EMS Annual Meeting Abstracts
Vol. 10, EMS2013-666, 2013
13th EMS / 11th ECAM

Spatial interpolation of daily minimum temperatures applying multi-dimensional co-variance functions

O. E. Tveito
Norwegian Meteorological Institute, Climatology Division, Oslo, Norway (ole.einar.tveito@met.no)

The Norwegian Meteorological Institute (met.no) has produced daily 1x1 km grids of mean daily temperatures and daily precipitation sums on a daily basis since 2006. The dataset currently cover the period back to 1957. The algorithm applied for interpolating daily mean temperatures is originally developed for producing 30-year mean monthly temperatures for Fennoscandia. The method has proved to be reliable for most parts of the year, but has severe disadvantages in the winter season. The gridded temperature and precipitation maps are used for monitoring flood, landslide and snow avalanche risks, and are important components in the forecasting and warning system for such natural hazards.

The temperature algorithm is a residual kriging approach, applying five external predictors to describe the large scale trend. The trend expressions are defined for each month, and so are the semi-variograms. The parameters are also fixed for the entire interpolation domain, which is characterized by large variations in terrain complexity and climatic conditions.

Correct estimation of low temperatures, especially in the winter season is complicated since the response to the actual weather situation might show large local variability. The most frequent situation is inversion layers. A predefined spatial model will not be able to provide reliable spatial estimates for such events, a fact shown by the validation procedures built into our gridding system.

The possibility to better describe the spatial variability for daily minimum temperatures, an element concerned by inversions throughout the year is investigated. The new concept is introducing 3-D anisotropic distance matrixes for estimating the spatial correlation structure instead of the traditional 2-D Euclidean distance most often applied in geostatistics. The first results are promising. This might reduce the dependence of the linear trend component in residual kriging that, if the trend expression is estimated on actual data, might be uncertain having a sparse observation network.