

A fractured future? Ice sheets and sea level

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Ice-cliff calving could greatly accelerate sea-level rise in a warming world. Sea level is rising now because of human-caused warming, impacting coastal communities. Shrinkage of the ice sheets of Antarctica and Greenland contributes to the rise, and could accelerate in the future by well-known but poorly modeled physical processes. Visitors to Glacier Bay, Alaska now sail more than 100 km into a fjord that was filled with ice as much as 1500 m thick when George Vancouver visited in 1794, but that was largely open water with the remaining glaciers calving icebergs at more than 10 km per year when John Muir visited less than a century later. A similar calving retreat in the wider, deeper basins of Antarctica, if triggered, could cause more than 3 m of sea-level rise in the next century, with even greater rise possible further in the future. Learning enough about the controls on stability, destabilizing forcings, and ice physics to project future behavior is challenging, but progress is being made.