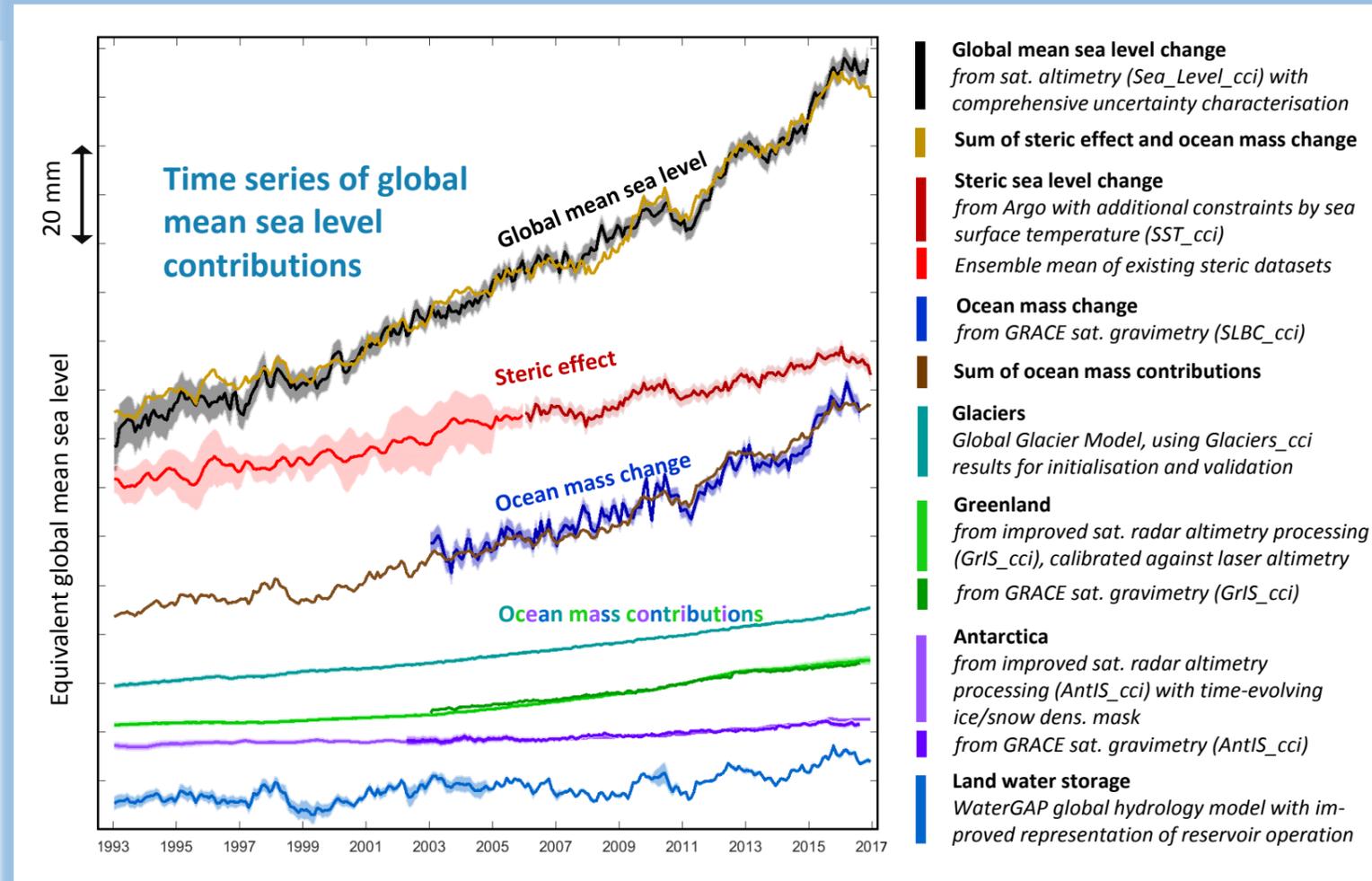




## Sea Level Budget Closure (SLBC\_cci)

- run from 2017 to 2019
- utilised products from several CCI projects
- developed additional products
- investigated the sea level budget and ocean mass budget over the periods
  - 1993-2016 (altimetry era)
  - 2003-2016 (GRACE/Argo era)
- included a regional study for the Arctic
- facilitated a consistent framework of uncertainty characterisation and budget analysis
- explored new aspects such as
  - statistics of budget misclosure on a monthly level
  - analyses on the seasonal components
  - investigations into causes of misclosure from a joint analysis of total sea level budget and ocean mass budget.



## Results in brief

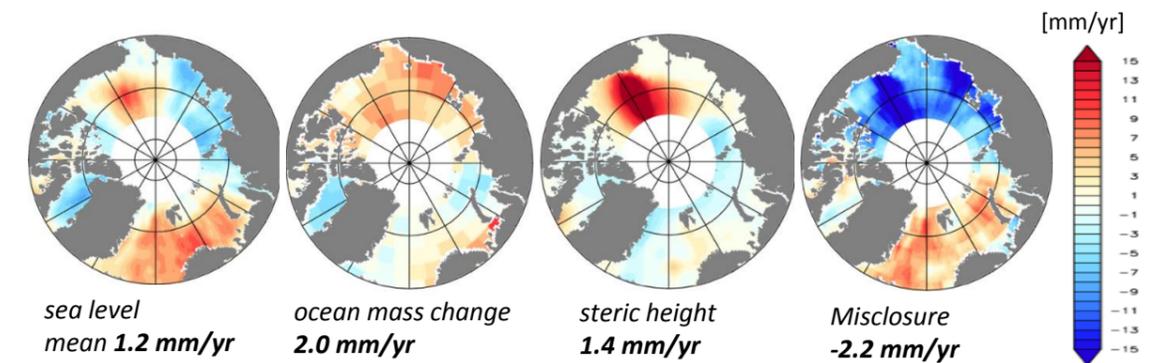
- For the long-term trend, the budget of the global sea level and of the ocean mass is closed within uncertainties.
- Trend uncertainties are on the order of 0.3 mm/yr (1σ). Any closure much better than that may be just a coincidence of errors compensating each other.
- On the level of monthly time series, misclosure is in agreement with the assessed uncertainties.
- Important interannual misclosures remain and have been tentatively attributed to errors in assessed steric and land water components.
- For the Arctic region, the analysis underlined the complexity of related processes and their assessment.
- Subjects of further work and an extended scope to regional sea level were reported in a roadmap towards follow-on activities.

Total sea level	3.64 ± 0.26	
Steric (SLBC_cci product)	1.09 ± 0.10	
Glaciers	0.77 ± 0.03	
Antarctica: GRACE / Altim.	0.27 ± 0.10 / 0.34 ± 0.02	
Greenland: GRACE / Altim.	0.74 ± 0.03 / 0.89 ± 0.07	
Land water:	0.40 ± 0.10	
Sum of mass contributions	2.19 ± 0.15 / 2.40 ± 0.13	Ocean mass (GRACE) 2.19 ± 0.22
Sum of contributions	3.28 ± 0.18 / 3.49 ± 0.16	Sum of contributions 3.28 ± 0.24
Misclosure (total budget)	0.36 ± 0.32 / 0.15 ± 0.31	Misclosure (total budget) 0.36 ± 0.35

## Trend budget for global mean sea level (2003-2016) [mm/yr]

Misclosure (mass budget) 0.00 ± 0.29 / -0.21 ± 0.29

## Regional study for the Arctic 1993-20016



Martin Horwath (1), Benjamin D. Gutknecht (1), Anny Cazenave (2), Hindumathi Palanisamy (2), Florence Marti (2), Ben Marzeion (3), Frank Paul (4), Raymond Le Bris (4), Anna E. Hogg (5), Inès Otosaka (5), Andrew Shepherd (5), Petra Döll (6), Denise Caceres (6), Hannes Müller Schmied (6), Johnny A. Johannessen (7), Jan Even Øie Nilsen (7), Roshin P. Raj (7), René Forsberg (8), Louise Sandberg Sorensen (8), Valentina R. Barletta (8), Per Knudsen (8), Ole B. Andersen (8), Heidi Randall (8), Stine K. Rose (8), Christopher John Merchant (9), Claire Rachel Macintosh (9), Karina von Schuckmann (10), Kristin Novotny (1), Andreas Groh (1), Marco Restano (11), Jérôme Benveniste (11).

[cci.esa.int/sea-level-budget-closure](http://cci.esa.int/sea-level-budget-closure)  
[martin.horwath@tu-dresden.de](mailto:martin.horwath@tu-dresden.de)  
[jerome.benvenist@esa.int](mailto:jerome.benvenist@esa.int)