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Tyndall°Centre for Climate Change Research

Global Climate Forum

A GLOBAL ANALYSIS OF SUBSIDENCE, RELATIVE SEA-LEVEL CHANGE AND COASTAL FLOOD EXPOSURE

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WAYS TO ASSESS SEA-LEVEL CHANGES

The standard geophysical approach to assess global sea-level change reports on global averages over the entire ocean. For climate impact research sea-level changes are assessed along the coast, and geological components (relative sea-level change - RSLC) are included.

Length-weighted RSLC is similar to the geophysical view, while **population-weighted RSLC** gives a different picture more related to a social view.

DIFFERENT RESULTS

Due to local **subsidence**, contemporary population-weighted global coastal mean RSLC is about **three times higher** than length-weighted coastal mean RSLC.

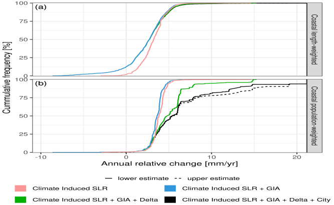

Fig. 1: Contemporary length-weighted and population-weighted coastal RSLC and the different contributing components.

The difference shows that **coastal residents are experiencing higher relative sea level rise than is widely appreciated** because they are concentrated in **places where the land is sinking rapidly** - deltas and some coastal mega-cities (in addition to climate-induced RSLC).

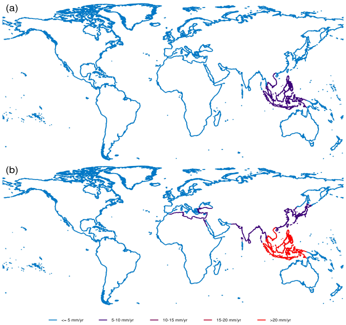

Fig. 2: Regional contemporary length-weighted (a) and population-weighted (b) coastal RSLC.

At a regional scale this shows most strongly in **South, South-East and East Asia**, where a lot of coastal mega-cities are located on subsiding deltas and alluvial plains (Jakarta, Bangkok, Ho-Chi-Minh City, Manila etc.).

Fig. 3: Jakarta is currently the fastest sinking place in the world (Photo: Prof. Miguel Esteban, Waseda University, Japan).

POLICY IMPLICATIONS

In the short run (up to 2050) subsidence effects determine coastal exposure more than climate-induced SLC-scenarios. Subsidence is often seen as a local problem, but this analysis shows that it has a regional and global signature. Subsidence control, especially in cites offers rapid benefits that complementary to the ones of climate mitigation.

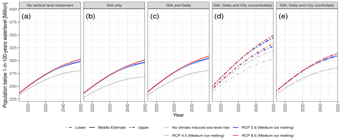

Fig. 4: Global coastal population exposure until 2050.

Nicholls, R.J., Lincke, D., et al. (2021). A global analysis of subsidence, relative sea-level change and coastal flood exposure. *Nat. Clim. Change 11, 338–342*.

COACCH CO-DESIGNING THE ASSESSMENT OF CLIMATE CHANGE COSTS

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