Geophysical Research Abstracts
Vol. 15, EGU2013-3330, 2013
EGU General Assembly 2013

Evaluation of ERA-Interim precipitation data in complex terrain

Lu Gao, Matthias Bernhardt, and Karsten Schulz
Ludwig-Maximilians-Universität München, Department of Geography, Munich, Germany

Precipitation controls a large variety of environmental processes, which is an essential input parameter for land surface models e.g. in hydrology, ecology and climatology. However, rain gauge networks provides the necessary information, are commonly sparse in complex terrains, especially in high mountainous regions. Reanalysis products (e.g. ERA-40 and NCEP-NCAR) as surrogate data are increasing applied in the past years. Although they are improving forward, previous studies showed that these products should be objectively evaluated due to their various uncertainties.

In this study, we evaluated the precipitation data from ERA-Interim, which is a latest reanalysis product developed by ECMWF. ERA-Interim daily total precipitation are compared with high resolution gridded observation dataset (E-OBS) at $0.25° \times 0.25°$ grids for the period 1979-2010 over central Alps (45.5-48°N, 6.25-11.5°E).

Wet or dry day is defined using different threshold values (0.5mm, 1mm, 5mm, 10mm and 20mm). The correspondence ratio (CR) is applied for frequency comparison, which is the ratio of days when precipitation occurs in both ERA-Interim and E-OBS dataset. The result shows that ERA-Interim captures precipitation occurrence very well with a range of CR from 0.80 to 0.97 for 0.5mm to 20mm thresholds. However, the bias of intensity increases with rising thresholds. Mean absolute error (MAE) varies between 4.5 mm day-1 and 9.5 mm day-1 in wet days for whole area. In term of mean annual cycle, ERA-Interim almost has the same standard deviation of the interannual variability of daily precipitation with E-OBS, 1.0 mm day-1. Significant wet biases happened in ERA-Interim throughout warm season (May to August) and dry biases in cold season (November to February).

The spatial distribution of mean annual daily precipitation shows that ERA-Interim significant underestimates precipitation intensity in high mountains and northern flank of Alpine chain from November to March while pronounced overestimate in the southern flank of Alps. The poor topographical and flow related characteristic representation of ERA-Interim model is possibly responsible for the bias. Particularly, the mountain block effect of moisture is weak captured. The comparison demonstrates that ERA-Interim precipitation intensity needs bias correction for further alpine climate studies, although it reasonably captures precipitation frequency. This critical evaluation not only diagnosed the data quality of ERA-Interim, but also provided the evidence for reanalysis products downscaling and bias correction in complex terrain.