Geophysical Research Abstracts
Vol. 19, EGU2017-6519, 2017
EGU General Assembly 2017

Using bias correction to achieve reliable near-term climate projections

Bert Van Schaeybroeck, Stéphane Vannitsem, and Piet Termonia
Royal Meteorological Institute of Belgium, Research and development, Brussels, Belgium (bertvanschaeybroeck@gmail.com)

Internationally coordinated climate initiatives (e.g. CORDEX or CMIP5) collect large multi-model ensembles of climate simulations to provide a sample of potential outcomes. Due to their large model biases, the climate models are used for sensitivity experiments in the context of climate change, rather than for reproducing exact climatological conditions. In other words, the main model output from model simulations under a certain greenhouse gas scenario are the climate changes or trends rather than the absolute values.

The ensemble simulations are perfectly reliable when the reality (observations) can be considered as a member from the ensemble. The reliability of climate predictions was already investigated on different time scales, from monthly and seasonal up to decadal ones (Räisänen, 2007; Weisheimer, 2011; Corti, 212). However, it has been shown that global models cannot reliably reproduce climate change trends of the past decades (Van Oldenborgh et al. 2013). More specifically, for both precipitation and temperature, the observations are more frequently an outlier to the CMIP5 ensemble than expected. Such underdispersive ensembles are common to medium-range ensemble weather forecasting. However, in numerical weather predictions, the lack of reliability is overcome by the use of advanced bias-correction methods (Van Schaeybroeck and Vannitsem, 2015).

We present an application of such post-processing (also called Model Output Statistics, MOS) techniques to climate predictions, with the aim of increasing the reliability of climate trends from the CORDEX ensemble. After a validation of the method on a historical period, we apply the calibration to different future near-term scenarios. The applied technique allows to correct each ensemble member in such a way that spatio-temporal correlations are preserved.

References

S. Corti, A. Weisheimer, T. N. Palmer, F. J. Doblas-Reyes, and L. Magnusson, Reliability of decadal predictions, Geophys. Res. Lett., 39, L21712, 2012.

A. Weisheimer, T. N. Palmer, and F. J. Doblas-Reyes, Assessment of representations of model uncertainty in monthly and seasonal forecast ensembles, 38, L16703, 2011.

Räisänen, J. How reliable are climate models? Tellus A, 59, 2-29, 2007.

Van Oldenborgh, G., Doblas Reyes, F., Drijfhout, S., Hawkins, E. Reliability of regional climate model trends, Environmental Research Letters, 8, 014055, 2013.

Van Schaeybroeck, B. and Vannitsem, S., Ensemble post-processing using member-by-member approaches: theoretical aspects. Q.J.R. Meteorol. Soc., 141: 807-818, 2015.