Space Gravimetry Applications and Needs for Drought Monitoring, Water Resource Assessment and Regional Climate Monitoring

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Abstract

GRACE and GRACE-FO have been instrumental in terrestrial water cycle monitoring, including quantification and monitoring of droughts and the assessment of water resources, as well as the hydrological contribution to sea level rise. Further, space gravimetric data has been successfully used for validating global and regional climate models. However, the biggest obstacle for a more widespread application is the still coarse resolution of these data, which is far from the resolution of processes relevant to the terrestrial water cycle, e.g., precipitation or soil moisture, from the horizontal resolutions of numerical modelling of the Earth system, as well as too coarse as required e.g. for operational drought monitoring and mitigation. Data assimilation, either for direct integration of space gravimetric data in numerical models and water cycle service applications, or for generating downscaled data products, has been suggested to overcome this problem. Data assimilation can further contribute to the disaggregation of total water storage variability measured via space gravimetry into various components. In the presentation, I will showcase results of GRACE data analysis, including assimilation for drought monitoring, water resource assessment, sea level contribution, and providing a downscaled 12km land water storage reference data set over Europe consistent with the meteorological COSMO-REA6 reanalysis. I will conclude with discussing needs for future data products from a user perspective.

Keywords: *GRACE, Hydrology, Data Assimilation, Downscaling, Temporal Gravity, Climate Change*