

Rising sea levels set to have major impacts around the world

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Research presented today at the International Scientific Congress on Climate Change in Copenhagen shows that the upper range of sea level rise by 2100 could be in the range of about one meter, or possibly more. In the lower end of the spectrum it looks increasingly unlikely that sea level rise will be much less than 50 cm by 2100. This means that if emissions of greenhouse gases is not reduced quickly and substantially, even the best case scenario will hit low lying coastal areas housing one in ten humans on the planet hard.

Dr John Church of the Centre for Australian Weather and [Climate Research](#), Hobart, Tasmania, Australia and the lead speaker in the [sea level](#) session, told the conference, "The most recent satellite and ground based observations show that sea-level rise is continuing to rise at 3 mm/yr or more since 1993, a rate well above the 20th century average. The oceans are continuing to warm and expand, the melting of mountain glacier has increased and the ice sheets of Greenland and Antarctica are also contributing to [sea level rise](#)."

New insights reported include the loss of ice from the Antarctic and [Greenland Ice](#) Sheets. "The ice loss in Greenland has accelerated over the last decade. The upper range of sea level rise by 2100 might be above 1m or more on a global average, with large regional differences depending where the source of ice loss occurs", says Konrad Steffen, Director of the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado, Boulder and co-chair of the congress session on sea level rise.

The last assessment report from the IPCC from 2007 projected a sea level rise of 18 - 59 centimeter. However the report also clearly stated that not all factors contributing to sea level rise could be calculated at that time. The uncertainty was centered on the ice sheets, how they react to the effects of a warmer climate and how they interact with the oceans, explains Eric Rignot, Professor of Earth System Science at the University of California Irvine and Senior Research Scientist at NASA's Jet Propulsion Laboratory.

"The numbers from the last IPCC are a lower bound because it was recognized at the time that there was a lot of uncertainty about ice sheets. The numerical models used at the time did not have a complete representation of outlet glaciers and their interactions with the ocean. The results gathered in the last 2-3 years show that these are fundamental aspects that cannot be overlooked. As a result of the acceleration of outlet glaciers over large regions, the ice sheets in Greenland and Antarctica are already contributing more and faster to sea level rise than anticipated. If this trend continues, we are likely to witness sea level rise one meter or more by year 2100", he says.

"Unless we undertake urgent and significant mitigation actions, the climate could cross a threshold during the 21st century committing the world to a sea level rise of metres", said John Church

"Measurements around the world show that sea level has risen almost 20 centimeters since 1880," explains Professor Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research, who will give the plenary speech on sea level rise at the congress. These data also reveal that the rate of sea level rise is closely linked to temperature: sea level rises faster the warmer it gets. "If sea level keeps rising at a constant pace, we will end up in the middle of that 18-59 cm IPCC range by 2100," says Rahmstorf. "But based on past experience I expect that sea level rise will accelerate as the planet gets hotter."

The impacts of sea level rise - even in the lower ranges of the current predictions - looks to be severe. Approximately ten percent of the world's population - 600 million people - live in low lying areas in danger of being flooded (1). A previously released study led by John Church, shows that even a modest sea level rise of 50 centimeters will result in a major increase in the number of coastal flooding events.

"Our study centered on Australia showed that coastal flooding events that today we expect only once every hundred years will happen several times a year by 2100", says John Church.

John Church also brings new results of the current sea level rise to the congress, "Sea level is currently rising at a rate that is above any of the model projections of 18 to 59 cm".

"Different groups may come to slightly different projections, but differences in the details of the projections should not cloud the overall picture where even the lower end of the projections looks to have very serious effects," says Konrad Steffen.

More information: (1) The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. Gordon McGranahan, Deborah Balk, and Bridget Anderson; Environment and Urbanization, Apr 2007; vol. 19: pp. 17-37.

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