



Towards downscaling GRACE-based drought indices by data assimilation

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The Gravity Recovery and Climate Experiment (GRACE) satellite mission has provided a new view on terrestrial water storage variability. GRACE has become an indispensable tool in monitoring global water resources as it senses climate- and anthropogenic driven contributions of the terrestrial sphere to sea level rise. New applications in monitoring and forecasting extreme events such as droughts and floods emerge, but the spatial and temporal resolution of the satellite data still represents a major limitation. In April 2018, the GRACE-Follow On (GRACE-FO) mission will be launched and a similar obstacle is expected, which emphasizes the need for developing tools to overcome this problem.

Drought indices seek to provide a comprehensive representation of meteorological, hydrological or agricultural droughts. GRACE data have been suggested for constructing new hydrological drought indices, since they are believed to better represent the total water availability compared to models, especially in terms of trends. By assimilating level-2 data from the GRACE mission into the WaterGAP Global Hydrological Model (WGHM), we are able to construct a range of downscaled drought indices at 50 km resolution, e.g. drought indices based on percentiles. We analyse the performance of these indices for historical droughts that occurred within the period 2003-2015 at a global and regional scale e.g. for South Africa.