

April 5, 2019

The State of Antarctica's Ice

Antarctica has lost 4.76 trillion metric tons of ice in the past four decades, according to a study published in the Proceedings of the National Academy of Sciences, which details changes in ice mass on the continent between 1979 and 2017.

The dominant cause of ice mass loss in Antarctica is intrusion of warm, salty circumpolar deep water, which accelerates glacier flows. Scientists foresee global warming strengthening polar westerly winds, which are expected to push more circumpolar deep water toward Antarctica's ice sheets and glaciers in the coming decades. "Warm water erodes the coastal margins, which reduces the resistance to flow of the glaciers, enabling them to flow at faster rates into the ocean and, in turn, raise sea levels," said the study's principal author, Eric Rignot. Some glaciers are prone to rapid retreat if an ice "plug" melts, Rignot said, resulting in an "unstoppable retreat of the glaciers, the melting of which will significantly contribute to sea level rise."

Sea bottom temperatures

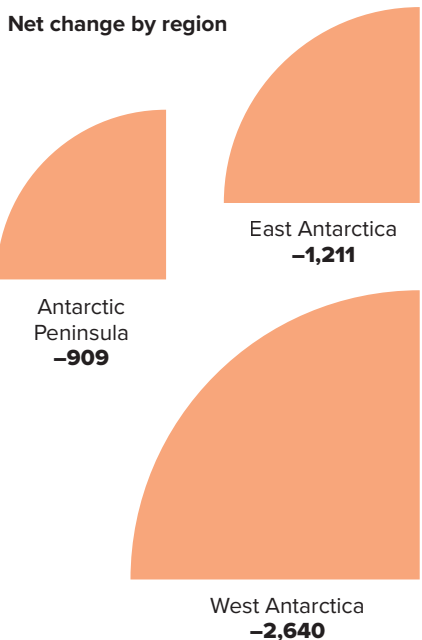
Southern Ocean State Estimate



Changes in ice mass, 1979 to 2017

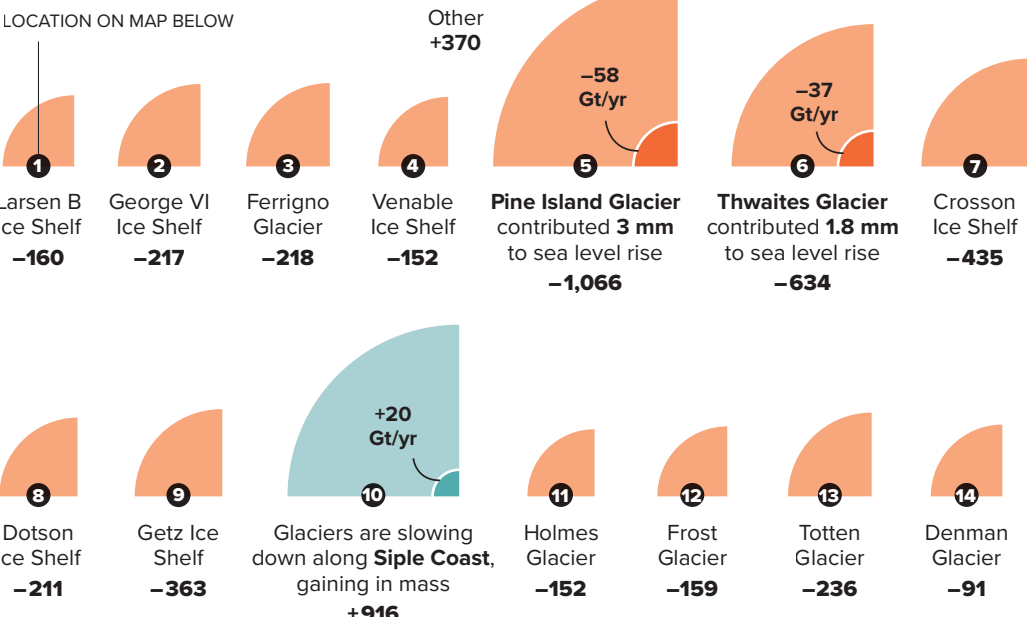
IN GIGATONS

Net change by region



Glaciers and ice shelves gaining or losing more than 150 Gt

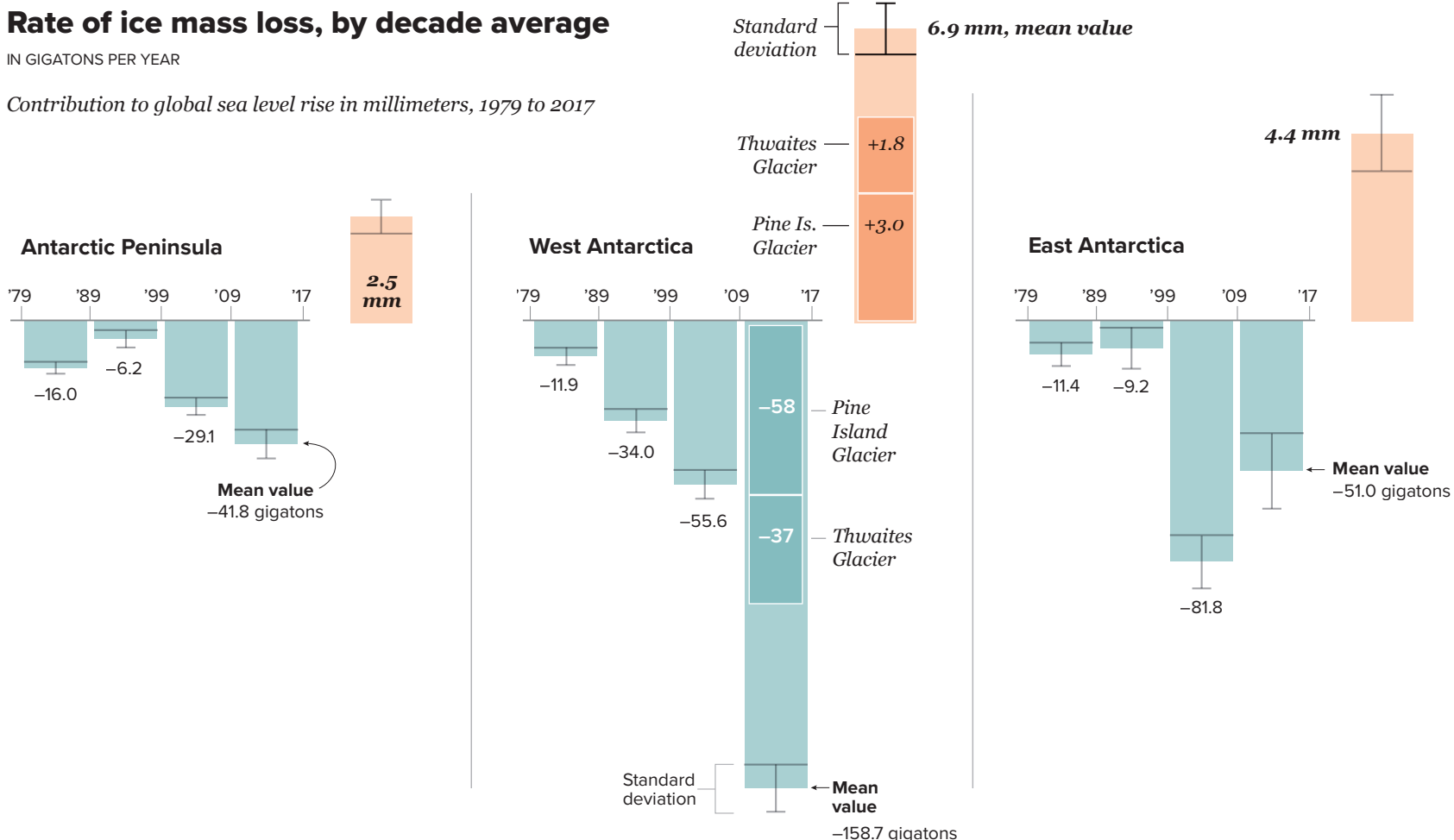
LOCATION ON MAP BELOW



Rate of ice mass loss, by decade average

IN GIGATONS PER YEAR

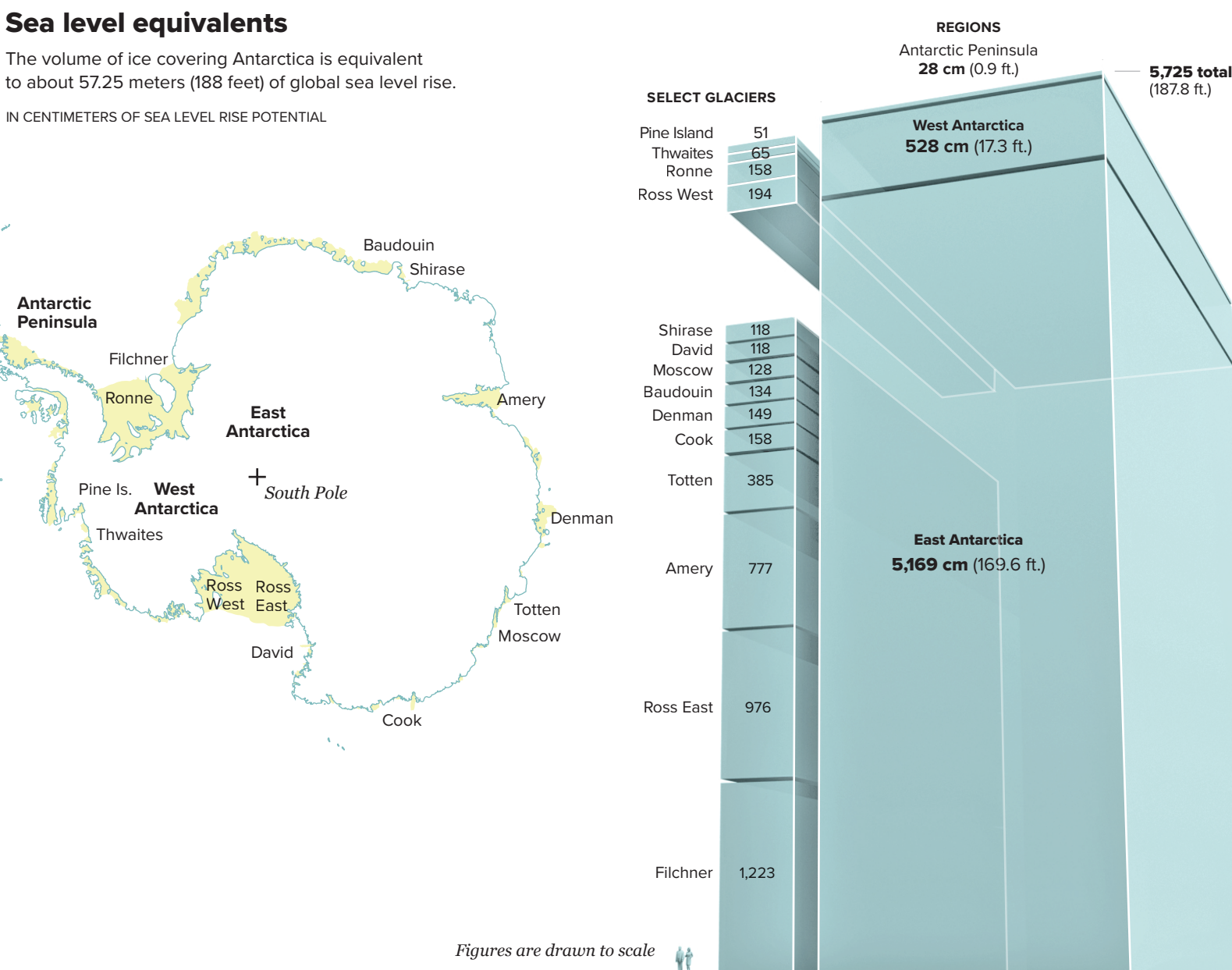
Contribution to global sea level rise in millimeters, 1979 to 2017



Sea level equivalents

The volume of ice covering Antarctica is equivalent to about 57.25 meters (188 feet) of global sea level rise.

IN CENTIMETERS OF SEA LEVEL RISE POTENTIAL



Figures are drawn to scale

Sources: "Four decades of Antarctic Ice Sheet mass balance from 1979–2017, Eric Rignot, et al, Proceedings of the National Academy of Sciences; Nature Geoscience; NASA; Eric Rignot, Department of Earth System Science, University of California, Irvine, and Jet Propulsion Laboratory, California Institute of Technology

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