Intercomparison of terrestrial water budgets in EURO-CORDEX and TSMP evaluation runs

Mohamed Eltahan1,2, Klaus Goerzen2, Carina Furusho-Percoti2 and Stefan Kollet1,3

1 Institute of Bio- and Geosciences (Agrosphere, IBG-3), Research Centre Jülich, 52428 Jülich, Germany
2 Centre for High-Performance Computing in Terrestrial Systems, Geoverbund ABC/0, 52428 Jülich, Germany

Motivation and goals

Water is one of Earth’s most important geo-ecosystem components. Water budgets provide means for evaluating the availability and sustainability of water supply. We present an evaluation of cycle components (1996-2008) using 12 EURO-CORDEX Regional Climate Models (RCMs) and the Terrestrial Systems Modeling Platform (TSMP) from ERA-Interim driven evaluation runs. TSMP provides an integrated representation of the terrestrial water cycle by coupling the numerical weather prediction model COSMO, the land surface model CLM and the surface-subsurface hydrological model ParFlow, which explicitly simulates shallow groundwater states and fluxes.

The goal is to assess water budget components of EURO-CORDEX RCMs and compare them with the fully coupled TSMP and evaluate the models with independent datasets. In order to use the water budget components for vulnerability, impact and adaptation studies the water budget should be closed.

Data and methods

Analysis strategy:

- Terrestrial water budget (I):
  \[ \text{pr} = \text{evapotranspiration} + \text{runoff} + \text{storage} \]
- Assessment of terrestrial water budget of 12 EURO-CORDEX RCMs (Table 2) and TSMP w.r.t. reference data (Tab. 1) for 20 river catchments over Europe (Fig 1)

Long-term averages of annual sum water budget components (1996-2008)

Empirical distributions

Evaluation of annual cycles: Rhine and Guadalquivir rivers

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Contact

Mohamed Eltahan, m.eltahan@fz-juelich.de

Agronomy and Demography Division, International Centre for Tropical Agriculture (CIAT), Cali, Colombia

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