WEATHER

Alaska's Coast Is Vanishing, 1 Storm at a Time

Ordinary storms are chipping away at coastal communities as protective sea ice disappears

By Andrea Thompson on November 30, 2017

A home destroyed by beach erosion tips over in the Alaskan village of Shishmaref. Temperatures that have risen 15F (4.4C) over the last 30 years are causing a reduction in sea ice, thawing of permafrost along the coast, making the shoreline vulnerable to erosion. Credit: Gabriel Bouys *Getty Images*

As storms go, the one that struck northwest Alaska in mid-November was not remarkable. Its pressure was not particularly low, nor its 30-mile-per-hour winds particularly strong. Still, it sent several feet of rough seas surging into the beleaguered coastal communities that dot Alaska's northern and western

shores. In Deering, a village of 126 people perched on a sandy spit on the northern coast of the Seward Peninsula, the tempestuous waters eroded some 10 to 20 feet of beach, according to local news reports.

Such run-of-the-mill storms are eating away Alaska's shores—which account for over 50 percent of the entire U.S. coastline—as the state's protective shield of sea ice disappears. Storms that meteorologists and locals would have barely noted 30 years ago now crumble off land in a death-by-a-thousand-cuts fashion. "It's the slow grind of erosion," says Rick Thoman, climate science and services manager of the National Weather Service's Alaska region. "That slow grind over time really has the big impacts."

Several decades ago the sea ice that clung to the state's shore during fall and winter naturally absorbed some of the energy of storm waves, and gave winds less room to build up significant surge and waves. Now autumn sea ice levels have dropped precipitously, and coastal sea ice forms about a month later than it did when satellites began routinely monitoring sea ice levels in 1979. This leaves the coast more exposed during fall, the prime storm season. Over the last few decades, the wave energy that reaches Alaska's shores has more than doubled along the north coast, according to Irina Overeem, a research scientist at the University of Colorado Boulder.

While big storms—such as the 2011 Bering Sea superstorm—garner the most attention, many of the storms hitting Alaska's coast are like the one in mid-November, Thoman says. Without the sea ice, even ordinary storm waves surge farther ashore with more power, sweeping sand and other sediment back into the sea. Where permafrost is more prevalent, warmer ocean waters cause melt and waves help wash cliffs of once-frozen soil into the sea. "The

coast is unprotected," says Jacquelyn Overbeck, the coastal hazards program manager with the Alaska Department of Natural Resources.

Erosion from storms has become a major issue for coastal communities such as Shishmaref, Kivalina and Kotzebue. "People who live on the coast of Alaska are very keen observers of their environment," and have long recognized the looming threat, Overbeck says.

The scientific world took longer to notice, in part because of the relative dearth of data from such a remote region. There is no systematic record of ordinary storms hitting the coast, Thoman notes. Scientists could potentially cobble one together from newspaper archives, but it would be a time-consuming task. Other records, such as tide gauges—which provide a record of how high waters get during storms—are also lacking compared to the contiguous U.S. Despite the state's vast size, there are only three tide gauges along the western coast of Alaska and only one along the northern coast, and their records do not go nearly as far back in time. "Our data systems are so far behind the rest of the Lower 48, we're still trying to play catch-up," Overbeck says.

The U.S. Geological Service (USGS) has been compiling what erosion data are available from high-altitude photography and remote sensing along the U.S. coastline. Comparing images from the 1940s to the early 2000s, they found that most of Alaska's north coast is eroding at an average of about 1.5 meters per year. (A similar report is in the works for the state's west coast.) And that degradation of the shoreline seems to be accelerating—a 2007 study found coastal erosion had doubled between 1955 and 2005 along part of the National Petroleum Reserve in Alaska.

The USGS hesitates to link this trend to global warming because data are sparse and do not extend far back in time. But, Overeem says, "I think we can firmly tie it into climate change" due to declining sea ice which has left the

coast exposed to even ordinary storms. In the future, damage from these storms will likely expand farther north and extend later into autumn as warming continues to melt the shield of ice around the shore.

More observations are needed to better understand how Alaska's coastline will evolve, including tidal data and better maps of the ocean floor along the coast. Overbeck visited 17 remote Alaskan communities this summer to install erosion monitors that local residents will maintain. Such data will improve forecasts that will help communities decide whether they need to relocate—and how far inland they might have to go to be safe from the ravages of the sea. It will also help secure relief funds for storms that lack the headline power of a Sandy or a Harvey. "In Alaska, we have a lot of storms with no names, so they may never get the same attention," Overbeck says. "But they're impacting Americans just the same."

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Credit: Nick Higgins

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