Sea levels to continue rising after Paris agreement emission pledges expire in 2030

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Sea levels will continue to rise around the world long after current carbon emissions pledges made through the Paris climate agreement are met and global temperatures stabilize, a new study indicates.

The historic Paris agreement on climate change mitigation, adopted in December 2015, calls for limiting global average temperatures to well below 2 degrees Celsius compared to pre-industrial levels, and to pursue efforts to keep the increase to 1.5 degrees Celsius. The agreement took effect in 2016.

The new study is the first to quantify how much sea level would rise from the carbon emissions pledged under the Paris agreement. The researchers found that emissions released during the initial 15-year period of the agreement would cause sea levels to rise by about 20 centimeters by the year 2300.

The estimates did not take into account the potential impact of an already irreversible melting of parts of the Antarctic ice sheet.

"Even if we were to meet these initial goals of the Paris agreement, the sea level commitment from global warming will be significant," said Peter Clark, an Oregon State University climate scientist and a co-author of the study. "When we pump more carbon into the atmosphere, the increase in temperature is almost immediate. But sea level rise takes a lot longer to respond to that warming. If you take an ice cube out of the freezer and put it on the sidewalk, it takes some time to melt. The bigger the ice cube, the longer it takes to melt."

The findings were published today in the *Proceedings of the National Academy of Sciences*. The study was led by the researchers at Climate Analytics and the Potsdam Institute for Climate Impact Research.

The increase in sea level rise related to emissions during the Paris agreement period is about 20 percent of a total one-meter sea level rise expected by 2300. The one meter rise is attributed to emissions dating back to the year 1750.

About half of the 20-centimeter sea level rise can be attributed to the world's top five polluters: the United States, China, India, Russia and the European Union, the researchers found.

Oceans, glaciers and ice sheets are the main contributors to sea level rise; each responds to climate change on time scales ranging from decades to millennia. Rising sea levels pose a significant threat to coastal ecosystems and the livelihoods of hundreds of million people around the world who live and work along the earth's coasts.

"Much of the carbon dioxide we've emitted into the atmosphere will stay up there for thousands of years," said Clark, who is on the faculty of OSU's College of Earth, Ocean, and Atmospheric Sciences. "So our carbon emissions this century are not only committing our planet to a warmer climate, but also to higher sea levels that will also persist for thousands of years."

More information: Alexander Nauels el al., "Attributing long-term sea-level rise to Paris Agreement emission pledges," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1907461116

Provided by Oregon State University

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