Geophysical Research Abstracts
Vol. 19, EGU2017-8800, 2017
EGU General Assembly 2017

Comparing the data-driven and the model-dependent strategies for improving filtered GRACE signal

Bramha Dutt Vishwakarma and Nico Sneeuw
Institute of Geodesy, University of Stuttgart, Stuttgart, Germany (vishwakarma@gis.uni-stuttgart.de)

The noisy level 02 GRACE products from various groups need to be filtered in order to obtain meaningful information about water mass transport within the Earth system. Filtering affects signal, which increases the uncertainty in the filtered GRACE observed total water storage time series. The signal loss is counter acted using a correction strategy that typically makes use of models. The accuracy of model-dependent methods is dependent on the accuracy of the model, which raises doubts on accuracy of corrected GRACE products over poorly modeled regions. This led to the development of data-driven methods. Although research contributions using a model-dependent method or a data-driven method claim that the corrected GRACE products are superior to filtered products, a comparison of model dependent methods and the data-driven methods is essential to choose the best one. In this contribution, we compare the three most popular model-dependent approaches: additive approach, multiplicative approach, scaling approach, and two data-driven methods proposed recently. In order to be comprehensive, we analyze the performance of these correction strategies over 32 catchments of different sizes located in different climate zones. In a realistic closed-loop simulation, we find that the data-driven methods are consistently superior to the model-dependent approaches. At last we analyze the desiccation of Aral Sea and lake Urmia with the GRACE products, and compare the corrected total water storage change with reports and contributions from different groups. We find that the model-dependent approaches have a tendency to overestimate the rate of water mass loss recorded by GRACE satellites.