Precipitation patterns and anomalies over the Tibetan Plateau as resolved by the High Asia Reanalysis

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Meteorological observations over the Tibetan Plateau are scarce. Existing data sets are often of inadequate resolution and/or accuracy to study the complex processes that occur on local to regional scales. Numerical Weather Prediction (NWP) models can be used to reduce this problem by simulating precipitation fields and other meteorological variables at a high spatio-temporal resolution. Longer time spans of years to decades can be simulated by NWP models by successive model runs of shorter periods - a method which can be described by the term "regional atmospheric reanalysis".

In this study we present the results of two series of simulations spanning a period of eleven years (2001-2011): a simulation of 30 km resolution covering a domain including most parts of central Asia, and a nested simulation of 10 km resolution for the Tibetan Plateau and surroundings (High Asia).

The modeled precipitation and its variability at inter-annual and seasonal scale show a good agreement with existing datasets (surface observations, satellite estimates). Moreover, this physically based and consistent dataset adds new details not available currently: representation of frozen precipitation, effects of topography, hourly resolution, and more. We analyse the product's added-value by selected examples, and describe High Asia's last decade precipitation climatology and spatio-temporal variability. Some remaining problems, such as how to quantify the model accuracy in this complex region are also addressed.