



A comparison of different interpolation methods for wind data in Central Asia

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For the assessment of the global climate change and its consequences, the results of computer based climate models are of central importance. The quality of these results and the validity of the derived forecasts are strongly determined by the quality of the underlying climate data. However, in many parts of the world high resolution data are not available. This is particularly true for many regions in Central Asia, where the density of climatological stations has often to be described as thinned out. Due to this insufficient data base the use of statistical methods to improve the resolution of existing climate data is of crucial importance. Only this can provide a substantial data base for a well-founded analysis of past climate changes as well as for a reliable forecast of future climate developments for the particular region.

The study presented here shows a comparison of different interpolation methods for the wind components u and v for a region in Central Asia with a pronounced topography. The aim of the study is to find out whether there is an optimal interpolation method which can equally be applied for all pressure levels or if different interpolation methods have to be applied for each pressure level.

The European reanalysis data Era-Interim for the years 1989 - 2015 are used as input data for the pressure levels of 850 hPa, 500 hPa and 200 hPa. In order to improve the input data, two different interpolation procedures were applied: On the one hand pure interpolation methods were used, such as inverse distance weighting and ordinary kriging. On the other hand machine learning algorithms, generalized additive models and regression kriging were applied, considering additional influencing factors, e.g. geopotential and topography.

As a result it can be concluded that regression kriging provides the best results for all pressure levels, followed by support vector machine, neural networks and ordinary kriging. Inverse distance weighting showed the worst results.