

Do satellite gravimetry and altimetry provide constraints on 4D fields of temperature and salinity?

Resolving Ocean heat Content changes by combining Space gravimeTry, Argo and Radar altimetry – ROCSTAR

Alisa Yakhontova, Roelof Rietbroek, Nadja Jonas

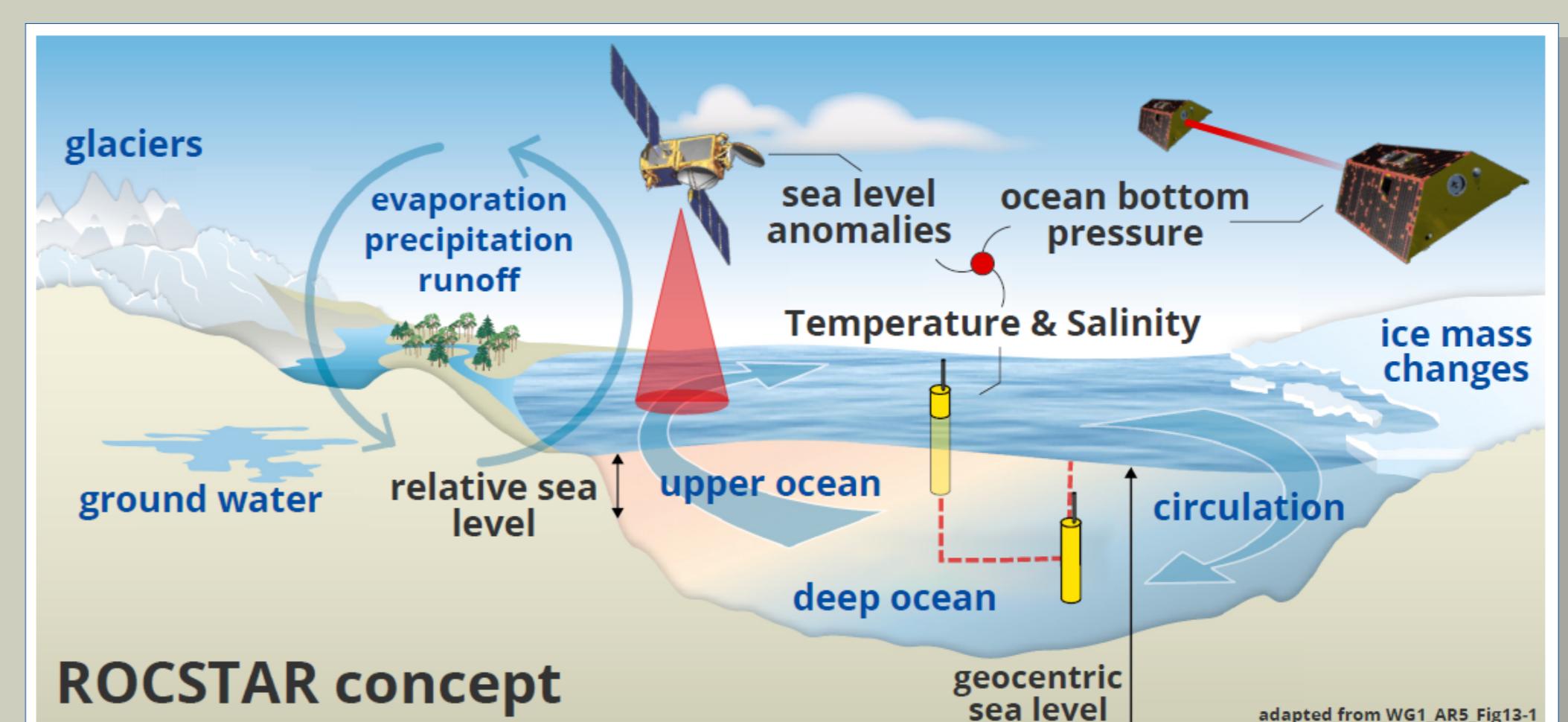
Institute of Geodesy and Geoinformation, University of Bonn, Germany

Background

- The thermosteric expansion of sea water accounts for the half of the global sea-level budget and acts as the main contributor to the regional sea level rise in Southeast Asia[1].
- The regional sea-level budget in the Bay of Bengal was partially closed using a combination of Gravity Recovery and Climate Experiment (GRACE) and altimetry data [2].

Hypothesis

- Geodetic observations of gravity and sea surface height change provide important constraints on 4D temperature (T) and salinity (S) fields from Argo.
- The improved estimates of T, S, and sea surface height help to close the regional sea-level budget.

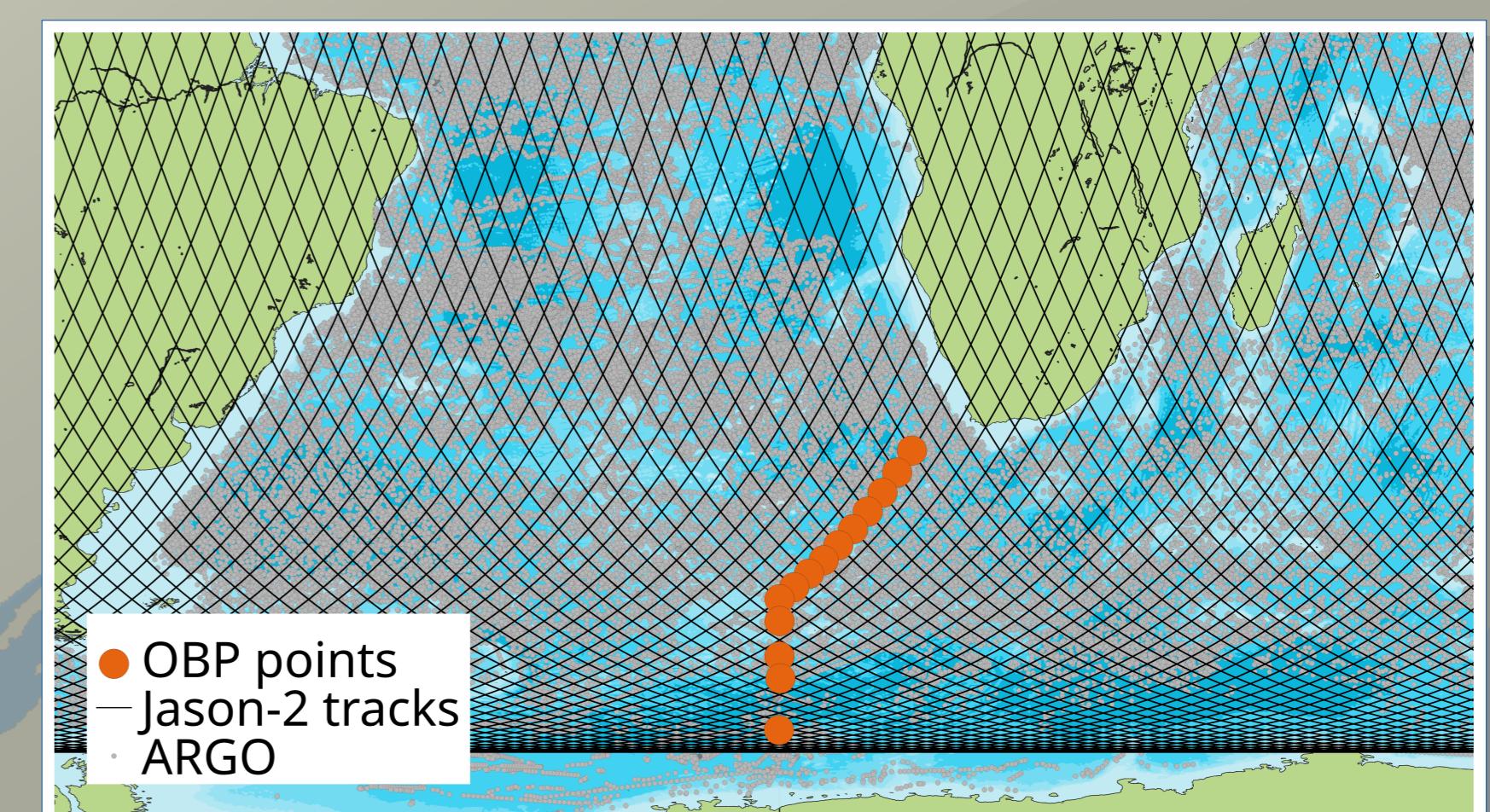


Work packages and interactions



Next steps: South Atlantic experiment

- Compute improved estimates of T, S, and sea surface height changes from altimetry, GRACE and Argo profiles
- Validate results by the in situ ocean bottom pressure measurements in a South Atlantic transect of the Antarctic Circumpolar current (in cooperation with Jens Schröter, AWI)
- Compare the observations in the South Atlantic region with simulations from the FESOM model in terms of variability



Next next steps: Southeast Asia

- Which are the major drivers of sea level rise in the Southeast Asia region over the GRACE/altimetry era?
- How do ocean heat changes affect the hydrological cycle in Southeast Asia?
- How large is the relative role of the halosteric versus the thermosteric sea level contribution in terms of sea level and ocean's energy budget?

References

- [1] R. Rietbroek, S. E. Brunnabend, J. Kusche, C. Dahle, and J. Schröter. Revisiting the Contemporary Sea Level Budget on Global and Regional Scales. *Proceedings of the National Academy of Sciences*, 201519132, 2016.
- [2] J. Kusche, B. Uebbing, R. Rietbroek, C. Shum, and Z. Khan. Sea level budget in the Bay of Bengal (2002–2014) from GRACE and altimetry. *Journal of Geophysical Research: Oceans*, 2016.
- [3] R. Rietbroek, S. E. Brunnabend, J. Kusche, and J. Schröter. Resolving sea level contributions by identifying fingerprints in time-variable gravity and altimetry. *Journal of Geodynamics*, 59:72–81, 2012.