WORLD CLIMATE RESEARCH PROGRAMME

42nd Session of the WCRP Joint Scientific Committee (JSC42)

GC: Regional Sea-level Change and Coastal Impacts

Robert J. Nicholls, Roderik van de Wal, David Behar, Kathy McInnes

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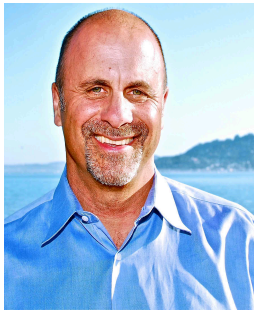
Structure and organization

Robert Nicholls

Roderik van deWal



David Behar

Kathy McInnes

WP1: An integrated approach to paleo time scale sea level estimates	***N Gomez, M Tamisea, T James***
WP2: Quantifying the contribution of land ice to near-future sea level rise	***S Nowicki, H Goelzer, B Otto-Bliesner, B Marzeion***
WP3: Causes for contemporary regional sea level variability and change	***R Ponte, B Meyssignac, M Marcos, B Hamlington***
WP4: Projections of regional sea level	***A Slangen, M Palmer***
WP5: Sea level science for coastal zone management	***J. Hinkel J Lowe D. Behar, K. McInnes***
WP6: Sea level budget	***A Cazenave, B Meyssignac, J Chen, M Horwarth***

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Future Plans

1. Coastal Climate Services Special Issue (2021) in *Frontiers in Marine Science*
2. High-end paper
3. Assessment of subsidence for practitioners
4. Global assessment of sea-level rise scenarios in practise (2021/2)
5. Singapore Conference: Sea Level 2022 (closure of the Grand Challenge
6. The Future of Sea-Level Research in WRCP?

High-End Paper

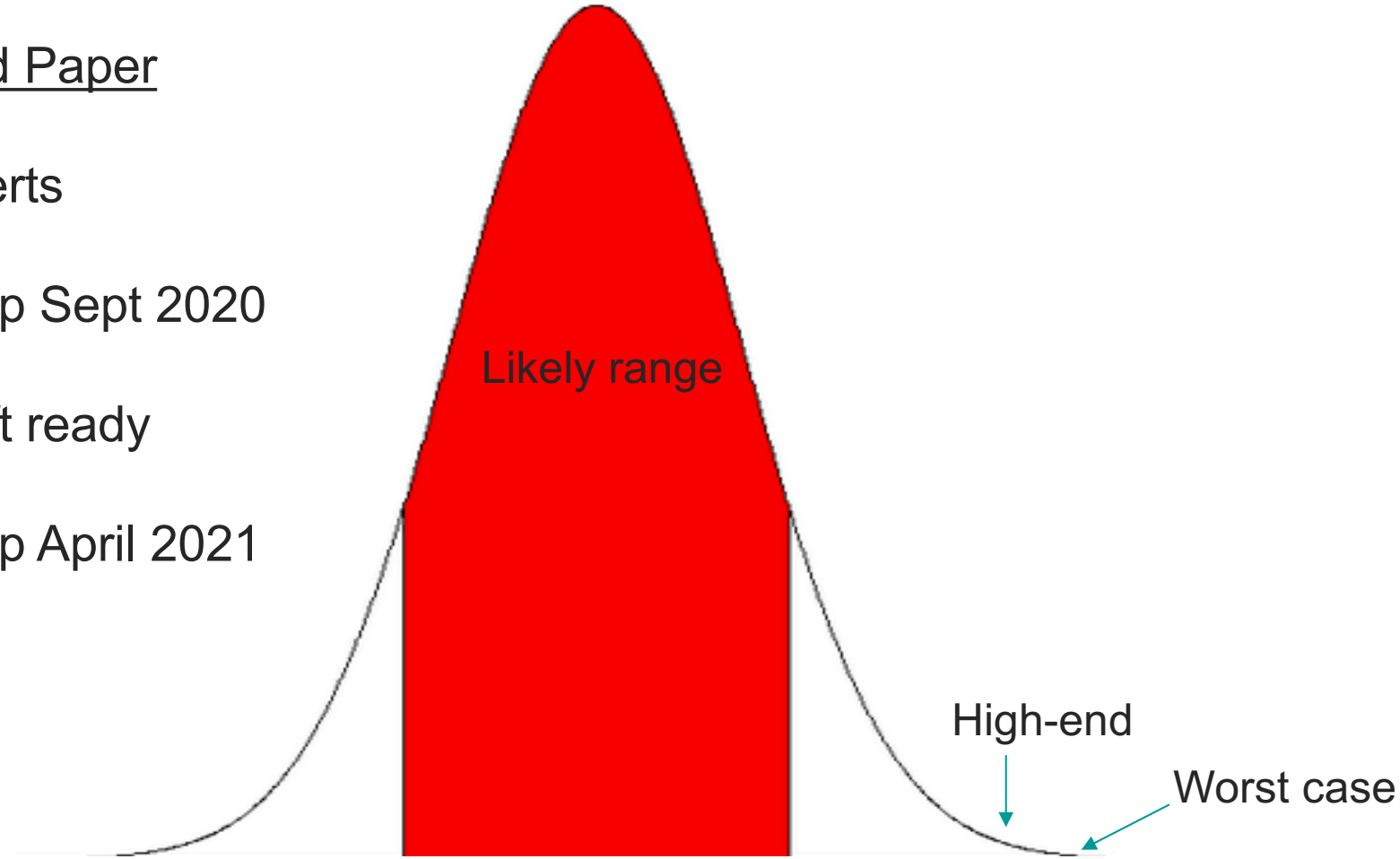
<u>High-End Paper</u>

~30 experts

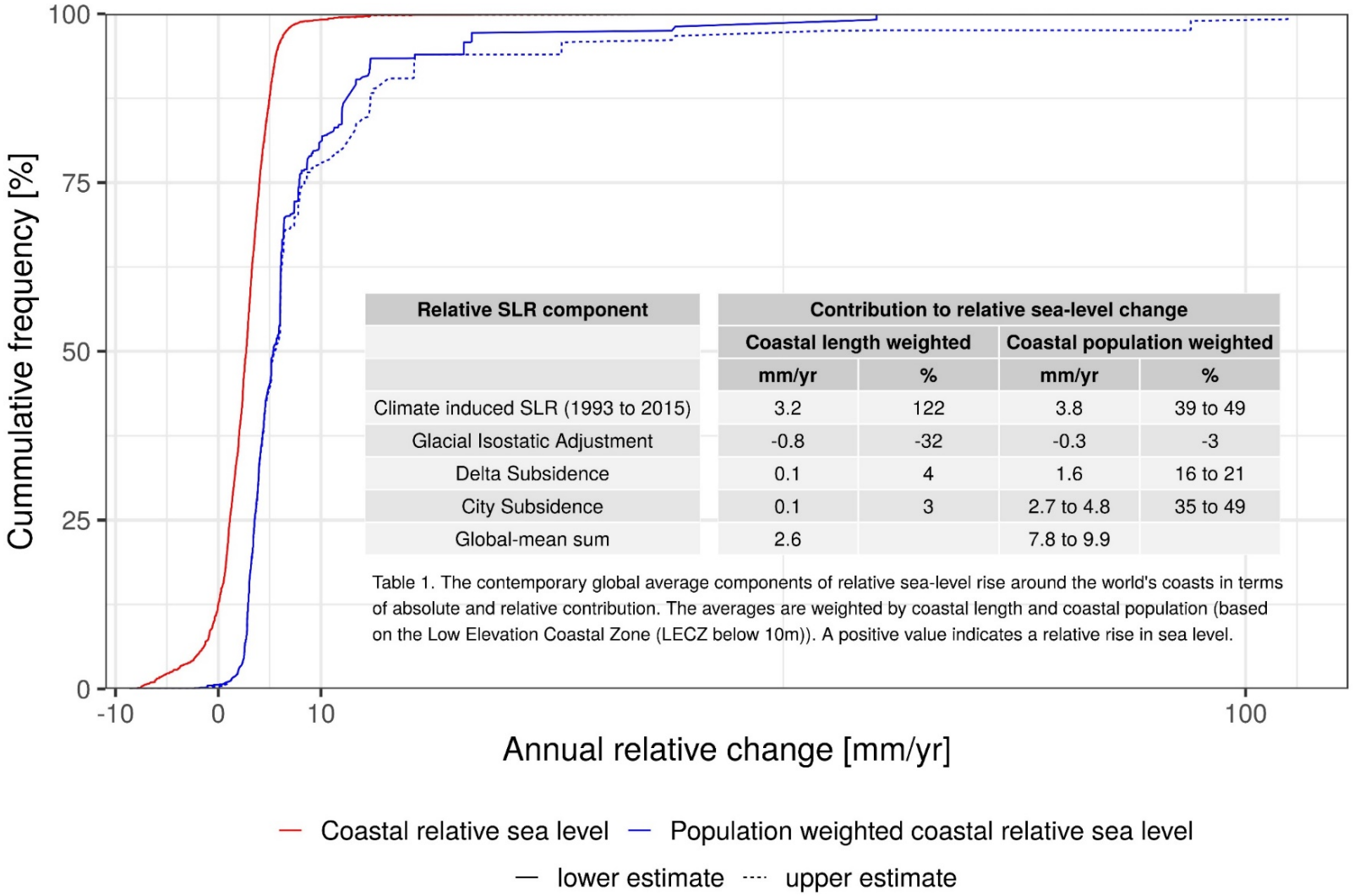
Workshop Sept 2020

First draft ready

Workshop April 2021



Global Effects of Subsidence: Length-Weighted vs Population Weighted Relative Sea-Level Rise



Relative SLR component	Contribution to relative sea-level change			
	Coastal length weighted		Coastal population weighted	
	mm/yr	%	mm/yr	%
Climate induced SLR (1993 to 2015)	3.2	122	3.8	39 to 49
Glacial Isostatic Adjustment	-0.8	-32	-0.3	-3
Delta Subsidence	0.1	4	1.6	16 to 21
City Subsidence	0.1	3	2.7 to 4.8	35 to 49
Global-mean sum	2.6		7.8 to 9.9	

Table 1. The contemporary global average components of relative sea-level rise around the world's coasts in terms of absolute and relative contribution. The averages are weighted by coastal length and coastal population (based on the Low Elevation Coastal Zone (LECZ below 10m)). A positive value indicates a relative rise in sea level.

Source: Nicholls et al 2021, Nature Climate Change

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Sea-level rise scenarios in practise

Surveying practitioners who use sea-level rise information on current practise

- What scenarios do they use?
- Where does this knowledge come from?
- What improvements would they like?

To date more than 300 questionnaires completed across the world and we hope to get to about 400 completions – survey closes at end of June. Paper by end of 2021 and presentation at Singapore

Provides a set of practitioners to work with up to the Singapore meeting and two workshops are planned as a preparation – first 16/18 November 2021

Save the date : WCRP International Conference on Regional Sea Level Change and Coastal Impacts

Published: 27 May 2021

Sea Level 2022, Singapore, 11-15 July 2022

Building on the success of the Sea Level 2017 Meeting in New York the World Climate Research Program (WCRP) Grand Challenge on “Regional Sea-Level Change and Coastal Impacts” will hold the Sea Level 2022 meeting in Singapore. This is three years after the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) report and one year after the publication of the new IPCC WG1 AR6 report. The conference will provide an opportunity to share the present status of climate-related sea-level research, and will have a strong focus on application of sea-level science for adaptation and stakeholder needs. The conference will consider the future of sea-level rise research within the new structures of the WRCP with lighthouse activities and safe landing as new flagship activities.

Sea-level rise is an existential threat to Singapore, where a third of the island is already today below 5 m above mean sea level. In Singapore, information on future sea levels is critical for coastal development, adaptation and planning.

The Conference will utilise state-of-the-art remote participation options to ensure inclusion and engagement and may include limited in-person aspects. Details of the conference programme and its format will be provided soon.

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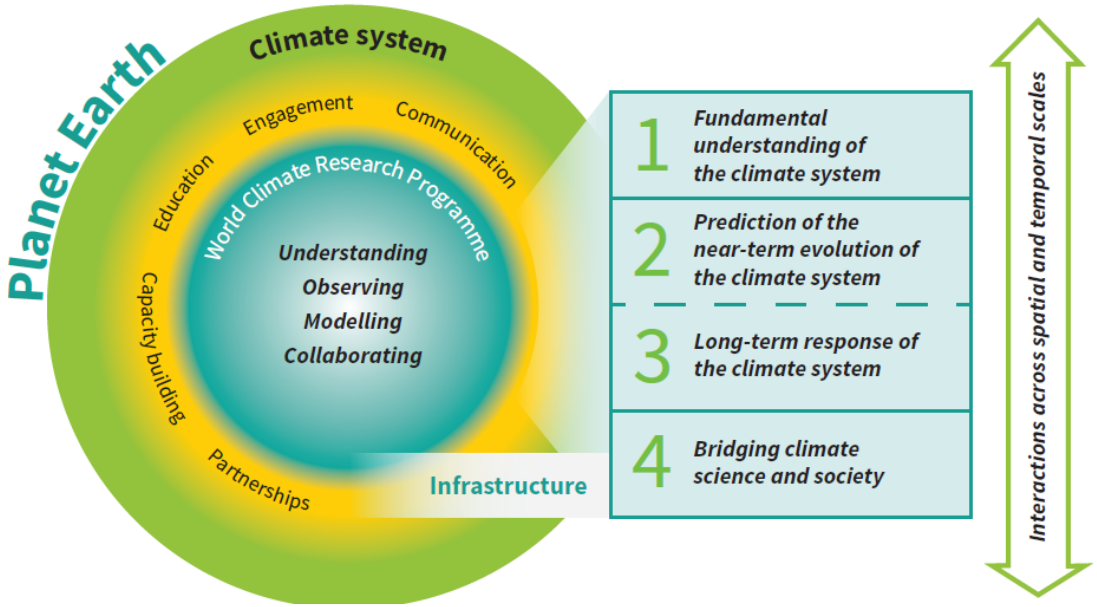
WCRP Core Project: GC SLR



Links to the WCRP Strategic and Implementation Plans

WCRP Lighthouse Activities

- Explaining and Predicting Earth System Change
- Your Climate Risk
- Safe Landing Climates
- WCRP Academy
- Digital Earths

The SL GC is relevant to all four WCRP Scientific Objectives.

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Sea-Level Research: Big themes next 10 years (1)

1. Thresholds, stability and rates of loss of the Antarctica and the Greenland ice sheets.
2. Understanding the commitment to sea-level rise over decades and centuries under different emission pathways and the implications for coastal adaptation and mitigation.
3. How can we use GIA information to constrain ice sheet changes?
4. How can we better understand the relation between large-scale open ocean sea level change and coastal sea level changes in order to translate the open ocean signal to coastal signal?
5. How do we combine sea level rise projections with forecasts on seasonal to decadal time scales to provide more meaningful guidance on sea level rise impacts?
6. How can we incorporate long- and mid-term sea-level projections into hydrodynamic models to constrain coastal extreme sea level projections and explore coastal sea level impacts?
7. How can we set-up regional and global sea-level budget studies and a linked consistent Earth energy budget to be repeated on a recurring basis? (frequency of recurrence to be decided)
8. Moving to sea-level rise being a direct and explicit output in Earth-System Models (ESM) such that we capture the feedbacks between all ESM components.

Sea-Level Research: Big themes next 10 years (2)

9. How can sea-level projections be best used with the range of decision analysis methods to develop effective, efficient and equitable adaptation solutions?
10. How can we maximize the value of sea-level science and projection range (including high end) for adaptation planning and close the gap between sea-level science and practise/user needs?
11. How can we capture the non-climate components of relative sea-level change that are essential for climate risk and adaptation assessment and develop appropriate scenarios, including human-induced subsidence.
12. How should coastal climate services evolve and scale as coastal adaptation action multiplies and accelerates?

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