

Sea levels could rise by more than three metres, shows new study

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Flood defences such as the Thames Barrier must take account of worst-case sea level scenarios. Credit: University of Southampton

Global sea levels could rise by more than three metres – over half a metre more than previously thought – this century alone, according to a new study co-authored by a University of Southampton scientist.

An international team including Sybren Drijfhout, Professor in Physical Oceanography and Climate Physics, looked at what might happen if [carbon dioxide emissions](#) continue unabated.

Using new projections of Antarctic mass loss and a revised [statistical method](#), they concluded that a worst-case scenario of a 2.5 to three-metre [sea level rise](#) was possible by 2100.

Professor Drijfhout said: "It might be an unlikely scenario, but we can't exclude the possibility of [global sea levels](#) rising by more than three metres by the year 2100.

"Unabated global warming will lead to sea-level rise of many metres – possibly more than ten metres – within a few centuries, seriously threatening many cities all over the world that are built in low-lying river deltas. This will also seriously affect the coastline of the UK."

The research – published this month in *Environmental Research Letters* – is consistent with the National Oceanic and Atmospheric Administration's (NOAA) recent adjustment of its possible future high-end sea-level rise from two to 2.5 metres.

However, the new study integrated different model estimates with a new statistical method, whereas the NOAA estimate relied on expert judgment.

Recent observation and modelling studies have shown the future melt of Antarctica might happen dramatically faster than previously thought.

Professor Drijfhout and scientists at the Royal Netherlands Meteorological Institute, which led the research, took this and other factors – including ocean warming, glacier melt, land water storage and Greenland ice sheet melt – into account to create their projection.

"This is the first time that robust statistical techniques have been used to develop a scenario like this, whereas previous high-end sea level projections have always been based on subjective expert judgment," said

Professor Drijfhout.

"It's important for policy-makers and the general public to know what the consequences might be when carbon dioxide emissions are not decreased, especially as there is a severe time-lag between emission-reduction and the [sea-level rise](#) response.

"Also, the construction of artificial flood defences need to take account of low-probability events, including the possibility that the international community fails to take adequate measures in reducing measures.

"We should not forget that the Paris Agreement is only a declaration of intention, and that no adequate measures have yet been agreed to turn these intentions into policy."

The team's projection explicitly accounted for three scientific uncertainties – the speed at which the Antarctic ice sheet is going to melt, the speed at which the ocean is warming up, and the amount of emitted greenhouse gases over the 21st century.

More information: Dewi Le Bars et al. A high-end sea level rise probabilistic projection including rapid Antarctic ice sheet mass loss, *Environmental Research Letters* (2017). [DOI: 10.1088/1748-9326/aa6512](#)

Provided by University of Southampton

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