# Climate Contributions to Arctic Sea Level Change (1995-2015)

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**Summary:** Arctic sea level change (SLC) is influenced by the changing climate in the Arctic. Most prominent is enhanced freshwater input (steric SLC) and gravitational effects from land-ice melt (manometric SLC). The combined estimated contributions to SLC resembles the observed SLC from tide gauges and satellite altimetry (R=0.5).

### Introduction

Sea level acts as a 'bulkmeasure' for multiple changes in the Arctic. Seperating the observed sea level change from 1995-2015 into different components provides insigths of the affects of Arctic climate change.

## Method

We divide the sea level into contributions from manometric (ocean mass) and steric (depth-integrated density) changes.

Tide-gauges are corrected for vertical deformations from past + contemporary land mass changes (VLM).

# Manometric

Maps of the manometric contributions to SLC from 1995-2015 (GMSL-contribution). Calculated from the Greens Functions. Greenland (0.39 mm y<sup>-1</sup>) NH glaciers (0.57 mm y<sup>-1</sup>)



## Steric

Maps of halosteric (from changed salinity) and thermosteric (from changed temperature) contributions to Arctic SLC from 1995-2015. 4Dinterpolated from ~300,000 T/S profiles.

Halosteric

Thermosteric

# **Comparing to SLC observations**



Steric + Manometric SLC can be compared to the absolute SLC observed from satellite altimetry and VLM-corrected tide-gauges (1995-2015). While the observed spatial pattern is reconstructed (R=0.5), there is a significant residual in the Beaufort and Eastern Siberian Seas. Sparse in-situ data and challenges by

altimetry in seaice covered areas can cause the difference.

More observations are needed!

