

Disagreements in basin-scale sea-level budgets due to the different measurement systems used

Plain language summary

An important check on the accuracy of our global measurement systems and understanding of the processes driving sea level rise is the sea level budget. This describes the comparison of measured sea surface height change from satellite radar altimetry with the sum of its component parts, due to changes in density (measured by a global network of Argo floats) and mass (measured by the Gravity Recovery and Climate Experiment, GRACE, satellite mission).

With over 11 years of very high-quality density and mass observations at good spatial scale, the sum of the parts matches the total within some uncertainty at a global scale. If, however, we examine the sea level budget at the ocean basin scale, we find significant discrepancies that are difficult to explain.

In this paper, we investigate different processing and averaging methods and find the density measurements do not include small spatial scales that are recorded by sea surface height measurements. Rather than this mismatch averaging out over basin scales, which we would expect if the errors are random, it instead leads to differences in the ocean basin average. Also, there is a mismatch at the hemispheric and global scale, which we believe comes from the way the satellite measurements are processed.

Full paper: Royston, S., Vishwakarma, B. D., Westaway, R. M., Rougier, J., Sha, Z., & Bamber, J. L. (2020). Can we resolve the basin-scale sea level trend budget from GRACE ocean mass? Journal of Geophysical Research: Oceans 125, e2019JC015535 (DOI:[10.1029/2019JC015535](https://doi.org/10.1029/2019JC015535))