



Added value of high-resolution regional climate model over the Bohai Sea and Yellow Sea areas

Delei Li (1), Hans von Storch (1,2), and Beate Geyer (1)

(1) Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research, System Analysis and Modelling, Geesthacht, Germany (delei.li@hzg.de), (2) Center of Excellence CliSAP, University of Hamburg, Hamburg, Germany

Added value from dynamical downscaling has long been a crucial and debatable issue in regional climate studies. A 34 year (1979–2012) high-resolution (7 km grid) atmospheric hindcast over the Bohai Sea and the Yellow Sea (BYS) has been performed using COSMO-CLM (CCLM) forced by ERA-Interim reanalysis data (ERA-I). The accuracy of CCLM in surface wind reproduction and the added value of dynamical downscaling to ERA-I have been investigated through comparisons with the satellite data (including QuikSCAT Level2B 12.5 km version 3 (L2B12v3) swath data and MODIS images) and in situ observations, with adoption of quantitative metrics and qualitative assessment methods.

The results revealed that CCLM has a reliable ability to reproduce the regional wind characteristics over the BYS areas. Over marine areas, added value to ERA-I has been detected in the coastal areas with complex coastlines and orography. CCLM was better able to represent light and moderate winds but has even more added value for strong winds relative to ERA-I. Over land areas, the high-resolution CCLM hindcast can add value to ERA-I in reproducing wind intensities and direction, wind probability distribution and extreme winds mainly at mountain areas. With respect to atmospheric processes, CCLM outperforms ERA-I in resolving detailed temporal and spatial structures for phenomena of a typhoon and of a coastal atmospheric front; CCLM generates some orography related phenomena such as a vortex street which is not captured by ERA-I. These added values demonstrate the utility of the 7-km-resolution CCLM for regional and local climate studies and applications.

The simulation was constrained with adoption of spectral nudging method. The results may be different when simulations are considered, which are not constrained by spectral nudging.