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Water Mass Fluxes and Budgets at Catchment-Scale over Europe in the Collaborative Research Cluster '*DETECT*'

Benjamin D. Gutknecht, Anne Springer, and Jürgen Kusche

Institut für Geodäsie und Geoinformation/APMG, SFB1502 '*DETECT*', Universität Bonn

Terrestrial Water Storage (TWS) is a measure of the total amount of net-accumulated water in all continental storage compartments. The Global Climate Observing System programme (GCOS) has recently approved TWS Anomalies as an Essential Climate Variable (ECV). With GRACE and GRACE-FO we have the ability to look back on an observable that can be interpreted as monthly TWS change since the year 2002. In the continental water mass budget equation, this change balances the water fluxes from precipitation, evapotranspiration and runoff.

Within the framework of the new Collaborative Research Cluster 1502 '*DETECT*', we analyse terrestrial/atmospheric and surface water fluxes and associated budget contributions from model simulations, reanalyses and remote sensing observations for all larger river basins in Europe and combine them with catchment-integrating TWS variability. While, as a first step, we are updating previous budget analyses with latest available data sets, the project's central objective is to quantify to what extent regional changes of land and water use contribute to observed budget changes.

In this presentation, we introduce our central objectives and show first results of the latest continuation of catchment-wide water mass flux time-series analysis over Europe. We discuss our budgeting strategies as well as opportunities and hurdles concerning data availability and uncertainties --- also in view of the recently launched SWOT mission and future GRACE successors.