Evaluation of the Regional Climate Eta Model for long-term simulations over South America

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The objective of this work is to evaluate the Eta Regional Climate Model (RCM) for long-term simulations over South America using reanalysis in the lateral boundary conditions and observed sea-surface temperatures. This work investigates the major precipitation and temperature errors produced by the Eta RCM over the area. The major errors, which are shared by different regional climate models, were identified in previous work by Solman et al. (2013). These errors are: the underestimate of precipitation in the Amazon region, near the northeastern coast of the continent and in the north of Argentina during summer, and the overestimate of temperature in northern Argentina and Paraguay region during summer. These errors were investigated by testing different model physics components, such as the cumulus convection schemes, gravity wave drag, radiation schemes, and the land-surface schemes, in addition to different initial soil conditions. The Eta RCM was set over South America at 20-km resolution and 38 model levels. A thirty-one year continuous run, from 1980-2010, was carried out. To assure that the errors are originated from the RCM, different reanalysis (Era-Interim and CFSR) and sea-surface temperature dataset were used to force the RCM. The errors remained despite the change of the observational dataset used to drive the runs. The errors also remained after the tests of different horizontal resolution and after changing the convection scheme from Betts-Miller to Kain-Fritsch scheme. The overestimate of incoming short wave radiation at the surface is reduced when the GFDL radiation scheme is replaced by the RRTMG scheme, which changed the temperature error pattern. The results of tests with other physics schemes and parameters will be shown. Maps of the land use and cover, and soil types will be shown.

Reference

Solman et al., 2013: Evaluation of an ensemble of regional climate model simulations over South America driven by the ERA-Interim reanalysis: model performance and uncertainties. Clim. Dyn. DOI 10.1007/s00382-013-1667-2