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Investigating the sea level budget in the East China Sea

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Sea level change is not uniform around the globe. We focus on regional sea level change in the East China Sea (ECS), a Western Pacific marginal sea of 770.000 km^2, with a densely populated and economically important coastal area. Several challenges arise when investigating past and current sea level change and budgets in this region.

Ocean mass change is observed by GRACE(-FO). However, one needs to account for hydrological signals leaking from land into the ocean, as well as for sediment discharge from rivers. Steric contributions are usually measured by Argo floats, but from the shallow inner shelf of the ECS only few data are available. Thus, ocean reanalyses should be handled with caution. Total sea level change from altimetry can be compared to tide gauge data, but gauges are sparsely distributed in the ECS area and only few stations are co-located with GNSS to account for vertical land motion.

In this contribution, we analyze and compare different data products to better understand regional sea level change and its contributors. Time series of ECS- averaged levels (total from altimetry, mass from GRACE and GRACE-FO and steric from ORAS5 reanalysis) are computed and compared in terms of trend, seasonal amplitudes and correlations. Additionally, spatial patterns are investigated, revealing that the shallow coastal regions, vast continental shelf areas and deep sea areas show distinct characteristic behaviors of sea level change. Altimetry and tide gauge data show a correlation of higher than 70% for 11 of 13 available records. Finally, we compare the individual data sets to results of a joint sea level inversion framework (Uebbing, 2022).