Geophysical Research Abstracts
Vol. 20, EGU2018-9256, 2018
EGU General Assembly 2018


# Daily global variations of surface water mass derived from GRACE-based potential difference Kalman filtering

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We propose the globalization of the continent-scale Kalman Filtering (KF) previously developed by Ramillien et al. (2015) to produce time series of daily maps of surface mass variations by progressive integration of daily geopotential variations measured by orbiting satellites. These geopotential variations can be determined from very accurate inter-satellite K-Band Range (KBR) rate measurements of daily 5-second sampled orbits by mechanical energy conservation. The along-track gravity contribution due to hydrological mass changes is extracted by removing dealiasing models for static field, atmosphere, oceans mass variations (including periodical tides), from raw potential difference data. These potential difference residuals from the previous stage are used to recover surface mass density changes – expressed in Equivalent-Water Height (EWH) - over a global network of elements of identical areas. So far, the juxtaposed triangular surface tiles of $\sim$100,000 km$^2$ are defined over the complete terrestrial sphere, and lately we have attempted a better sampling of $\sim$25,000 km$^2$. The amplitudes of the recovered hydrological patterns in the daily global solutions remain realistic and comparable to the ones of the classical GRACE-based datasets. This type of KF production of daily global solutions can also be useful for exploring the possibility of refining time and space resolutions for ocean and land-related studies, the improvements of resolutions would be hopefully brought by the launches and the combination of future Low Earth Orbiter missions.