



Downscaling Precipitation via Meiyu-like pattern

Thorsten Simon (1), Andreas Hense (1), Tong Jiang (2), Clemens Simmer (1), and Christian Ohlwein (1)
(1) Meteorological Institute, University Bonn, Germany, (2) National Climate Centre (NCC), Beijing, China

This study identifies daily Meiyu-like East Asian Summer Monsoon patterns that are linked to precipitation observations in the Poyang lake catchment. This analysis provides insight into the dynamics of strong, local precipitation events and has the potential to improve projections of precipitation from coarse-grid numerical simulations.

Precipitation observations between 1960 and 1999 are taken from 13 rain gauges located in the Poyang lake catchment, which is a sub-catchment of the Yangtze River. The analysis shows, that the observations are linked to daily patterns of relative vorticity at 850 hPa (Vo850) and vertical velocity at 500 hPa (W500) taken from the ERA-40 reanalysis data set. The patterns are derived by two approaches: (a) empirical orthogonal function (EOF) analysis and (b) rotated EOF analysis. Vo850 and W500 refer to geostrophic and ageostrophic processes, respectively. A logistic regression connects the large-scale dynamics to the local observations, whereby a forward regression selects the patterns best suited as predictors for the probability of exceeding thresholds of 24h accumulated rainfall at the gauges. The regression model is verified by cross-validation.

The spatial structure of the detected patterns can be interpreted in terms of well-known meso- α -scale disturbances called Southwest vortices. Overall, the proposed EOF and rotated EOF patterns are both related to physical processes and have the potential to work as predictors for exceedance rates of local precipitation in the Poyang catchment.

References

T. Simon, A. Hense, B. Su, T. Jiang, C. Simmer, and C. Ohlwein, **2013**: Pattern-based statistical downscaling of East Asian Summer Monsoon precipitation. *Tellus A*. 65. <http://dx.doi.org/10.3402/tellusa.v65i0.19749>