



Smaller scale hydrology applications with GRACE: a case study in northern China

B.C. Gunter (1), E. Hermans (2), P. Droogers (2), N. van de Giesen (3), H. Winsemius (3), G. van den Eertwegh (4), and S. Qinglin (5)

(1) Delft Institute of Earth Observation and Space Systems (DEOS), Delft University of Technology, Delft, The Netherlands (b.c.gunter@tudelft.nl), (2) FutureWater, Wageningen, The Netherlands (info@futurewater.nl), (3) Dept of Water Management, Delft University of Technology, Delft, The Netherlands (n.c.vandegiesen@citg.tudelft.nl), (4) Waterschap Rivierenland, Tiel, The Netherlands (g.vanden.eertwegh@wsrl.nl), (5) Shiyang River Basin Management Bureau, Wuwei, China

Using GRACE gravity data to infer changes in continental hydrology has been one of the primary applications of the mission since its launch in 2002. Most of the studies to date have focused on the larger basins, i.e., greater than 250000 km², since the seasonal signals of these basins are large enough to be clearly observed by GRACE. In this study, we push the limit of the sensitivity of the GRACE mission by examining the Shiyang river basin in northern China, which is considerably smaller at only 42000 km² in size. Parts of northern China have experienced accelerated desertification over the past decade, primarily due to the increased utilization of water resources for agricultural purposes. To address this problem, the Dutch government, in cooperation with the Chinese government, sponsored the Groundwater Management and Exploration Package (GMPEP) project. The goal of the project was to develop a web-based tool that could be used by local water board officials to assess current and future water management scenarios. The Shiyang basin was chosen because it has a well developed ground measurement network that provided the project with multi-year observations of ground and surface water movements, and which served as input to a regional water allocation model (WEAP). GRACE estimates of total water storage were used to validate the results of the model. The accuracy of the GRACE estimates were unexpectedly good, considering the small size of the basin, and were supported by independent precipitation estimates derived from the TRMM satellite mission. The findings are significant because they demonstrate that, given favorable circumstances, GRACE data can also be applied to smaller scale hydrological studies. Some results and conclusions of the study will be presented, including the potential that the methodologies developed for this study could have for the water management policies of other regions within China.