



Variability of Moisture Sources and Moisture Transport in the East Asian Monsoon System

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The rainfall of the East Asian Monsoon is of key importance for livelihoods in the densely populated area of China, Japan and Korea. The interplay of many factors, including land surface processes, makes monsoon precipitation difficult to predict. To contribute to improved precipitation prediction we investigate the atmospheric mechanisms importing moisture to the region. In previous studies moisture transport has mainly been analysed by examining a combination of temperature, pressure, winds and water vapour content. However this has been done without linking precipitation to its moisture sources directly.

In this project we use the Lagrangian particle dispersion model FLEXPART and the diagnostic tool Water-Sip to analyse ERA Interim reanalysis data to obtain a link between precipitation and its moisture sources. The total atmospheric mass is subdivided into millions air parcels, which are traced backwards for 20 days for each rainfall event in the 34 year ERA-Interim period. Specific humidity changes are interpreted as evaporation and precipitation in the area beneath the parcel with the help of a sophisticated accounting method related to target precipitation. Results on the relationship between source and sink areas reflect changes in the conditions of the source regions and in moisture transport. We investigate the moisture transport mechanisms for both seasonal and inter-annual variations during the study period 1979-2013.

Preliminary results show that the sources for precipitation in the Yangtze River Valley (YRV) in China have a clear seasonal cycle in terms of location and evaporation conditions. Land areas outside the YRV Region contribute most of the moisture. The second largest source is inside the YRV region itself. For monthly means the sum of all direct oceanic sources rarely exceeds 20%. Recycling of moisture from land surfaces outside the target regions therefore seems to play a pivotal role in the East Asian Monsoon's moisture budget. Contrasting moisture sources for El Niño/La Niña years show substantial changes with respect to timing and season, coinciding with circulation changes.