CARPATCLIM
Climate of the Carpathian Region

CARPATCLIM project

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Status

- Increasing needs for good quality regional/subregional databases
- Several attempts:
  - Gridded datasets:
    - dynamical modelling
    - statistical modelling
  - Raw data
    - regional climate centres
    - specific databases

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Location

Carpathians

- Length about 1500 km , second longest in Europe
- Highest peak is 2655 m
- Area is 190000 km^2
- Area of the project is about 500000 km^2 (appr. the territory of Spain)

ECSN Advisory Committee, 11th Meeting

Exeter, 21 – 23 June 2006

12th Meeting, Ponta Delgada, Portugal, 23-25 May 2007

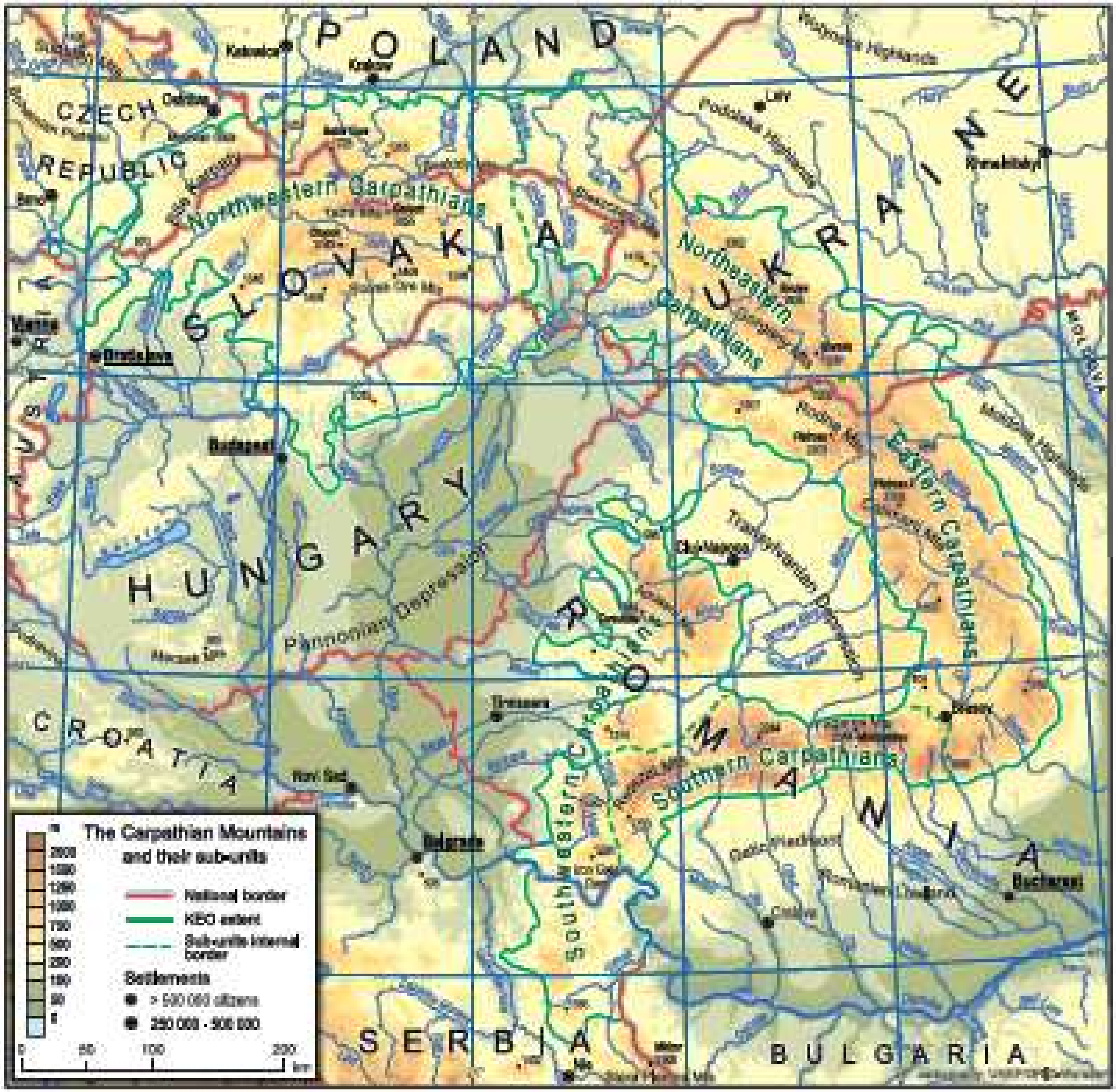
Background of the project

- Hungarian initiative in the Environmental Committee at the European Parliament in 2008
- Accepted by the Economical Committee and the Plenary in 2008
- Preparation of the tender by DG Environment and JRC Ispra in 2009
- Call in June 2010
- Duration of the project: 22 December 2010 - 22 December 2012
- Final: March 2013 (+)

Territory of the project

- For the production of the digital climate atlas, the resulting climatological grids should cover the area between latitudes 50°N and 44°N, and longitudes 17°E and 27°E, approximately.

Map


POLAND
CZECH REPUBLIC
SLOVAKIA
UKRAINE
HUNGARY
ROMANIA
CROATIA
SERBIA
BULGARIA
Northwestern Carpathians
Northeastern Carpathians
Eastern Carpathians
Southern Carpathians
Pannonian Depression
Transylvanian Depression
Katowice
Krakow
Bratislava
Budapest
Cluj-Napoca
Brasov
Novi Sad
Belgrade
Bucharest
The Carpathian Mountains and their sub-units
National border
KEO extent
Sub-units internal border
Settlements
km

Countries of the Carpathian Region

Country	Area in sq. km
Croatia	14 662,66
Czech Rep.	17 570,58
Hungary	86 996,47
Poland	19 794,32
Serbia	45 015,09
Slovakia	48 520,49
Bulgaria	1 208,63
Moldova	437,90
Romania	184 434,63
Ukraine	71 530,71

Philosophy of CARPATCLIM

- No common database of raw data
- Each country provide the same work (hope for a network as dense as possible for the project)
- Common software
- National and international consistency
- Near border data exchange (minimum number of data exchanged on equal basis)
- Freely available database

Participants

- Leading organisation: Hungarian Meteorological Service
- Participants:

  (Hydro)meteorological institutes and services of Austria, Croatia, Czech Republic, Poland, Serbia, Slovakia, Ukraine

  National Research and Development Institute of Environmental Protection of Romania

  Szent Istvan University from Hungary

Structure

- Module 1: Data rescue, quality control, and data homogenisation by the use of MASH. (Leader: SHMU)
- Module 2: Data harmonisation and gridded datasets by the use of MISH. (Leader: OMSZ)
- Module 3: Climate Atlas, publicly accessible dedicated web site, gridded climatological datasets and searchable metadata catalogue (Leader: RHMSS)

Tab.1. Minimum, optimum and proposed number of climatological and precipitation stations used in CARPATCLIM project in period 1961 - 2010

1	2	3	4	5	6	7	8	9	10	11	12
			Minimal			Optimal			Available		
Country	Area (sqkm)	Area (%)	Min CLIM	Min PREC	Min CLIM +PREC	Opt CLIM (+ 10%)	Opt PREC (+ 10%)	Opt CLIM +PREC (+ 10%)	Prop CLIM	Prop PREC	Prop CLIM +PREC
Austria	0	0	0	0	0	0	0	0	0	0	0
Croatia	14663	3.0	6	18	24	7	20	27	7	19	26
Czech Republic	12571	2.6	5	15	20	6	17	23	6	17	23
Hungary	86996	18.0	35	104	139	39	114	153	37	139	165
Poland	19794	4.1	8	24	32	9	26	35	9	26	35
Romania	184435	38.1	74	221	295	81	243	324	91	67	158
Serbia	45015	9.3	18	54	72	20	60	80	21	42	63
Slovakia	48520	10.0	20	57	77	22	63	85	22	63	85
Ukraine	71531	14.8	29	85	114	32	94	126	30	91	121
Sum	483525	0.0	195	578	773	216	543	853	223	464	687

Digitized data

Country	Nb. of stations for data rescue		Nb. of records to be digitized	Status of digitalization	Notice
	Climatological	Precipitation			
Croatia	0	0	0	Finished	All necessary data already digitized
Czech Republic	0	0	0	Finished	All necessary data already digitized
Hungary	6/21	0	1 303050	Finished	14 variables from 6 stations, 1 variable from 21 stations
Poland	12	3	389455	Finished	
Romania	10	20	1525700	Finished	
Serbia	0	12	30660	Finished	
Slovakia	5	15	394200	Finished	Full station sheets digitized (more than 12 variables)
Ukraine	39	91	11 625750 (9964500 +1660750)	Finished	14 variables from 39 stations, 1 variable from 91 stations

Austria participates in the near border data exchange only and Croatia and Czech Republic have all necessary data already digitized.

Summary of digitized data per country with percentage (%) of data digitized in the frame of the project with respect to the all data used in the project per country

Country	Climatological stations		Precipitation stations		Database (Y/N)	QC (Y/N)
	Number of digit. data	%	Number of digit. data	%		
Hungary	1 522 780	20,0	0	0	Y	Y
Poland	65 700	2,9	281 780	29,7	Y	Y
Romania	1 323 490	6,0	203 670	8,0	Y	Y
Serbia	9 560	0,19	21 900	2,26	Y	Y
Slovakia	255 500	4,5	219 000	9,5	Y	Y
Ukraine	9 396 176	94.2	1 531 520	92.2	Y	Y

Metadata

- General principles:

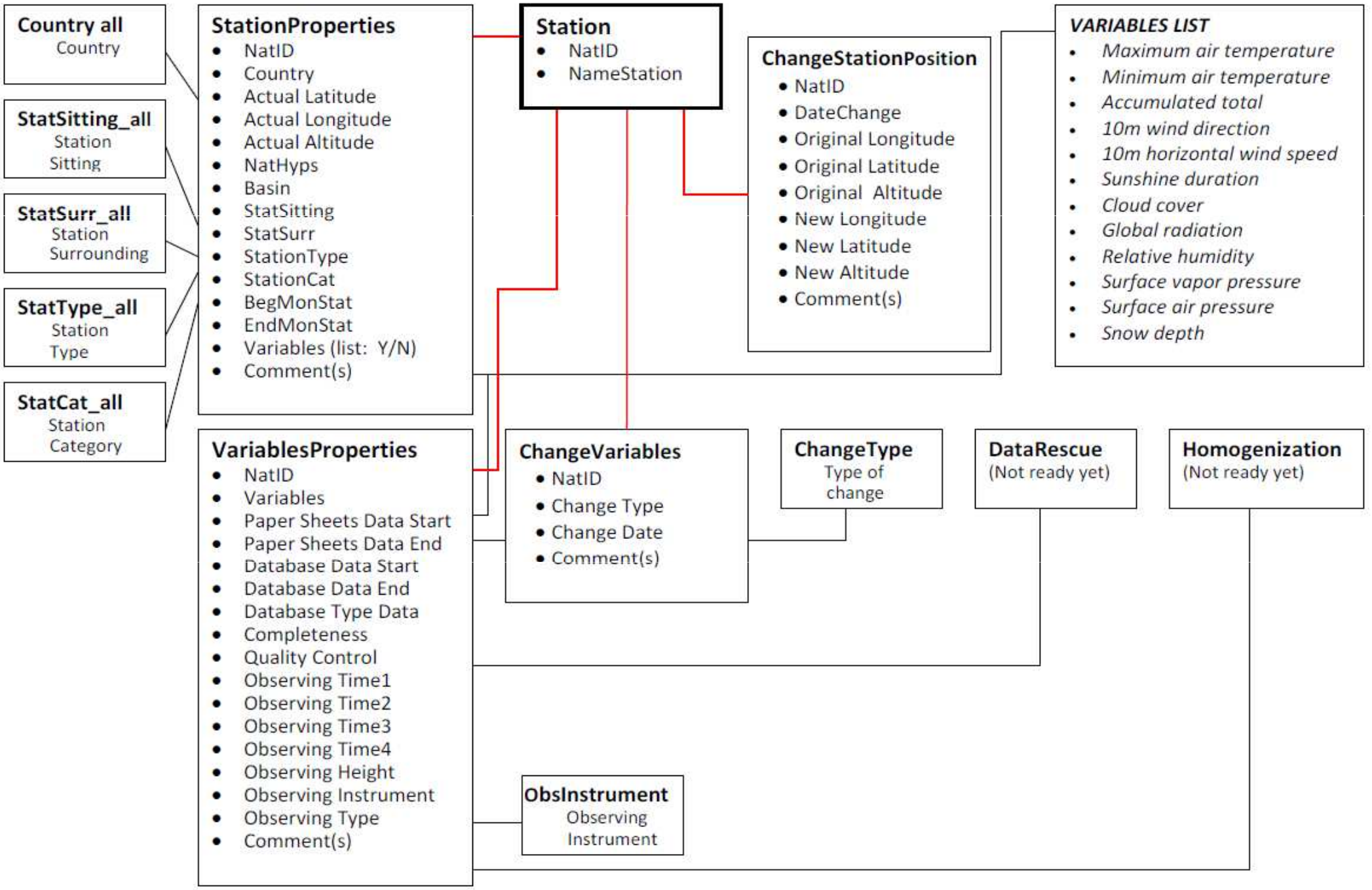
-a conformity to ISO 19115 and INSPIRE to possible extent

-ISO 19115 and INSPIRE elements and packages were considered and adapted

-the metadata elements should be able to be supplied by the data supplier

- partner's dataset structure was consulted. The metadata profile was adapted based on the feedback of the providers.

Metadatabase scheme



Gridded meteorological variables

Daily variables listed in the contract
Mean daily air temperature
Minimum air temperature
Maximum air temperature
Accumulated total precipitation
Wind direction
Wind speed (10 m)
Sunshine duration
Cloud cover
Global radiation
Relative humidity
Surface vapour pressure
Surface air pressure
Snow depth

Additional variables
Maximum daily wind speed
Wind speed (2m)
Snow water equivalent

Computed variables

- Mean daily air temperature
- Daily mean wind speed and direction
- Daily maximum wind speed
- Daily mean wind speed at 2m
- Sunshine duration/ Global radiation
- Surface water vapour pressure
- Daily snow depth and snow water equivalent

Daily snow depth and water equivalent

- A process-related snow cover model (developed at ZAMG) based on prefinished CARPATCLIM grids was applied
- Daily grids of mean air temperature, precipitation sum and relative humidity were used as input

Set of variables and indicators to be provided for the Digital Climate Atlas of the Carpathian Region

Average air temperature (2 m), average mean air temperature (2 m), minimum air temperature, maximum air temperature, precipitation, maximum 10 m horizontal wind speed, average 10 m horizontal wind speed, sunshine duration, cloud cover, global radiation, relative humidity, vapour pressure, surface air pressure, snow depth, snow water equivalent, number of frost days, number of days with Tmax above 25 °C, number of days with Tmax above 30 °C, Palfai Drought Index, Standardized Precipitation Index averaged over a three-months period, Reconnaissance Drought Index, Palmer Drought Severity Index, percentage of days without defrost (ice days), percentage of extremely hot days, percentage of severe cold days, growing season length, percentage of wet days, percentage of wet days above 20 mm/d, greatest 1-day total rainfall, greatest 5-day total rainfall, aridity index, moisture index, Ellenberg index

Outcomes

- High-resolution (10 km*10 km) freely available databases
- Data availability on monthly and daily level
- Time frame: 1961-2010

Plans

- Large work
- Should be enlarged:
  - Spatial
  - Temporal
  - Thematically

Acknowledgement

- Author thanks to European Comission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy for Contract Notice OJEU 2010/S 110-166082 dated 9 June 2010

LETTER OF RECOMMENDATION[1]

To whom it may concern,

The Steering Group of the Priority Area 5 **"To manage environmental risks"**, made up of representatives from the Danube Region countries (nominated by their governments), has pre-examined the project idea submitted by **Sándor Szalai** (address: Szent István University, Páter K. u. 1. Gödöllő Hungary 2100), with the title:

Climate of the Danube Region
Acronym: DANUBECLIM

in the framework of the written procedure between 10/03/2012 and 26/03/2012.

The **conclusion** is:

The project **DANUBECLIM** contributes to the achievement of the targets and goals of the relevant actions in Priority Area 5 of the EU Strategy for the Danube Region.

The Steering Group – representing the Danube countries – invites the funding sources to consider providing adequate financial support to the project.

Budapest, 15/02/2014

On behalf of the Steering Group:

Simona-Olimpia Negru	**Péter Bakonyi**
Co-coordinator – Romania	Co-coordinator – Hungary

1 [illegible]

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in the framework of the written procedure between 19/03/2012 and 26/03/2012.

The **conclusion** is:

The project **DANUBECLIM** contributes to the achievement of the targets and goals of the relevant actions in Priority Area 5 of the EU Strategy for the Danube Region.

Thank you for your attention!