GEOÖKO VOLUME/BAND XLI, 41 - 66 GÖTTINGEN 2020

EVALUATION OF SPATIAL VARIATION CHARACTERISTICS OF DYNAMICALLY MODELLED PRECIPITATION AND TEMPERATURE FIELDS – A COMPARATIVE ANALYSIS OF WRF SIMULATIONS OVER THE WESTERN AMAZONIA AND THE CENTRAL HIMALAYAS

BEWERTUNG RÄUMLICHER VARIATIONSMUSTER VON DYNAMISCHEN TEMPERATUR- UND NIEDERSCHLAGSSIMULATIONEN – EINE VERGLEICHENDE ANALYSE VON WRF SIMULATIONEN FÜR WEST-AMAZONIEN UND DEN ZENTRALEN HIMALAYA

JÜRGEN BÖHNER, SHABEH UL HASSON & MARKUS KILIAN

SUMMARY

We investigate the added value of dynamical refinement of temperature and precipitation over the central Himalayas and the western Amazon featuring distinct climates. For this, we dynamically downscale ERA5 reanalyses at 0.25° resolution to 10 km and further to 3.3 km convection-permitting scale for the period 2010-2019, employing the same one-way nested architecture and physics suit from the Weather Research and Forecasting model. Simulations are validated against sparse but independent weather stations, and additionally, against spatially complete observational grid-datasets of TerraClimate. Our results suggest an added value for temperature and precipitation refined at 10 km resolution relative to the ERA5 forcing, and further at 3.3 km relative to 10 km over the Himalayas. However, such added value is limited to 10 km resolution over the Amazon, where downscaling at 3.3 km fails to outperform coarser resolutions. Underestimated winter rains in the Himalayas and distinctly overestimated wet season rains in the Amazon emphasize on both exploiting the model physics to improve model fidelity and, particularly, on extending the existing weather station network for a robust validation.

Keywords: regional climate modelling, dynamical downscaling, WRF simulation, Amazonia, Himalayas

ZUSAMMENFASSUNG

In dieser Studie analysieren wir das Potential dynamischer Temperatur- und Niederschlags-simulationen am Beispiel von Modellregionen im zentralen Himalaya und westlichen