Record-low sea ice as Arctic temperatures soar

Daniel de Vries
22 November 2016

Never since satellite monitoring began in the late 1970s has such little ice covered the polar seas this time of year. In both the Arctic and the Antarctic, the extent of sea ice is tracking at the lowest levels on record.

The onset of polar night in the Arctic, in which the sun never rises above the horizon, typically triggers rapid ice growth as consistently bitter cold temperatures chill the warmer seas. However over the past two months, temperatures in the high Arctic have remained unusually warm. Temperatures last week rose to a startling 20 degrees Celsius (38 degrees Fahrenheit) above the historical average.

This extraordinary warmth is in part attributable to shrinking ice cover and may well drive further losses. And it is not just high air temperatures. Mark Serreze of the National Snow and Ice Data Center explained to the *Washington Post*, "There are some areas in the Arctic Ocean that are as much as 25 degrees Fahrenheit (14 degrees Celsius) above average now," he said. "It's pretty crazy."

While it is too early to say whether this season's winter ice maximum will set a new low, the long-term trends are unmistakable. The decline of ice, particularly in the Arctic, is recognized by climate scientists as an alarming indicator of a warming planet. The amount of ocean area covered by at least 15 percent ice reached a minimum in 2012, with the subsequent years all well below the long-term average.

It is not only the extent of the ice that concerns scientists, but its shrinking thickness and age. According to NASA, a comparison between September 2014 and September 1984 shows a decline of older ice, four years old or more, by a staggering 94 percent. Virtually all of the older, thicker ice has melted away or thinned, leaving the region more vulnerable to additional melting during relatively warm weather.

This vulnerability is not merely a theoretical possibility. At the end of 2015, for example, a storm and warm spell triggered the loss of ice over an area the size of Florida at a time when the ice pack would normally be growing, according to a recent analysis by NASA's Goddard Institute. The "extremely warm" temperatures were 10 degrees Celsius above normal, half the magnitude of the current warm spell.

The current extraordinarily high temperature abnormalities in the Arctic are matched by equally cold deviations spanning almost the entirety of the vast region of Siberia. This month, nearly 140 low temperature records were set in Russia, from the Finland border to the Sea of Japan. Schools in central Russia shuttered as temperatures plunged to negative 36 Celsius (negative 33 Fahrenheit).

The record heat in the Arctic and cold over the continents are linked. Jennifer Francis, a climatologist at Rutgers University, told the *Post*, "The Arctic warmth is the result of a combination of record-low sea-ice extent for this time of year, probably very thin ice, and plenty of warm/moist air from lower latitudes being driven northward by a very wavy jet stream."

An increasing amount of research has tied changes in atmospheric circulation patterns to the loss of Arctic sea ice. The wintertime Arctic polar vortex, a circulating zone of low pressure extending several miles up in the atmosphere, has weakened over the past few decades, together with retreating sea ice. This weakened and perhaps shifting vortex allows colder weather, normally confined to the polar region, to escape farther south. The current weather patterns appear to be a prime example of this phenomenon.

Vast changes are afoot not only in the northern latitudes but in the Antarctic as well. In recent years, up through 2014, the region had seen growth in winter sea

ice extending into the Southern Ocean. While these gains were far outweighed by the losses in the Arctic, this year has brought a stark reversal. Now, for the first time, sea ice extents near both poles are on course for record lows.