



Towards understanding the causes of 20th-century sea-level changes

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The sea-level budget

The sea-level budget: accounting for all the millimeters and gigatons:

Observed sea level change == Sum of all contributing processes?

- We know that we can close the global budget since ~1960 and over the altimetry era
- But what about the 20th century?

The sea-level budget: challenges

To understand the 20th-century sea-level budget, we have to overcome multiple challenges:

Reconstruct sea level:

- How much has sea level risen over the whole century? Tide-gauge coverage is limited
- Tide-gauge coverage is not equally distributed: how do we avoid biases in reconstructions?
- What is the role of vertical land motion?
- What are the confidence intervals of 20th-century sea-level rise?

The sea-level budget: two challenges

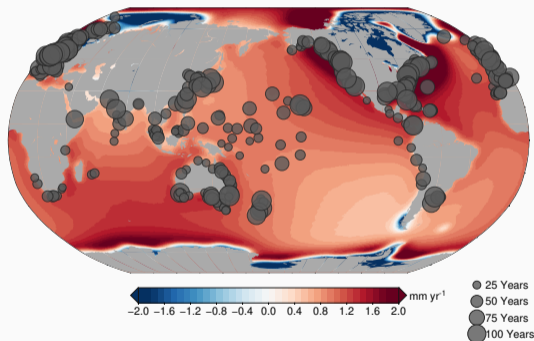
To understand the 20th-century sea-level budget, we have to overcome multiple challenges:

Determine the causes of sea-level change:

- Limited number of estimates for many processes, such as Antarctic mass loss, steric expansion
- How do we quantify uncertainties?
- How do we deal with multiple different estimates?
- How do the spatial patterns of the resulting sea-level changes affect tide-gauge observations?

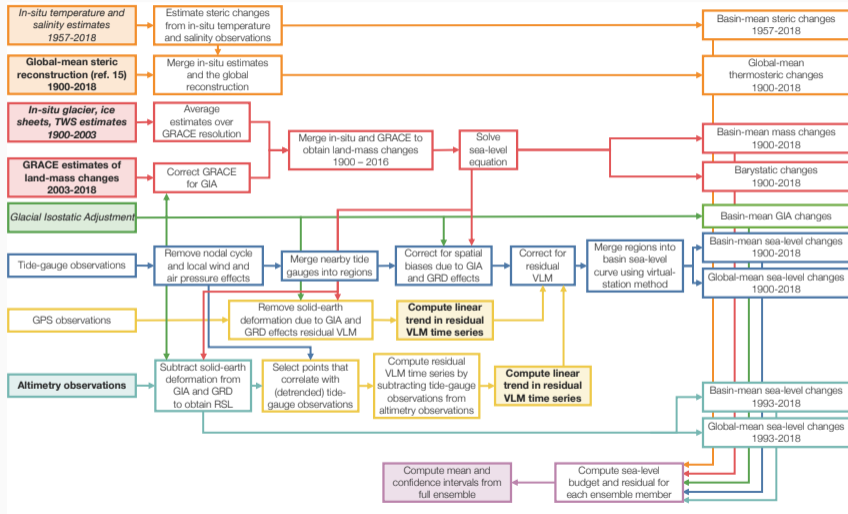
Tide-gauge sampling

Tide-gauge records mis-sample global-mean sea level due to GIA, ice, and hydrology:



Sea-level trends (1900-2018) due to GIA, ice, and hydrology

A framework to re-assess the sea-level budget and its uncertainties



Summary

- Progress is being made to understand 20th-century sea-level changes
- Many challenges on the road
- Framework to study the budget is in development
- Stay tuned for the first results!

Questions?

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