513	40	40.36	11779	49	39.83
11858	5	38.48	11806	2	37.91	6707	46	37.74
11903	12	36.57	690	38	36.17	11787	52	35.28
11867	7	33.60	11993	22	32.86	625	35	32.23
11785	51	30.96	11961	18	28.96	11868	8	28.07
6809	47	27.33	11813	3	20.26	33634	27	19.78
11931	15	19.35	6518	41	18.22			
AVERAGE:		58.26						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
6618	43	2883.39	11819	4	1387.04	11779	49	1193.33
11946	17	1028.36	53101	31	762.41	23201	32	716.39
11977	20	712.84	33634	27	641.84	11858	5	551.97
33631	26	541.57	44121	28	504.87	23703	29	492.29
660	37	439.38	61709	33	392.09	33511	23	358.41
11774	48	353.65	11766	50	348.45	11868	8	340.32
650	36	338.23	6628	44	322.56	11866	6	310.37
6513	40	303.91	6507	39	282.04	11910	13	245.05
11785	51	238.72	11787	52	237.71	51705	30	227.43
11782	53	226.95	11927	14	211.90	11968	19	211.01
11961	18	210.33	11867	7	199.51	11806	2	192.38
33514	24	180.65	690	38	154.43	6518	41	151.16
11876	10	146.25	11803	1	145.88	6707	46	145.82
33517	25	144.74	600	34	135.44	11902	11	125.89
11938	16	124.54	6605	42	121.26	6809	47	83.57
11874	9	81.22	11978	21	79.61	6702	45	67.71
11903	12	64.80	11993	22	59.51	11813	3	58.24
625	35	50.36	11931	15	27.40			
AVERAGE:		368.97						

Table 13B.5b. Representativity statistics for the annual series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
11787	52	0.02	11931	15	0.04	11910	13	0.09
11876	10	0.10	53101	31	0.13	6618	43	0.16
6605	42	0.18	11946	17	0.19	11874	9	0.20
11902	11	0.22	6507	39	0.22	11927	14	0.23
11961	18	0.26	650	36	0.26	44121	28	0.27
33514	24	0.27	6628	44	0.32	11813	3	0.34
11806	2	0.35	660	37	0.37	11868	8	0.37
33634	27	0.39	600	34	0.39	11766	50	0.39
51705	30	0.40	11819	4	0.40	11977	20	0.41
11779	49	0.41	625	35	0.42	11938	16	0.43
6809	47	0.43	11866	6	0.44	33631	26	0.44
6707	46	0.46	11903	12	0.46	61709	33	0.46
11978	21	0.47	33511	23	0.47	23201	32	0.49
6513	40	0.50	11782	53	0.51	690	38	0.55
11803	1	0.55	11968	19	0.55	6702	45	0.56
11993	22	0.57	11785	51	0.59	11867	7	0.59
6518	41	0.59	11858	5	0.60	23703	29	0.66
33517	25	0.66	11774	48	0.67			
AVERAGE:		0.39						

Table 13B.6a. Test statistics for harmonization control of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
7	7	87.68	29	29	84.16	8	8	78.53
37	37	77.26	39	39	75.66	17	17	72.05
33	33	71.49	5	5	64.34	16	16	55.82
22	22	52.17	12	12	51.78	13	13	51.41
11	11	50.18	19	19	46.14	28	28	43.40
32	32	43.33	31	31	42.41	36	36	42.26
25	25	40.91	3	3	40.64	41	41	40.19
18	18	37.15	20	20	35.75	21	21	35.30
27	27	35.00	10	10	33.10	30	30	30.34
6	6	29.98	34	34	28.29	14	14	28.04
24	24	26.42	4	4	25.54	35	35	25.27
42	42	24.41	40	40	22.86	1	1	22.42
9	9	22.17	38	38	19.64	23	23	19.48
15	15	18.03	2	2	15.24	26	26	11.36
AVERAGE:		41.85						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
06618	17	3343.37	1strn	23	1510.24	00540	1	1068.47
33391	39	809.79	33392	38	621.43	11977	35	435.23
33398	40	397.55	1cerv	24	360.10	06628	18	344.09
1lysa	26	314.68	11868	29	314.56	1hole	22	313.53
00650	7	303.93	06513	14	303.91	33511	41	303.36
00660	8	302.85	11866	28	272.95	06507	13	266.03
1fren	25	262.15	06605	16	256.69	05508	11	207.13
33514	42	202.10	11961	34	198.55	11876	31	184.44
11874	30	181.93	05511	12	179.85	00580	4	177.01
06707	20	145.82	11993	36	143.91	1mosn	27	137.24
06518	15	136.88	05409	10	115.61	00690	9	114.93
00566	2	112.87	00575	3	99.05	33287	37	89.29
11938	33	81.00	06809	21	80.00	06702	19	79.35
00600	5	59.00	00625	6	54.74	11931	32	27.24
AVERAGE:		355.07						

Table 13B.6b. Representativity statistics for the annual series system of Poland and near border series from Ukraine, Slovakia, Czech Republic (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
11938	33	0.05	11931	32	0.24	00540	1	0.25
06618	17	0.28	1fren	25	0.29	00566	2	0.30
11961	34	0.31	11876	31	0.31	00625	6	0.33
05508	11	0.36	11874	30	0.36	06809	21	0.38
00650	7	0.39	05409	10	0.40	33514	42	0.42
06513	14	0.44	11993	36	0.46	1lysa	26	0.47
11977	35	0.47	1hole	22	0.50	06707	20	0.50
1cerv	24	0.50	06605	16	0.51	1strn	23	0.51
11866	28	0.53	05511	12	0.53	00600	5	0.53
00660	8	0.53	33392	38	0.54	33398	40	0.55
11868	29	0.56	00575	3	0.58	06518	15	0.58
06507	13	0.58	1mosn	27	0.59	00580	4	0.59
06628	18	0.60	00690	9	0.60	06702	19	0.60
33287	37	0.62	33391	39	0.65	33511	41	0.72
AVERAGE:		0.46						

Table 13B.7a. Test statistics for harmonization control of the series system of Czech Republic and near border series from Slovakia, Poland

TEST STATISTICS FOR SERIES INHOMOGENEITY

Null hypothesis: the examined series are homogeneous.

Critical value (significance level 0.05): 20.86

Test statistics (TS) can be compared to the critical value.

The larger TS values are more suspicious!

1. Test Statistics After Homogenization

Series	Index	TSA	Series	Index	TSA	Series	Index	TSA
7	7	72.16	11	11	67.65	1	1	66.74
16	16	62.62	12	12	57.67	6	6	50.84
10	10	48.74	5	5	44.17	17	17	43.70
4	4	42.08	8	8	39.86	15	15	36.47
14	14	36.40	2	2	31.65	3	3	30.34
13	13	30.11	9	9	22.35			
AVERAGE:		46.09						

2. Test Statistics Before Homogenization

Series	Index	TSB	Series	Index	TSB	Series	Index	TSB
10	10	1315.14	2	2	1202.50	15	15	1199.87
11	11	623.42	12	12	429.81	14	14	402.45
3	3	359.79	1	1	325.74	5	5	315.67
4	4	257.75	17	17	202.32	6	6	166.89
8	8	163.82	7	7	151.19	13	13	89.88
16	16	82.96	9	9	54.15			
AVERAGE:		431.96						

Table 13B.7b. Representativity statistics for the annual series system of Czech Republic and near border series from Slovakia, Poland (1-relative interpolation error)

Series	Index	RS	Series	Index	RS	Series	Index	RS
15	15	0.25	9	9	0.28	4	4	0.31
8	8	0.32	13	13	0.37	7	7	0.37
11	11	0.38	17	17	0.39	3	3	0.44
2	2	0.45	1	1	0.46	5	5	0.46
14	14	0.47	16	16	0.47	10	10	0.49
12	12	0.51	6	6	0.60			
AVERAGE:		0.41						

**Annex 13C. Report on the gridding results
of maximum wind speed**

Table 13C.1a. Monthly modelling results for the spatial trend of the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.750 percent: 33.9%
 variables: h 1 2 3 5 13
 coefficients: -0.0012 0.5806 0.2295 -0.0112 -0.0072 0.0795

2: number of model variables: 6 correlation: 0.704 percent: 29.0%
 variables: h 1 2 3 11 13
 coefficients: -0.0010 0.4865 0.2280 -0.0095 -0.0150 0.0601

3: number of model variables: 6 correlation: 0.599 percent: 19.9%
 variables: h 1 2 3 6 13
 coefficients: -0.0008 0.4346 0.1760 -0.0069 0.0115 0.0561

4: number of model variables: 6 correlation: 0.589 percent: 19.2%
 variables: h 1 2 3 13 14
 coefficients: -0.0007 0.3834 0.1324 -0.0061 0.0536 0.0172

5: number of model variables: 6 correlation: 0.535 percent: 15.5%
 variables: h 1 2 3 5 13
 coefficients: -0.0013 0.3820 0.1321 -0.0082 -0.0077 0.0656

6: number of model variables: 6 correlation: 0.461 percent: 11.2%
 variables: h 1 2 3 5 13
 coefficients: -0.0013 0.4106 0.1618 -0.0080 -0.0091 0.0561

7: number of model variables: 6 correlation: 0.494 percent: 13.0%
 variables: h 1 2 6 13 15
 coefficients: 0.0000 0.2990 0.1942 0.0238 0.0665 -0.0731

8: number of model variables: 6 correlation: 0.481 percent: 12.3%
 variables: h 1 3 5 13 15
 coefficients: -0.0009 0.2668 -0.0059 -0.0101 0.0774 -0.0429

9: number of model variables: 6 correlation: 0.562 percent: 17.3%
 variables: h 1 2 3 5 13
 coefficients: -0.0011 0.4093 0.1457 -0.0086 -0.0099 0.0681

10: number of model variables: 6 correlation: 0.601 percent: 20.1%
 variables: h 1 2 3 6 13
 coefficients: -0.0006 0.4288 0.1741 -0.0073 0.0145 0.0577

11: number of model variables: 5 correlation: 0.650 percent: 24.0%
 variables: h 1 2 3 13
 coefficients: -0.0008 0.5352 0.2325 -0.0084 0.0561

12: number of model variables: 6 correlation: 0.742 percent: 33.0%
 variables: h 1 2 3 6 13
 coefficients: -0.0007 0.5650 0.2806 -0.0091 0.0125 0.0660

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.1b. Monthly benchmark results for the interpolation parameters modelled by the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

BENCHMARK STUDY: cross-validation test, interpolation between the stations
 Number of stations: 66

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.482	-0.048
2	0.494	-0.071
3	0.427	-0.262
4	0.432	-0.284
5	0.409	-0.405
6	0.378	-0.566
7	0.390	-0.589
8	0.332	-0.698
9	0.368	-0.475
10	0.458	-0.229
11	0.473	-0.127
12	0.463	-0.113
MEAN	0.426	-0.322

Table 13C.1c. Monthly ANOVA results for the series system of Hungary, Croatia and near border series from Austria, Serbia, Romania, Ukraine, Slovakia

	1	2	3	4	5	6	7	8	9	10	11	12
E:	3.9	4.4	4.8	4.8	4.5	4.2	4.1	3.8	3.8	3.9	4.1	3.9
D _t :	0.9	0.9	0.8	0.8	0.7	0.6	0.6	0.6	0.6	0.7	0.8	0.8
S _s :	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.9

Table 13C.2a. Monthly modelling results for the spatial trend of the series system of Serbia and near border series from Croatia, Hungary, Romania

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.723 percent: 30.9%
variables: h 7 8 10 13 15
coefficients: -0.0002 -0.0200 -0.0275 -0.0920 -0.0664 0.0673

2: number of model variables: 6 correlation: 0.710 percent: 29.6%
variables: h 3 6 10 13 15
coefficients: -0.0002 -0.0051 0.0152 -0.0625 -0.0315 0.0377

3: number of model variables: 6 correlation: 0.742 percent: 33.0%
variables: h 1 3 6 10 13
coefficients: -0.0002 0.5092 -0.0061 0.0141 -0.0295 -0.0147

4: number of model variables: 6 correlation: 0.760 percent: 35.1%
variables: h 1 3 6 10 13
coefficients: 0.0000 0.5217 -0.0058 0.0154 -0.0279 -0.0213

5: number of model variables: 6 correlation: 0.818 percent: 42.5%
variables: h 1 3 6 10 13
coefficients: 0.0001 0.4759 -0.0065 0.0188 -0.0327 -0.0360

6: number of model variables: 6 correlation: 0.769 percent: 36.1%
variables: h 8 9 10 13 14
coefficients: -0.0002 -0.0114 0.0215 -0.0274 -0.0455 0.0276

7: number of model variables: 6 correlation: 0.731 percent: 31.8%
variables: h 3 6 10 12 13
coefficients: -0.0004 -0.0040 0.0171 -0.0416 -0.0176 -0.0237

8: number of model variables: 6 correlation: 0.731 percent: 31.7%
variables: h 8 9 10 13 14
coefficients: -0.0003 -0.0137 0.0210 -0.0413 -0.0363 0.0334

9: number of model variables: 6 correlation: 0.742 percent: 32.9%
variables: h 5 8 9 10 13
coefficients: -0.0004 0.0112 -0.0215 0.0242 -0.0337 -0.0410

10: number of model variables: 6 correlation: 0.762 percent: 35.2%
variables: h 5 8 10 13 15
coefficients: -0.0003 0.0103 -0.0263 -0.0738 -0.0611 0.0565

11: number of model variables: 6 correlation: 0.722 percent: 30.8%
variables: h 1 3 5 8 13
coefficients: -0.0002 0.7824 -0.0062 0.0116 -0.0282 -0.0288

12: number of model variables: 6 correlation: 0.791 percent: 38.8%
variables: h 1 3 8 10 13
coefficients: -0.0003 0.7359 -0.0068 -0.0197 -0.0332 -0.0411

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.2b. Monthly benchmark results for the interpolation parameters modelled by the series system of Serbia and near border series from Croatia, Hungary, Romania

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 40

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.410	-0.058
2	0.377	-0.043
3	0.367	-0.130
4	0.390	-0.088
5	0.328	-0.194
6	0.325	-0.243
7	0.312	-0.291
8	0.279	-0.270
9	0.317	-0.276
10	0.407	-0.129
11	0.415	-0.102
12	0.351	-0.147
MEAN	0.356	-0.164

Table 13C.3a. Monthly modelling results for the spatial trend of the series system of Romania and near border series from Serbia, Hungary, Ukraine

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 4 correlation: 0.800 percent: 39.9%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0070 0.0103 0.0130

2: number of model variables: 5 correlation: 0.783 percent: 37.8%
 variables: h 3 8 10 17
 coefficients: 0.0000 -0.0072 0.0139 0.0130 -0.0168

3: number of model variables: 6 correlation: 0.796 percent: 39.4%
 variables: h 3 4 5 8 10
 coefficients: 0.0000 -0.0058 -0.0034 0.0027 0.0093 0.0151

4: number of model variables: 6 correlation: 0.748 percent: 33.6%
 variables: h 3 5 7 8 10
 coefficients: 0.0000 -0.0040 0.0028 0.0069 0.0065 0.0131

5: number of model variables: 6 correlation: 0.726 percent: 31.2%
 variables: h 3 4 5 8 10
 coefficients: 0.0000 -0.0041 -0.0028 0.0025 0.0100 0.0112

6: number of model variables: 6 correlation: 0.707 percent: 29.3%
 variables: h 3 4 8 10 11
 coefficients: 0.0001 -0.0037 -0.0036 0.0089 0.0101 0.0053

7: number of model variables: 6 correlation: 0.691 percent: 27.7%
 variables: h 3 4 6 8 10
 coefficients: 0.0001 -0.0037 -0.0047 0.0053 0.0093 0.0097

8: number of model variables: 6 correlation: 0.695 percent: 28.1%
 variables: h 3 4 6 8 10
 coefficients: 0.0001 -0.0038 -0.0039 0.0032 0.0106 0.0090

9: number of model variables: 5 correlation: 0.758 percent: 34.7%
 variables: h 3 4 8 10
 coefficients: 0.0001 -0.0046 -0.0026 0.0123 0.0114

10: number of model variables: 4 correlation: 0.779 percent: 37.4%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0054 0.0143 0.0131

11: number of model variables: 4 correlation: 0.803 percent: 40.5%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0065 0.0133 0.0133

12: number of model variables: 4 correlation: 0.789 percent: 38.6%
 variables: h 3 8 10
 coefficients: 0.0001 -0.0073 0.0117 0.0148

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.3b. Monthly benchmark results for the interpolation parameters modelled by the series system of Romania and near border series from Serbia, Hungary, Ukraine

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 120

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.449	-0.078
2	0.452	-0.088
3	0.423	-0.115
4	0.410	-0.142
5	0.392	-0.181
6	0.343	-0.251
7	0.352	-0.287
8	0.344	-0.246
9	0.338	-0.256
10	0.419	-0.187
11	0.464	-0.064
12	0.408	-0.197
MEAN	0.399	-0.174

Table 13C.4a. Monthly modelling results for the spatial trend of the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.881 percent: 52.7%
 variables: h 1 3 6 8 15
 coefficients: 0.0001 0.6222 -0.0076 -0.0121 0.0151 0.0259

2: number of model variables: 5 correlation: 0.906 percent: 57.6%
 variables: h 1 3 6 15
 coefficients: 0.0001 0.7221 -0.0062 -0.0089 0.0203

3: number of model variables: 5 correlation: 0.885 percent: 53.4%
 variables: h 1 3 6 13
 coefficients: -0.0001 0.5768 -0.0056 -0.0083 -0.0180

4: number of model variables: 6 correlation: 0.854 percent: 47.9%
 variables: h 1 3 6 7 13
 coefficients: -0.0001 0.5979 -0.0040 -0.0053 0.0085 -0.0116

5: number of model variables: 6 correlation: 0.862 percent: 49.4%
 variables: h 1 3 7 11 15
 coefficients: -0.0001 0.4970 -0.0043 0.0086 -0.0082 0.0104

6: number of model variables: 4 correlation: 0.839 percent: 45.5%
 variables: h 1 3 7
 coefficients: 0.0001 0.5275 -0.0040 0.0113

7: number of model variables: 4 correlation: 0.830 percent: 44.2%
 variables: h 1 3 15
 coefficients: -0.0001 0.5052 -0.0053 0.0184

8: number of model variables: 4 correlation: 0.848 percent: 47.1%
 variables: h 1 3 15
 coefficients: 0.0000 0.6019 -0.0047 0.0152

9: number of model variables: 6 correlation: 0.870 percent: 50.7%
 variables: h 1 3 6 8 13
 coefficients: 0.0000 0.5457 -0.0066 -0.0086 0.0137 -0.0181

10: number of model variables: 5 correlation: 0.879 percent: 52.4%
 variables: h 1 3 6 13
 coefficients: 0.0000 0.5863 -0.0052 -0.0101 -0.0229

11: number of model variables: 5 correlation: 0.883 percent: 53.0%
 variables: h 1 3 6 15
 coefficients: 0.0000 0.5613 -0.0069 -0.0089 0.0182

12: number of model variables: 6 correlation: 0.884 percent: 53.2%
 variables: h 1 3 6 12 15
 coefficients: 0.0001 0.7352 -0.0054 -0.0131 0.0118 0.0225

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.4b. Monthly benchmark results for the interpolation parameters modelled by the series system of Ukraine and near border series from Romania, Hungary, Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 52

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.477	-0.032
2	0.476	-0.003
3	0.426	-0.096
4	0.441	-0.058
5	0.372	-0.177
6	0.347	-0.292
7	0.382	-0.194
8	0.390	-0.125
9	0.381	-0.205
10	0.433	-0.076
11	0.479	-0.029
12	0.476	0.027
MEAN	0.423	-0.105

Table 13C.5a. Monthly modelling results for the spatial trend of the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.786 percent: 38.1%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.4419 -0.0070 0.0205 0.0183 0.0306

2: number of model variables: 6 correlation: 0.796 percent: 39.5%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.5228 -0.0063 0.0181 0.0181 0.0300

3: number of model variables: 6 correlation: 0.794 percent: 39.2%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.4825 -0.0058 0.0150 0.0150 0.0276

4: number of model variables: 6 correlation: 0.797 percent: 39.6%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5517 -0.0056 0.0145 0.0168 0.0263

5: number of model variables: 6 correlation: 0.743 percent: 33.1%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.5461 -0.0052 0.0131 0.0128 0.0224

6: number of model variables: 6 correlation: 0.739 percent: 32.7%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.5386 -0.0046 0.0129 0.0131 0.0214

7: number of model variables: 6 correlation: 0.782 percent: 37.6%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5529 -0.0058 0.0172 0.0199 0.0283

8: number of model variables: 6 correlation: 0.775 percent: 36.8%
variables: h 1 3 11 12 15
coefficients: -0.0004 0.5993 -0.0060 0.0218 0.0250 0.0331

9: number of model variables: 6 correlation: 0.810 percent: 41.4%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.6365 -0.0062 0.0195 0.0203 0.0347

10: number of model variables: 6 correlation: 0.805 percent: 40.7%
variables: h 1 3 11 12 15
coefficients: -0.0003 0.4535 -0.0068 0.0206 0.0232 0.0354

11: number of model variables: 6 correlation: 0.808 percent: 41.0%
variables: h 1 3 11 12 15
coefficients: -0.0001 0.4125 -0.0067 0.0169 0.0149 0.0283

12: number of model variables: 6 correlation: 0.801 percent: 40.1%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.4047 -0.0076 0.0222 0.0199 0.0317

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.5b. Monthly benchmark results for the interpolation parameters modelled by the series system of Slovakia and near border series from Hungary, Ukraine, Poland, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 53

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.376	-0.374
2	0.391	-0.314
3	0.293	-0.447
4	0.332	-0.302
5	0.274	-0.495
6	0.239	-0.646
7	0.238	-0.629
8	0.264	-0.606
9	0.298	-0.495
10	0.345	-0.398
11	0.379	-0.415
12	0.356	-0.457
MEAN	0.315	-0.465

Table 13C.6a. Monthly modelling results for the spatial trend of the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables: 6 correlation: 0.817 percent: 42.4%
variables: h 1 3 9 11 15
coefficients: -0.0003 0.7412 -0.0054 0.0269 0.0164 0.0197

2: number of model variables: 6 correlation: 0.826 percent: 43.6%
variables: h 1 3 9 11 15
coefficients: -0.0002 0.7304 -0.0049 0.0225 0.0130 0.0181

3: number of model variables: 6 correlation: 0.818 percent: 42.5%
variables: h 1 3 9 15 16
coefficients: -0.0004 0.5250 -0.0066 0.0126 0.0212 0.0319

4: number of model variables: 6 correlation: 0.819 percent: 42.6%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.4450 -0.0057 0.0165 0.0163 0.0209

5: number of model variables: 5 correlation: 0.803 percent: 40.4%
variables: h 1 3 9 11
coefficients: 0.0000 0.6569 -0.0033 0.0145 0.0124

6: number of model variables: 5 correlation: 0.759 percent: 34.9%
variables: h 1 3 9 11
coefficients: 0.0000 0.6443 -0.0027 0.0173 0.0114

7: number of model variables: 6 correlation: 0.794 percent: 39.2%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.4689 -0.0057 0.0205 0.0252 0.0291

8: number of model variables: 6 correlation: 0.805 percent: 40.7%
variables: h 1 9 10 11 14
coefficients: 0.0003 0.8131 0.0346 -0.0200 0.0240 0.0355

9: number of model variables: 6 correlation: 0.826 percent: 43.6%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.6384 -0.0059 0.0234 0.0249 0.0329

10: number of model variables: 6 correlation: 0.806 percent: 40.8%
variables: h 1 3 11 12 15
coefficients: -0.0002 0.5402 -0.0065 0.0222 0.0238 0.0325

11: number of model variables: 6 correlation: 0.824 percent: 43.4%
variables: h 1 3 9 15 16
coefficients: -0.0004 0.5824 -0.0077 0.0133 0.0237 0.0380

12: number of model variables: 6 correlation: 0.813 percent: 41.7%
variables: h 1 3 9 10 11
coefficients: 0.0000 0.6203 -0.0048 0.0306 -0.0093 0.0220

(percent=(1-RMSE/(Standard Deviation))*100%)

Table 13C.6b. Monthly benchmark results for the interpolation parameters modelled by the series system of Poland and near border series from Ukraine, Slovakia, Czech Republic

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 42

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.393	-0.606
2	0.381	-0.672
3	0.315	-0.766
4	0.341	-0.492
5	0.270	-0.904
6	0.256	-1.016
7	0.242	-0.943
8	0.298	-0.857
9	0.317	-0.702
10	0.366	-0.688
11	0.420	-0.653
12	0.374	-0.592
MEAN	0.331	-0.741

Table 13C.7a. Monthly modelling results for the spatial trend of the series system of Czech Republic and near border series from Slovakia, Poland

MODELLING OF SPATIAL TREND (linear regression)

Multiplicative model: logarithmic values are used

1: number of model variables:	4	correlation:	0.909	percent:	58.4%
variables:	h 3		14 17		
coefficients:	-0.0003 -0.0089		0.0240 -0.0463		
2: number of model variables:	4	correlation:	0.901	percent:	56.6%
variables:	h 3		13 16		
coefficients:	-0.0009 -0.0129		0.0305 -0.0214		
3: number of model variables:	4	correlation:	0.906	percent:	57.8%
variables:	h 3		11 17		
coefficients:	-0.0005 -0.0098		0.0155 -0.0365		
4: number of model variables:	4	correlation:	0.874	percent:	51.4%
variables:	h 1		6 17		
coefficients:	0.0002 0.3830		0.0214 -0.0534		
5: number of model variables:	4	correlation:	0.845	percent:	46.5%
variables:	h 1		12 17		
coefficients:	0.0007 0.2420		0.0548 -0.0768		
6: number of model variables:	4	correlation:	0.826	percent:	43.6%
variables:	h 3		11 17		
coefficients:	-0.0003 -0.0075		0.0213 -0.0413		
7: number of model variables:	4	correlation:	0.848	percent:	47.0%
variables:	h 3		8 17		
coefficients:	-0.0005 -0.0096		0.0168 -0.0352		
8: number of model variables:	4	correlation:	0.880	percent:	52.4%
variables:	h 3		8 13		
coefficients:	-0.0008 -0.0102		0.0186 0.0311		
9: number of model variables:	4	correlation:	0.907	percent:	57.9%
variables:	h 3		8 17		
coefficients:	-0.0004 -0.0104		0.0214 -0.0395		
10: number of model variables:	4	correlation:	0.874	percent:	51.4%
variables:	h 3		13 16		
coefficients:	-0.0007 -0.0118		0.0314 -0.0269		
11: number of model variables:	4	correlation:	0.903	percent:	57.0%
variables:	h 3		10 16		
coefficients:	-0.0009 -0.0140		-0.0266 -0.0265		
12: number of model variables:	4	correlation:	0.893	percent:	55.0%
variables:	h 3		12 17		
coefficients:	0.0001 -0.0079		0.0437 -0.0494		

(percent=(1-RMSE/ (Standard Deviation)) *100%)

Table 13C.7b. Monthly benchmark results for the interpolation parameters modelled by the series system of Czech Republic and near border series from Slovakia, Poland

BENCHMARK STUDY: cross-validation test, interpolation between the stations

Number of stations: 17

MEAN REPRESENTATIVITY VALUES (REP) FOR THE MONTHS

REP=1-RMSE/(Standard Deviation)

REPop: interpolation with optimum parameters

REPmp: interpolation with modelled parameters

MONTH	REPop	REPmp
1	0.359	-0.389
2	0.353	-0.392
3	0.283	-0.526
4	0.303	-0.523
5	0.258	-0.707
6	0.228	-0.990
7	0.225	-0.978
8	0.264	-0.756
9	0.310	-0.728
10	0.361	-0.599
11	0.343	-0.598
12	0.282	-0.528
MEAN	0.297	-0.643