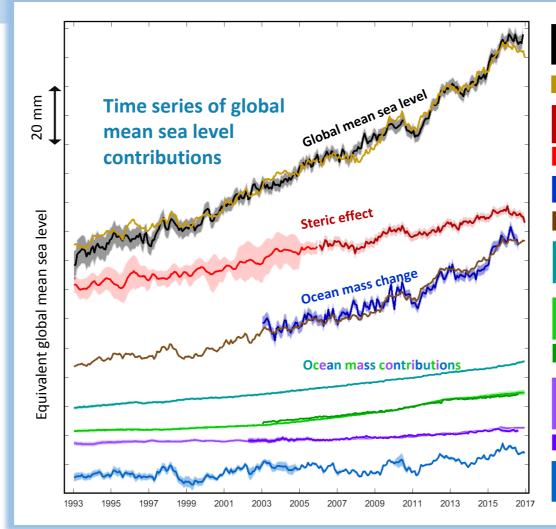
sea level budget closure : Results from CCI's first cross-ECV project

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
 0 1993-2016 (altimetry era)
 - o 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
 - o analyses on the seasonal components
 - investigations into causes of misclosure from a joint analysis of total sea level budget and ocean mass budget.



Global mean sea level change from sat. altimetry (Sea_Level_cci) with comprehensive uncertainty characterisation Sum of steric effect and ocean mass change

Steric sea level change from Argo with additional constraints by sea surface temperature (SST_cci) Ensemble mean of existing steric datasets

Ocean mass change from GRACE sat. gravimetry (SLBC cci)

Sum of ocean mass contributions

Glaciers

Global Glacier Model, using Glaciers_cci results for initialisation and validation

Greenland

from improved sat. radar altimetry processing (GrIS_cci), calibrated against laser altimetry from GRACE sat. gravimetry (GrIS_cci)

Antarctica

from improved sat. radar altimetry processing (AntIS_cci) with time-evolving ice/snow dens. mask from GRACE sat. gravimetry (AntIS_cci)

Land water storage

WaterGAP global hydrology model with improved representation of reservoir operation

Total sea level 3.64 ± 0.26 Steric (SLBC_cci product) 1.09 ± 0.10 Glaciers 0.77 ± 0.03 Antarctica: GRACE / Altim. $0.27 \pm 0.10 / 0.34 \pm 0.02$ Greenland: GRACE / Altim. $0.74 \pm 0.03 / 0.89 \pm 0.07$ Land water: 0.40 ± 0.10		Trend budget for global mean sea level (2003-2016) [mm/yr]	Action of the study for the Arctic 199OutputOutputOutputOutputSealevel men 1.2 mm/rOutput <td< th=""></td<>
Sum of mass contributions $2.19 \pm 0.15 / 2.40 \pm 0.13$ Sum of contributions $3.28 \pm 0.18 / 3.49 \pm 0.16$ Misclosure (total budget) $0.36 \pm 0.32 / 0.15 \pm 0.31$	Ocean mass (GRACE) 2.19 ± 0.22 Sum of contributions 3.28 ± 0.24 Misclosure (total budget) 0.36 ± 0.35	Misclosure (mass budget) 0.00 ± 0.29 / -0.21 ± 0.29	

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).

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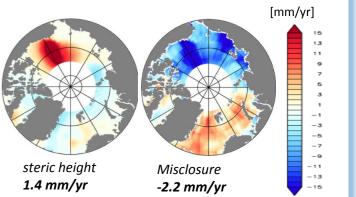


10th CCI Colocation Meeting, September 2020

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 (1\sigma). 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.

93-20016



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11

