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On the relative importance of water vapour advection and evapotranspiration for precipitation in the Nam Co drainage basin on the Tibetan Plateau

Julia Curio, Fabien Maussion, and Dieter Scherer
Institut für Ökologie, Technische Universität Berlin, Berlin, Germany (julia.curio@tu-berlin.de)

There are many studies related to the amount, origin and transportation of atmospheric moisture on the Tibetan Plateau. However, the various driving factors of precipitation at local to regional scales are complex and unresolved so far. Is there a substantial influence of the monsoon system on the local scale, and, if so, is it just a dynamical forcing or also a major source of the atmospheric moisture?
In this study, we address the following questions: i) how large is the atmospheric moisture content available for precipitation in a specific region, and ii) how much of this moisture is provided by water vapour advection due to large-scale circulations, such as the monsoon and the westerlies, versus local recirculation (evapotranspiration)?
In order to answer these questions, we have developed an algorithm to calculate the atmospheric moisture flux divergence for a drainage basin with no outlet. As a result, we obtain the amount of water vapour in- and outflow. This provides information about the atmospheric moisture content of the whole atmospheric column and whether the atmospheric moisture available for precipitation is provided by the local water cycle or is transported to the basin. Therefore, we can ascertain the relative importance of water vapour advection and evapotranspiration for precipitation in the drainage basin.
As forcing for the algorithm, we use the High Asia Reanalysis (HAR) generated by the numerical Weather Research and Forecasting (WRF) model in a spatial resolution of 10km. This dataset is available for a period of eleven years (2001-2011). In this study, we focus on the Nam Co drainage basin as an example, a well studied region located in the central Tibetan Plateau, transition zone between the continental climate of Central Asia and the Indian Monsoon system.