HOMOGENISATION OF MONTHLY PRECIPITATION TIME SERIES IN CROATIA

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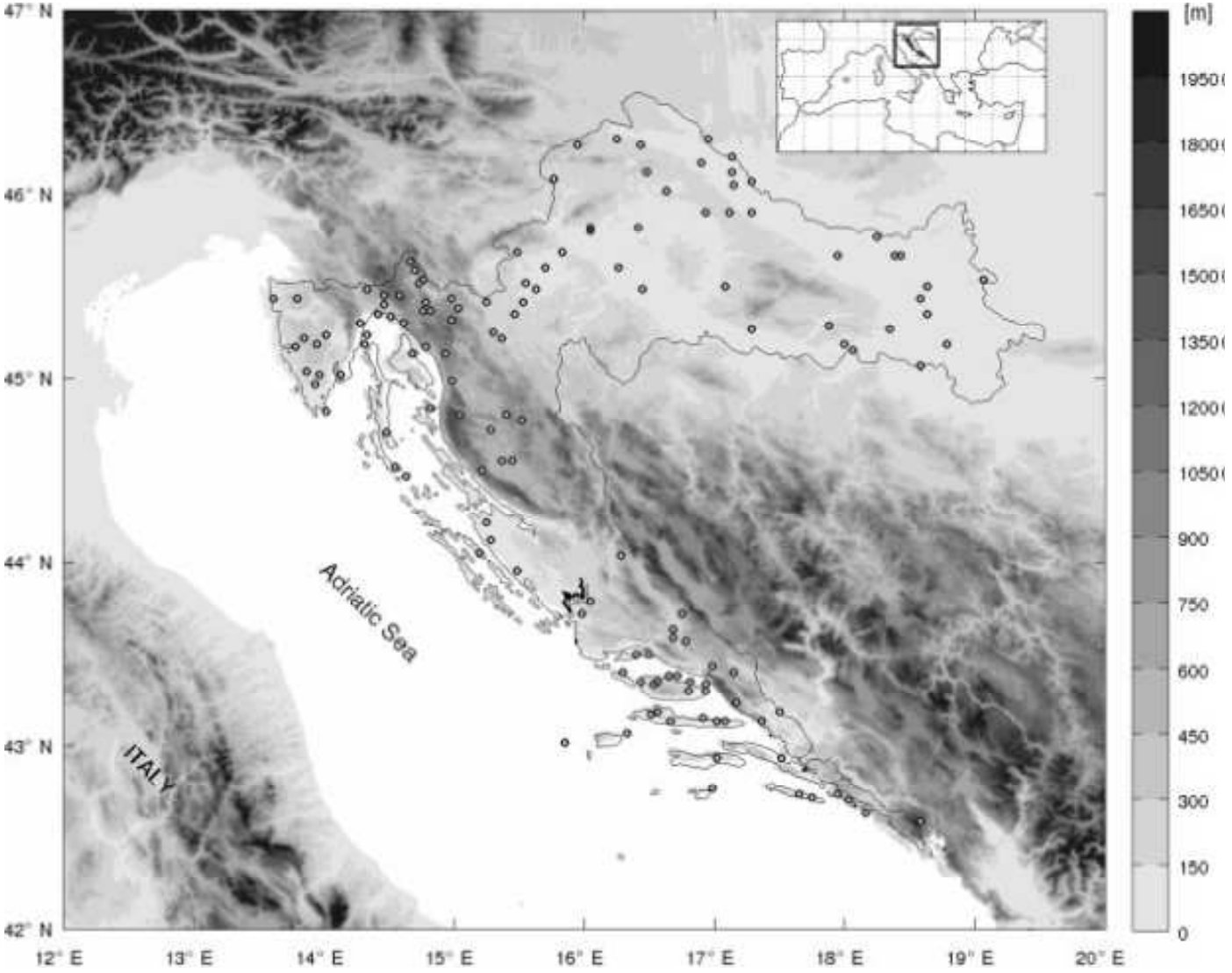
MOTIVATION

The main goal was to select the best quality dataset during the last 60 years with the purpose of eliminating any suspicious features from the future analysis of precipitation variability in Croatia.

DATA

- 24 main
  10 climatological
  103 precipitation stations
- Monthly precipitation sums
- Most from late 1940s to 2010



METHOD

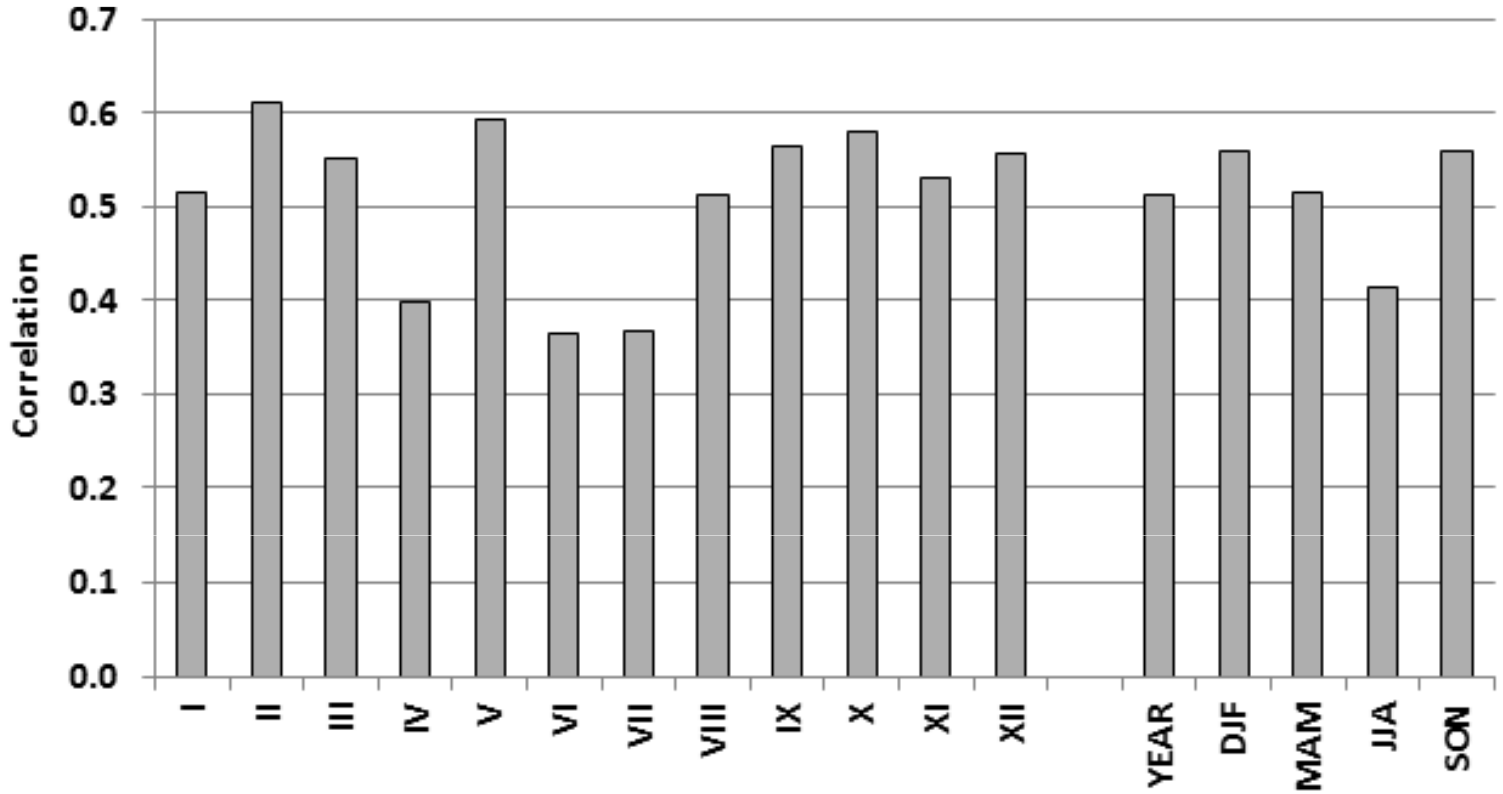
ProClimDB/Anclim software (P. Stepanek)

Homogenisation steps:

- Creation of reference series (6 best correlated reference stations)
- Application of 2 statistical tests (Standard Normal Homogeneity Test and Maronna and Yohai bivariate test) on the monthly, seasonal and annual series
- Homogenisation - correction of detected inhomogeneities on the monthly scale
- Filling missing values

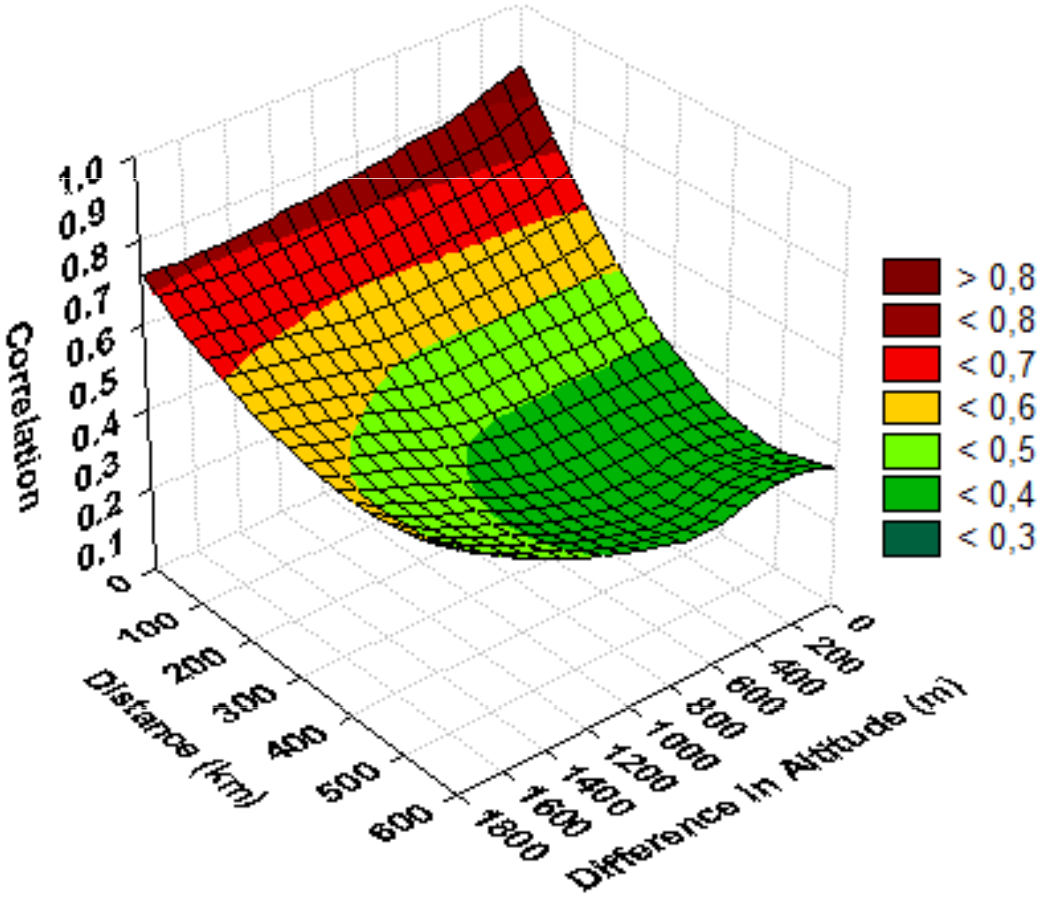
CORRELATION

For each pair of stations, Spearman correlation coefficient for monthly data was calculated.



Average correlation coefficient of precipitation amounts. Highest in winter and lowest for the summer season.

CORRELATION



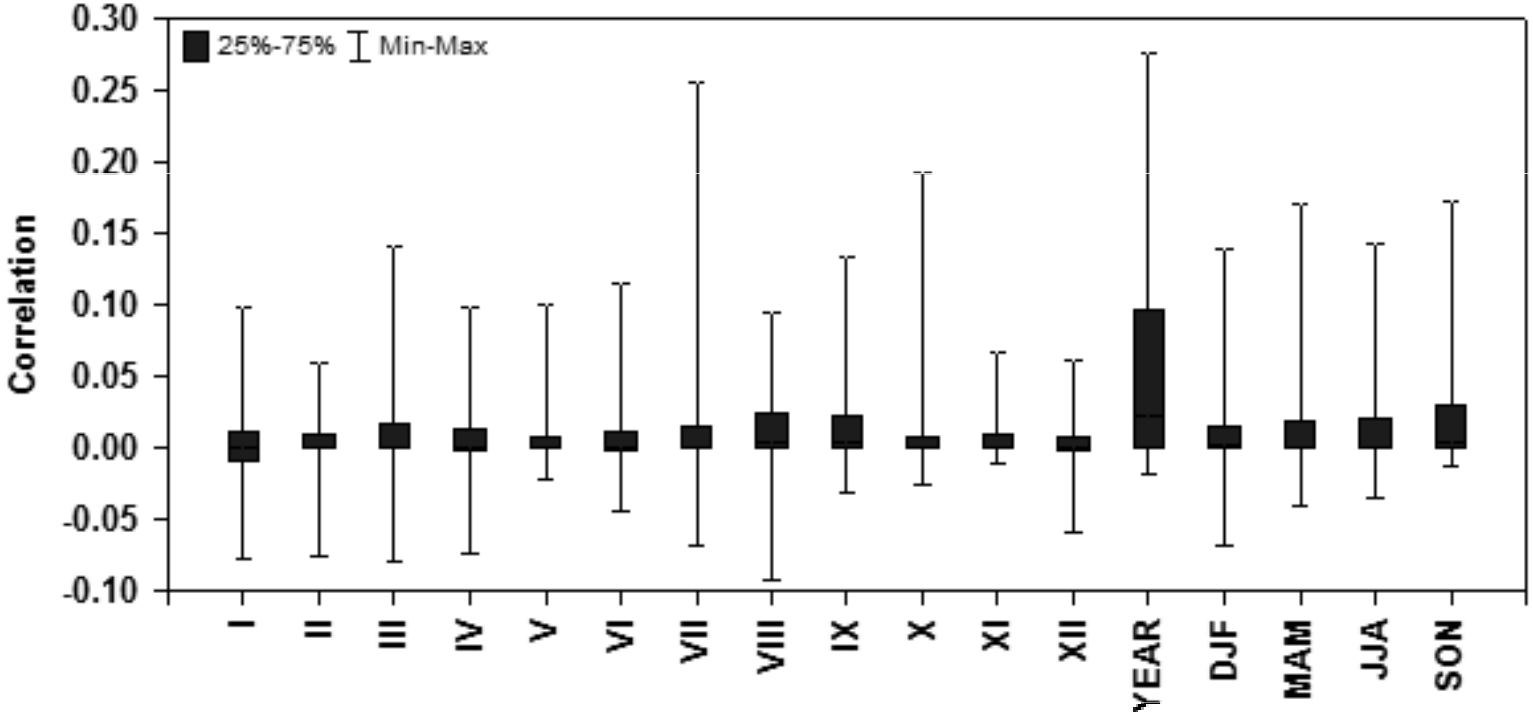
Correlation coefficients between stations in relation to their altitude and distance for precipitation series.

Mean correlation of 0.77 was found for distances up to 50 km, within that group there were stations with weak correlations due to complex orography.

Distances 50 to 100 km - correlation only 0.65

Distances higher than 200 km – correlation decreased to very low values

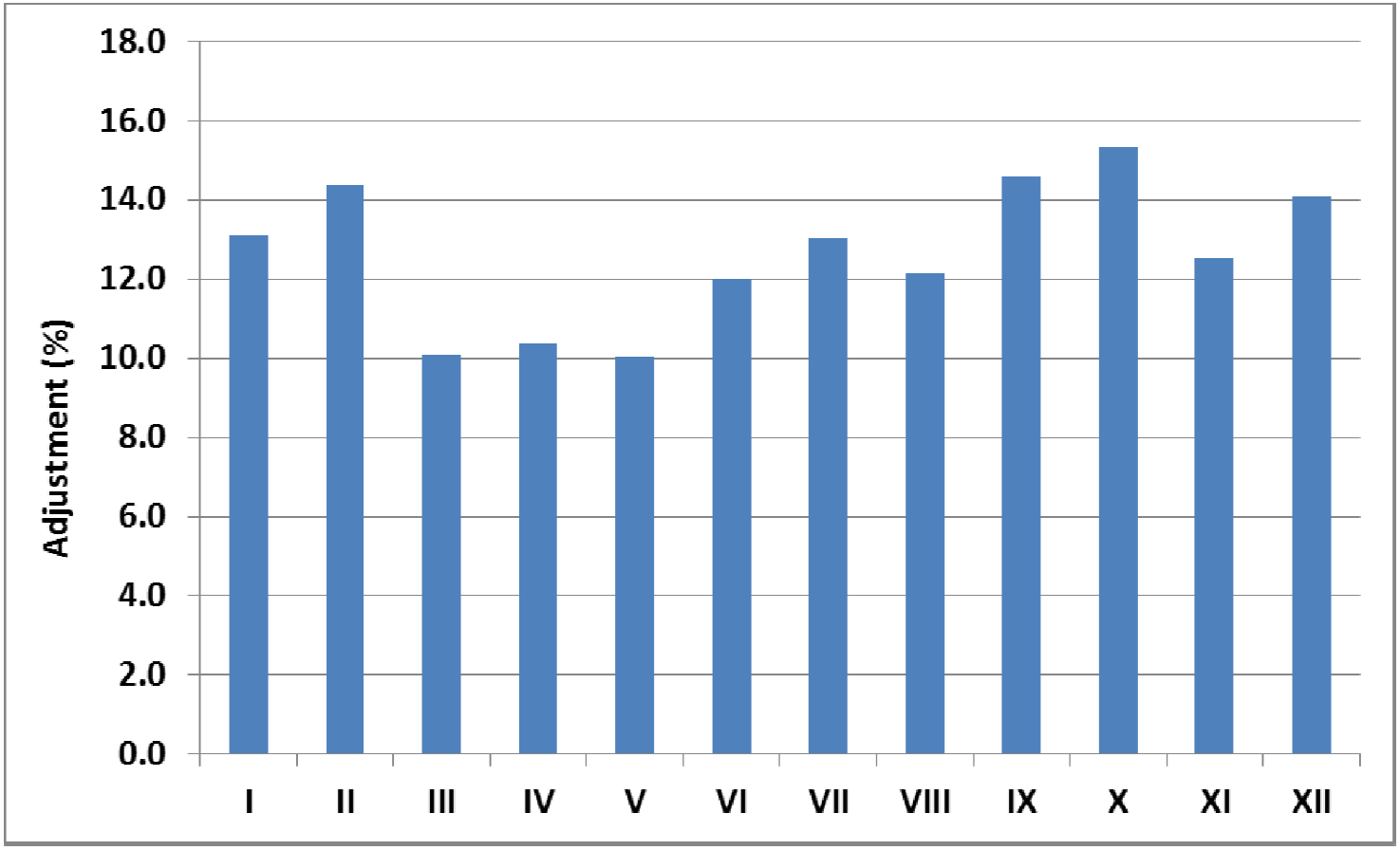
CORRELATION



Annual variation changes of correlation after correction of inhomogeneities for precipitation series.

If the values of the coefficient of correlation between the reference and adjustment series after correction decreased, the series were not corrected.

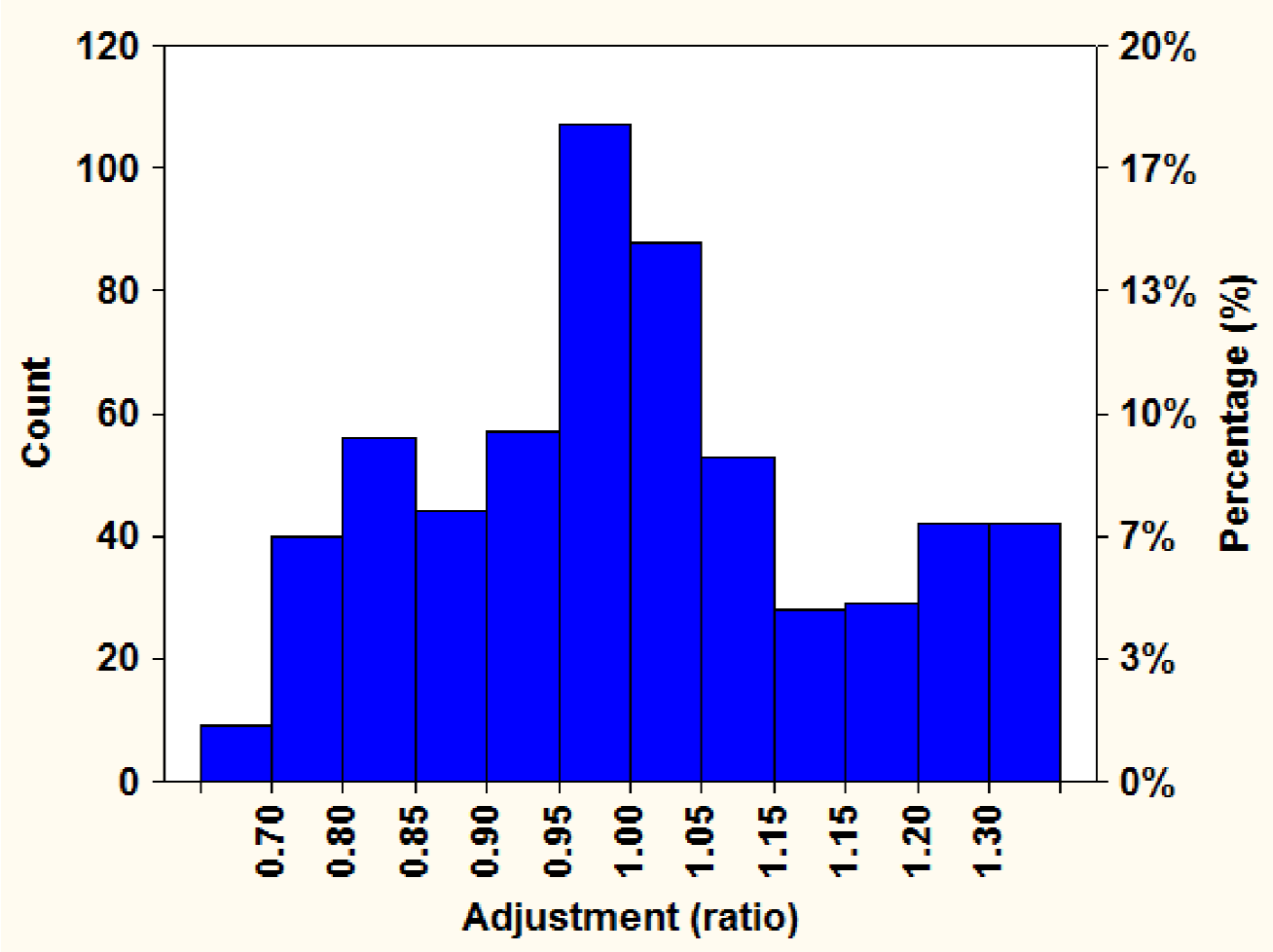
ADJUSTMENT



Annual variation in means of absolute values of inhomogeneity corrections.

Higher absolute size of correction occurred in autumn and winter and was lower in spring (average for all months was 13 %).

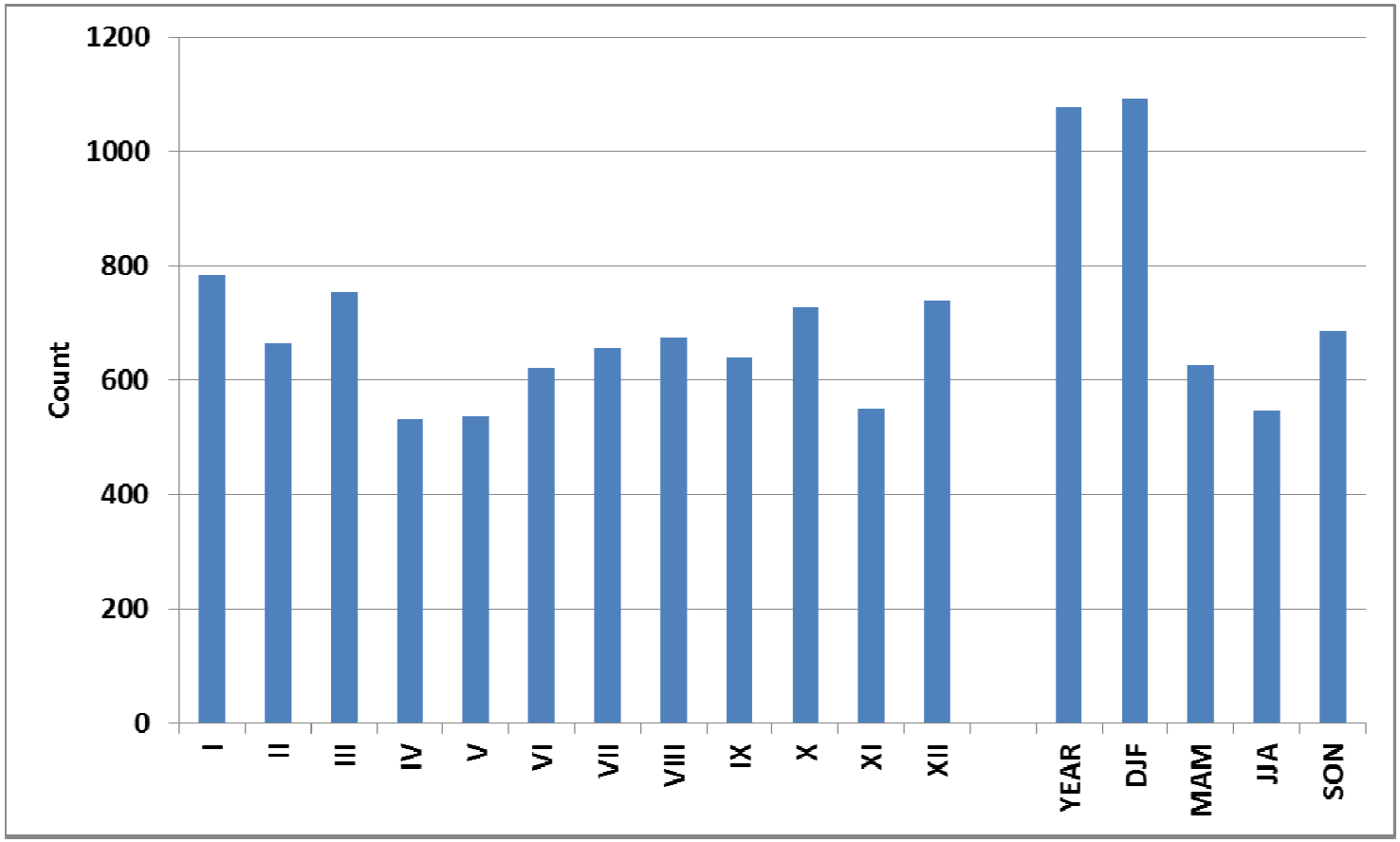
ADJUSTMENT



Histogram of the distribution of size of the correction.

Corrections were more or less equally positive and negative.
The median ratio of correction for all months is close to 1.

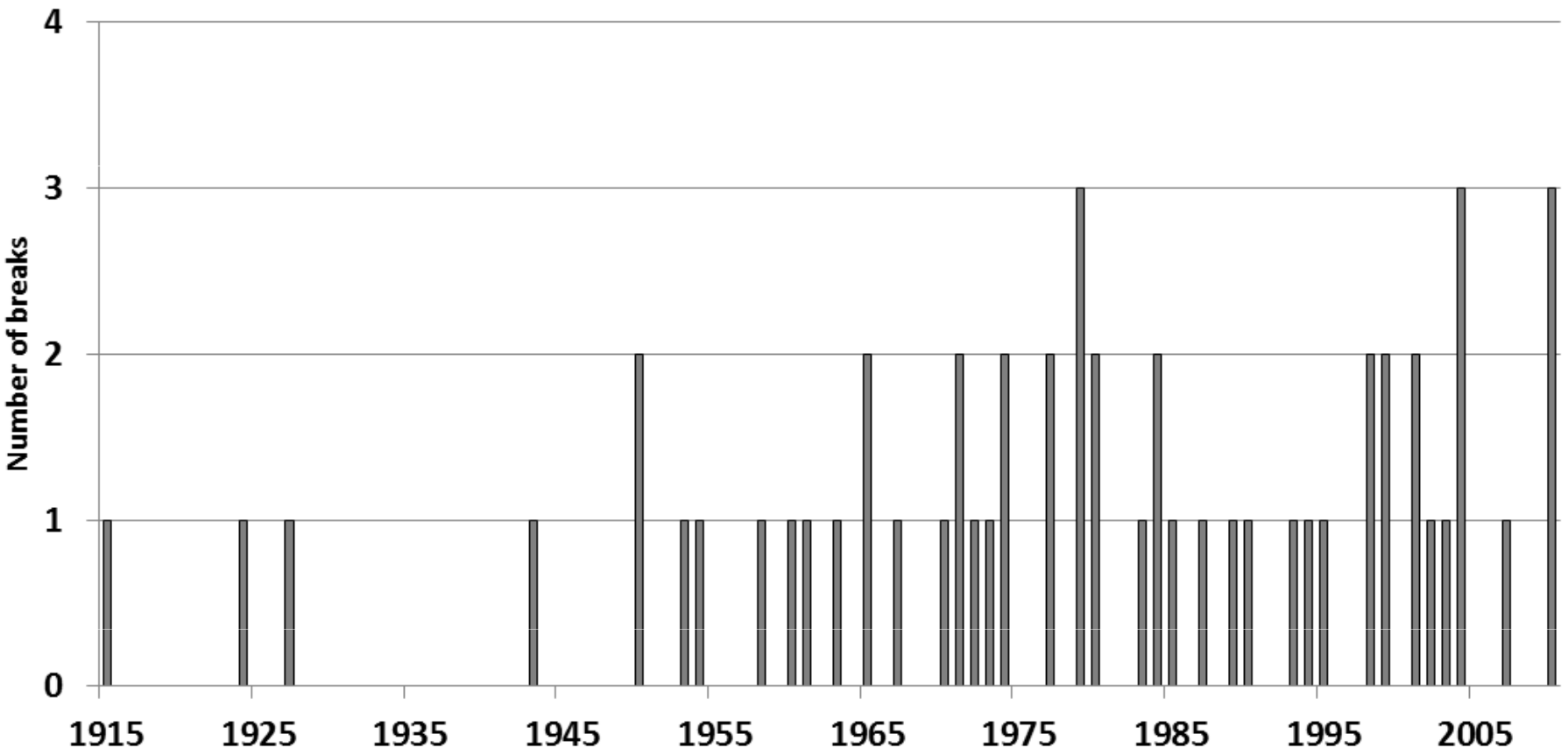
NUMBER OF BREAKS



Number of detected statistically significant (α=0.05) breaks.

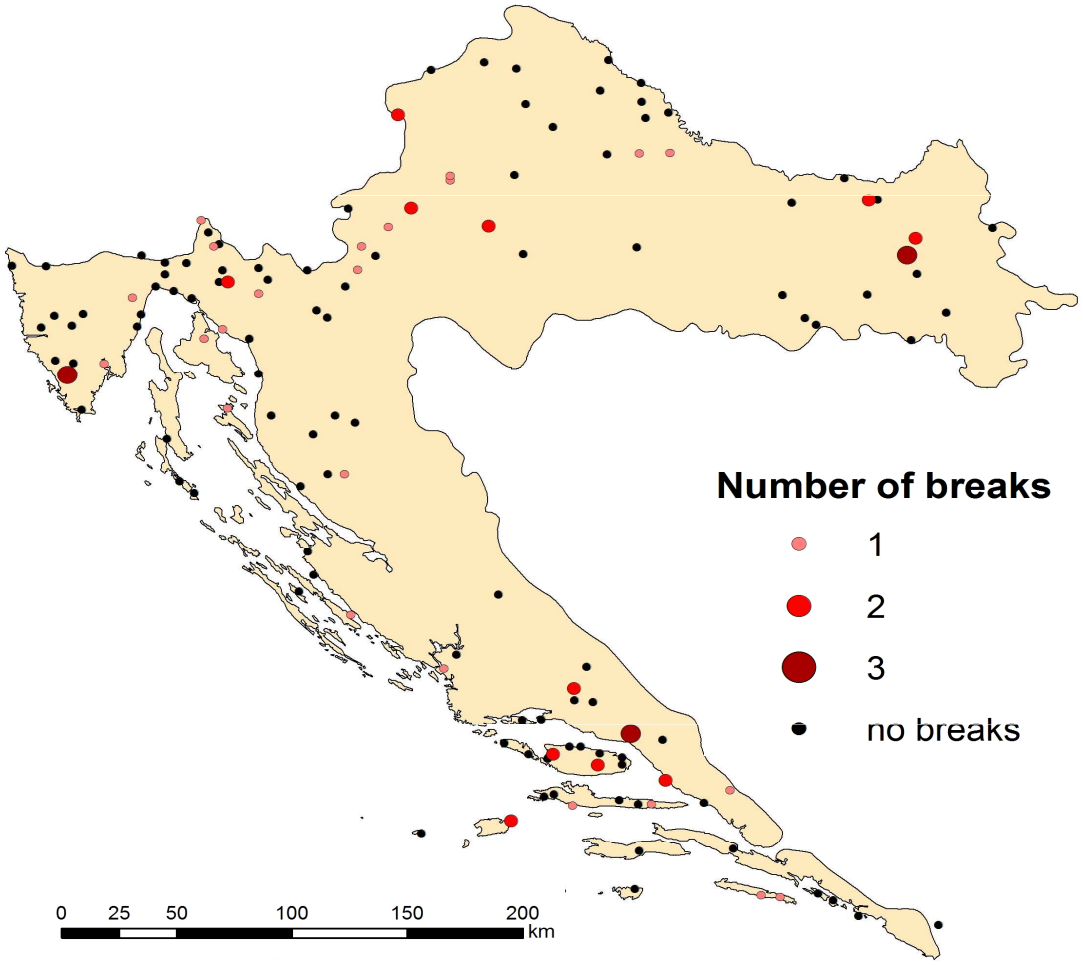
There is a seasonal variation, more breaks were detected in winter, than in summer. This may be caused by lower spatial correlation of summer precipitation, thus making inhomogeneities more difficult to detect.

NUMBER OF BREAKS



Temporal distribution of number of breaks.

NUMBER OF BREAKS



Number of statistically significant (α=0.05) breaks detected on each station.

METADATA

- Very sparse and incomplete, especially for the rain gauge stations that make up the majority of the data sets explored in this study

- 13 % (6 breakpoints) of all inhomogeneities found are supported by metadata

- 3 because of the relocation, 2 because of the change of the observer and one can be explained by the combination of the relocation and change of the observer

RESULTS

- The precipitation series in Croatia are fairly homogeneous. Inhomogeneities were found at 32 (23 %) stations.
- One break point at 20 stations, two at 9 stations and three at 3 stations
- If we exclude the stations with inhomogeneities before 1961, only 26 stations (19 %) out of 137 are considered to be inhomogeneous.
- We recommend using the whole network with homogenized series.