First results from LandFlux-EVAL intercomparison project: Analysis of multi-year datasets

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Numerous evapotranspiration (ET) datasets have recently been derived using different data and models. Such datasets are crucial to study the hydrological cycle. However, a major constraint of their application is their validation, since a direct comparison to in-situ measurements is only possible on a point scale. An intercomparison of different ET datasets can therefore be useful. The aim of this study is to provide some insight in the spatial differences and uncertainties of ET data products.

In the framework of the LandFlux-EVAL project (www.iac.ethz.ch/url/research/LandFlux-EVAL), we compare the following ET datasets:
1) Diagnostic datasets ("observation based"): Five different datasets, where the calculation of ET is based on satellite retrievals and other observations, using different models and algorithms.
2) Reanalysis and land-surface model (LSM) output: Three reanalyses datasets (ERA-Interim, MERRA, JRA-25) as well as land-surface models from the GLDAS and GSWP projects.
3) Global climate model (GCM) output: IPCC AR 4 simulations from 12 GCMs.

The datasets included in this intercomparison are averaged over several years and compared within and among groups. Despite the differences in their computation and the data they are based on, all datasets show similar regional patterns in their multi-year means. Within the groups, the diagnostic datasets reveal larger variances than Reanalyses/LSM datasets and IPCC model output in certain regions (e.g. Europe, parts of Middle East and Australia). We also compare the spread between the ET data of the different products for some river basins and for each season.

Further analyses focus on a newly derived, diagnostic dataset. It is calculated from the atmospheric water balance using ECMWF Reanalysis data (ERA-Interim) and observed precipitation. The differences between this data product to other diagnostic datasets are highlighted and a more detailed analysis - including uncertainty estimates - is presented.