EMS Annual Meeting Abstracts
Vol. 11, EMS2014-590, 2014
14th EMS / 10th ECAC

A high resolution climate data set for Europe through dynamical downscaling with frequent reinitializations

Thomas Remke (1), Claas Teichmann (1,2), Daniela Jacob (1,2)

(1) Climate Service Center (CSC), Helmholtz-Zentrum Geesthacht, Germany, (2) Max Planck Institute for Meteorology, Hamburg, Germany

Reanalyses depict the state of the atmosphere as a best fit in space and time of a variety of quality-checked atmospheric observations. By essentially solving the data assimilation problem in a very accurate and physically consistent manner, reanalysis results can be used as a reference for model evaluation procedures and as forcing data sets for different model applications. However, their spatial and temporal resolution is too coarse to simulate small-scale and fine-scale processes important for certain model applications.

To achieve a higher spatial and temporal resolution, regional climate models are extensively used to dynamical downscale large-scale climate information to generate small-scale and fine-scale detail. However, the simulating model generates its own dynamics. An alternative procedure to the common continuous downscaling approach is to frequently reinitialize the three-dimensional atmospheric driving fields without any additional data assimilation (also referred to as PoorMan's reanalysis). This downscaling procedure retains the sequence of meteorological events inherent to the forcing data. This might be beneficial for certain model applications or impact studies which rely on such high resolution data.

We present a frequently (daily) reinitialized model simulation with the regional climate model REMO. In this manner, the ERA-Interim renanalysis is downscaled to the European CORDEX domain to a horizontal resolution of 0.11° for the period from 1989 to 2008. This high resolution data set indicates reduced systematic errors and generated reliable added value while providing a sequence of meteorological events matching with observations, compared to a standard continuous regional climate model simulation. However, this is at the expense of model generated variability on almost all temporal scales.

Overall, dynamical downscaling with frequent reinitializations is a beneficial and comparable cheap tool to increase the spatial and temporal resolution of an atmospheric reanalysis, which better suit the needs of impact studies, since they reproduce observation-based weather events in space and time when driven with an atmospheric reanalysis.