Geophysical Research Abstracts
Vol. 16, EGU2014-5059, 2014
EGU General Assembly 2014

Generation and transfer of internal variability in a regional climate model

Thorsten Simon (1), Dinan Wang (2), Andreas Hense (1), Clemens Simmer (1), and Christian Ohlwein (1)

(1) Meteorological Institute, University Bonn, Germany, (2) Institute for Energy Systems and Energy Business, Hochschule Ruhr West, Mühlheim an der Ruhr, Germany

There is a strong need for tools allowing the comparison between the performance of a regional climate model (RCM) and the corresponding model providing lateral boundary conditions (LBC) for the RCM, which is a global general circulation model (GCM) in most cases. A method is presented to investigate the temporal scales on which a RCM is able to generate internal variability on its own and on which variability is copied from the driving model. This is implemented by a cross-spectral analysis between the RCM output and a bi-linearly interpolated version of the driving model, leading to an estimate of the coherence spectrum.

Applying the aforementioned technique to surface temperature and temperature and specific humidity at 850 hPa from the RCM COSMO-CLM East Asia with a horizontal resolution of 50 km and its driving model ECHAM5, it was found that features in the spatial distribution of coherence are related to atmospheric dynamics in East Asia, e.g. monsoons and inter-tropical convergence zone (ITCZ). A further application to a double-nesting approach, where COSMO-CLM East Asia is the driving model for two domains – namely the Haihe catchment and the Poyang catchment – each with a horizontal resolution of 7 km, shows that the frequencies on which internal variability is generated by the driven model are much higher compared to the first nesting step.

Concluding RCMs can produce a considerable variability on the respective temporal-scales. This implies that a dynamical downscaling with a re-analysis as LBC is conceptually different to a regional re-analysis, i.e. data assimilation on the regional-scale.

References

T. Simon, D. Wang, A. Hense, C. Simmer and C. Ohlwein, **2013**: Generation and transfer of internal variability in a regional climate model. *Tellus A. 65*. http://dx.doi.org/10.3402/tellusa.v65i0.22485