



Precipitation recycling: Moisture sources over Europe

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Atmospheric moisture within a region is supplied by both local evaporation and advected from external sources. The contribution of local evaporation in a region to the precipitation in the same region is defined as “precipitation recycling”. Precipitation recycling helps in defining the role of land-atmosphere interactions in regional climate. A dynamic precipitation recycling model has been applied to calculate spatial and temporal summer variability of the recycling ratio over Europe. The moisture storage term in the model is not neglected. This enables us to calculate precipitation recycling at timescales shorter than a month. Time series for 3 regions in Europe (central Europe, Spain and the Balkan) are obtained to analyze the variability in recycling and to compare the potential in the 3 different regions for interactions between land surface processes and atmospheric processes. The recycled precipitation and recycling ratio are linked to the precipitation, evaporation, moisture transport and moisture convergence. It is found that the Central Europe recycling ratio's are large during dry summers, while for the Balkan recycling ratio's are large during wet summers. For Spain nothing significant is found. For Central Europe, large horizontal moisture fluxes dominates local evaporation during wet summers, while in dry summers small moisture transport leads to large recycling. For the Balkan, the major source of summertime precipitation is convective precipitation. In dry summers, when the recycling ratio's are small, large moisture transport suppressed the recycled precipitation. For regions, such as the Balkan for wet summers and Central Europe for dry summers, which are vulnerable for land-atmosphere interactions future climate and/or land use can have an impact on the regional climate conditions.