EGU21-11684
https://doi.org/10.5194/egusphere-egu21-11684
EGU General Assembly 2021

Impact of Low-Degree Stokes Coefficients and Spatial Leakage on Barystatic Sea-Level Rise from GRACE/GRACE-FO

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Temporal variations in the total ocean mass representing the barystatic part of present-day global-mean sea-level rise can be directly inferred from time-series of global gravity fields as provided by the GRACE and GRACE-FO missions. A spatial integration over all ocean regions, however, largely underestimates present-day rates as long as the effects of spatial leakage along the coasts of in particular Antarctica, Greenland, and the various islands of the Canadian Archipelago are not properly considered.

Based on the latest release 06 of monthly gravity fields processed at GFZ, we quantify (and subsequently correct) the contribution of spatial leakage to the post-processed mass anomalies of continental water storage and ocean bottom pressure. We find that by utilizing the sea level equation to predict spatially variable ocean mass trends out of the (leakage-corrected) terrrestial mass distributions from GRACE and GRACE-FO consistent results are obtained also from spatial integrations over ocean masks with different coastal buffer zones ranging from 400 to 1000 km. However, the results are critically dependent on coefficients of degree 1, 2 and 3, that are not precisely determined from GRACE data alone and need to be augemented by information from satellite laser ranging. We will particularly discuss the impact of those low-degree harmonics on the secular rates in global barystatic sea-level.