

RF: Regional Sea Level Change and Coastal Impacts

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RF overview

The RF “Regional Sea Level Change and Coastal Impacts” (SL for short hereafter) is one of the WCRP Grand Challenges which are managed by CLIVAR. This RF was decided to be developed in the 19th session of CLIVAR SSG in 2012, in line with one of the WCRP grand challenge topics “Regional Sea Level Change” agreed by WCRP JSC. During a 10-year period (Jan 2015 - Dec 2024), the program will address the following imperatives, which are being approached via six parallel, but strongly interconnected, working groups:

- An integrated approach to historic sea level estimates (paleo time scale)
- Quantifying the contribution of land ice to near-future sea level rise
- Contemporary regional sea level variability and change
- Predictability of regional sea level
- Sea level science for coastal zone management
- Global sea level change

Activities in 2018-2019:

In October, 2018, 3rd Science Steering Team Meeting of the RF SL was held in Boulder, Colorado, USA. The meeting reviewed the progress of all the aspects of the Science Plan, and the relationship to other activities, especially IPCC special reports and CMIP6, as well as joint papers. An international workshop for coastal climate services was proposed for Orleans France in Autumn 2019. A second international conference on Regional Sea Level Changes and Coastal Impacts was also discussed as a follow up to Sea Level 2017 in New York with a time frame of about 5 years later in a venue close to some of big sea-level rise problems in the developing world.

Detlef Stammer stepped down as a co-leader of the RF SL at the end of 2018 to take up the Chair of WRCF. It was agreed as an interim measure that the two other co-chairs will continue to lead the RF SL and this will be discussed among the members of the RF at the next meeting (in Orleans, November 2019).

Achievements for 2018-19

Eight papers on sea-level rise that were directly stimulated and supported by interactions in the RF SL have been published (see below).

Plans for 2020 and beyond

The major plan is to build on the success of the New York Sea Level 2017 meeting. Hence, we are planning the second International WCRP/IOC Conference on Regional Sea Level Changes and Coastal Impacts with a venue in Asia (discussions are ongoing with Singapore) to be held in 2022/23. This conference aims for over 300 participants with a large representation from vulnerable Asian coastal areas, and including top world scientists, city planners, coastal developers and managers and other relevant stakeholders to focus on the flow of knowledge from sea-level science to strengthen climate change adaptation and disaster resilience in the coastal zone.

To support this major activity, we will hold some earlier focused workshops, building on the Coastal Climate Services Workshop in November 2019 on key issues themes will be decided at the RF SL meeting in Orleans in November 2019 (and will require CLIVAR support).

Articles published in 2018/19 as part of RF activities (if any)

Cazenave, A., M Ablain, J Bamber, V Barletta, B Beckley, J Benveniste, E Berthier, A Blazquez, T Boyer, D Caceres, D Chambers, N Champollion, B Chao, J Chen, L Cheng, J A Church, J G Cogley, S Dangendorf, D Desbruyères, P Döll, C Domingues, U Falk, J Famiglietti, L Fenoglio-Marc, R Forsberg, G Galassi, A Gardner, A Groh, A Hogg, M Horwath, V Humphrey, L Husson, M Ishii, A Jaeggi, S Jevrejeva, G Johnson, N Kolodziejczyk, Ju Kusche, K Lambeck, F Landerer, P Leclercq, B Legresy, E Leuliette, W Llovel, L Longuevergne, B D Loomis, S B Luthcke, M Marcos, B Marzeion, C Merchant, M Merrifield, B Meyssignac, G Milne, G Mitchum, Y Mohajerani, M Monier, S Nerem, H Palanisamy, F Paul, B Perez, C G Piecuch, R M Ponte, S G Purkey, J T Reager, R Rietbroek, E Rignot, R Riva, D H Roemmich, L Sandberg Sørensen, I Sasgen, E J O Schrama, S I Seneviratne, C K Shum, G Spada, D Stammer, R S W van de Wal, I Velicogna, K von Schuckmann, Y Wada, Y Wang, C Watson, D Wiese, S Wijffels, R Westaway, G Woppelmann, B Wouters. Global Sea Level Budget 1993-present. Earth System Science Data, 2018-53.

Cozannet G Le, R J Nicholls, J Hinkel, W v Sweet, K L McInnes, R S W van de Wal, A B A Slangen, J Lowe and K White (2017). Sea-level projections and coastal climate services: the way forward. J of Marine Science and Engineering, 5,49,doi:10.3390/jmse5040049.

Gregory, J.M., Griffies, S.M., Hughes, C.W., Lowe, J.A., Church, J.A., Fukimori, I., Gomez, N, Kopp, R.E., Landerer, F., Le Cozannet, G., Ponte, R.M., Stammer, D., Tamisiea, M.E., van de Wal, R. (2019) Concepts and Terminology for Sea Level: Mean, Variability and Change, Both Local and Global, Surveys in Geophysics <https://doi.org/10.1007/s10712-019-09525-z>

Hinkel, J., Church, J. A., Gregory, J. M., Lambert, E., Le Cozannet, G., Lowe, J., McInnes, K.L., Nicholls, R.J., van der Pol, T.D, van de Wal, R. (2019). Meeting user needs for sea level rise information: A decision analysis perspective. Earth's Future, 7(3), 320-337. doi:10.1029/2018EF001071.

Jevrejeva S, T Frederikse, R Kopp, G Le Cozannet, L Jackson, R S W van de Wal (2019). Probabilistic sea level projections at the coast by 2100, Surveys of Geophysics, doi.org/10.1007/s10712-019-09550-y.

Ponte R M, M Carson, M Cirano, C Domingues, S Jevrejeva, M Marcos, G Mitchum, R S W van de Wal, P L Woodworth, M Ablain, F Arduin, V Ballu, M Becker, J Benveniste, F Birol, E Bradshaw, A Cazenave, P De Mey-Frémaux, F Durand, T Ezer, L-L Fu, I Fukumori, K Gordon, M Gravelle, S M Griffies, W Han, A Hibbert, C W Hughes, D Idier, V H Kourafalou, C M Little, A Matthews, A Melet, M Merrifield, B Meyssignac, S Minobe, T Penduff, N Picot, C Piecuch, R D Ray, L Rickards, A Santamaría-Gómez, D Stammer, J Staneva, L Testut, K Thompson, P Thompson, S Vignudelli, J Williams, S D P Williams, G Wöppelmann, L Zanna, X Zhang (2019). Towards comprehensive observing and modeling systems for monitoring and predicting regional to coastal sea level, *Frontiers of Marine Sciences*, doi.org/10.3389/fmars.2019.00437.

Stammer, D., van de Wal, R. S. W., Nicholls, R. J., Church, J. A., Le Cozannet, G., Lowe, J. A., Horton, B.P., White, K., Behar, D., Hinkel, J. (2019). Framework for high-end estimates of sea-level rise for stakeholder applications. *Earth's Future*. doi:10.1029/2019EF001163

Van de Wal R S W, X Zhang, S Minobe, S Jevrejeva, R E M Riva, C Little, K. Richter, M Palmer (2019). Uncertainties in long-term process-based coastal sea-level projections. *Surv. of Geophysics*.

Budget and other needs for 2020

We plan annual Science Steering Team Meetings and two specialist science meetings and appreciate continued support of these activities.

Aim for a total length of ~2 pages, more is fine, but not necessary

Annex A

Proforma for CLIVAR Research Focus requests for SSG approval for meetings

- 1. RF name:**
- 2. Title of meeting or workshop:**
- 3. Proposed venue:**
- 4. Proposed dates:**
- 5. Proposed attendees, including likely number:**
- 6. Rationale, motivation and justification, including: relevance to CLIVAR science & WCRP Grand Challenges, and any cross-panel/research foci links and interactions involved:**
- 7. Specific objectives and key agenda items:**
- 8. Anticipated outcomes (deliverables):**
- 9. Format:**
- 10. Science Organizing Committee (if relevant)**
- 11. Local Organizing Committee (if relevant)**
- 12. Proposed funding sources and anticipated funding requested from WCRP:**