# Statistical spatiotemporal modelling and methods for different climatological topics

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At the statistical modelling of the meteorological elements we have to take account that the probability distribution of the variables is changing in space and in time alike. The spatial change means that the climate is different on the globe. The temporal change is the result of the possible global climate change furthermore the data series are inhomogeneous as a consequence of numerous non-climatic factors. Moreover the precise statistical estimation of the climate change 'signal' is impossible. Consequently in case of linear modelling as well there is the problem that the expected value is changing in space and in time alike, furthermore the precise estimation of climatic temporal change is impossible and filtering the non-climatic temporal change (inhomogeneities) out is not a trivial task. In addition numerous classical multivariate methods assuming the identical distribution in time can not be applied. This statement is in connection with such problems as homogenization of data series, missing data complementing, data quality control and spatial interpolation. For example the classic multiple linear regression formula can not be acceptable for spatial interpolation owing to the climatic temporal change in expected value. But if this signal is estimated by the generalized-least-squares method, then various geostatistical kriging formulas are obtained from the linear regression formula. Completing with changing expected value in space, these kriging formulas can be efficiently used for the problems as comparison of data series at the homogenization, missing data complementing, comparison of the data at quality control and spatial interpolation. Nevertheless the spatial interpolation methods developed in geostatistics and built in GIS softwares are not optimal for the meteorology. In geostatistics the usable information or the sample for modelling is only the observations, that is a single realization in time, while in meteorology we have spatiotemporal data, namely the long data series which form a sample in time and space as well. Our methods MASH (Multiple Analysis of Series for Homogenization; Szentimrey) and MISH (Meteorological Interpolation based on Surface Homogenized Data Basis; Szentimrey, Bihari) were developed in accordance with the above statistical methodology.