Greenland is burning

By Daniel de Vries
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Wildfires have raged for weeks in Greenland, the massive Arctic island known principally for its vast quantities of ice. The fires are unprecedented in size and duration, marking an ominous new stage in the warming of Greenland and the entire Arctic.

Scientists first observed signs of the current burning in late July, in an area of western Greenland about 150 kilometers from the second largest town, Sisimiut. That blaze and smaller ones nearer the coast have engulfed over 18 square kilometers to date. The latest satellite data indicate the fires continuing to burn as of August 16.

The burned-out area is on the border between the frigid, arid grasslands close to the border of the ice sheet, and typically wetter, coastal landscapes with mosses, shrubs and small trees. The fires appear to be fueled at least in part by peat, the partially decomposed plant material which takes thousands of years to form.

While the size of the current blaze is not remarkable on a global scale, scientists have never before seen anything like it on Greenland. Since 2000, satellite monitors have enabled researchers to detect remote wildfires on the island. As Stef Lhermitte of Delft University in the Netherlands wrote on Twitter, "wildfires have occurred in the past over Greenland but 2017 is exceptional in the number of active fire sections by MODIS," referring to the thermal detection instrument used to assess the fires.

The immediate cause for the fires is unknown. Lightning, a campfire, or a stray cigarette can all provide the necessary spark. Pinpointing precisely how the blazes began can be very difficult, particularly in such remote areas. The unusually dry summer weather, however, contributed to the conditions for the fire to spread rapidly. Sisimiut had trace amounts of rain in June and half the normal amount in July.

Yet more than the normal variability of weather is at play. "The Earth is complex. Our climate system is complex. Rarely can we say it's one thing that caused this," Jessica McCarty, a geography professor at Miami University, told NPR. "But in this example, we do know that it was not expected for the permafrost to be at this condition so soon," she said. The fires indicate that the layer of frozen ground known as permafrost has melted to an extent not expected until 2050.

Temperatures are rising twice as fast in the Arctic compared to the global average. Alongside the warming—and even outstripping it—is the rate of melting by glaciers and ice sheets. "In Greenland, everything got warmer at the same time: the air, the ocean surface, the depths of the ocean," Ian Joughin, a University of Washington glaciologist, told NASA earlier this month. "We don't really understand which part of that warming is having the biggest effect on the glaciers. What scientists do know is that warming Arctic temperatures—and a darkening surface of the Greenland ice sheet—are causing so much summer melting that it is now the dominant factor in Greenland's contribution to sea level rise."

Joughin added that Greenland's summer melt season is 70 days longer than it was 40 years ago. Over half the surface of Greenland's ice sheet now regularly melts in summer. In extreme cases like 2012 virtually all of the ice sheet can experience surface melt. In all, Greenland contains the equivalent of more than seven meters of sea level rise trapped in its ice sheets.

Wildfires together with warming temperatures are thought to be responsible for much of this accelerated melting. Fires across the northern hemisphere deposit black soot on the white surface of Greenland's ice sheet, darkening the ice and absorbing more of the sun's heat. While the soot is typically transported from vast distances—in fact, smoke from a Canadian forest fire is currently tracking over Greenland—large deposits can be expected from the intense local smoke originating just 80 kilometers from the edge of the ice

sheet.

Perhaps the most ominous aspect is the prospect for the synergistic impacts of climate change and wildfire activity in the high latitudes to increase further in the future. While on a global scale wildfires are trending downwards, largely driven by expanding agriculture in the African savannas, areas of the high north like Alaska have seen a sharp increase in large forest fires over the past few decades.

As warming temperatures continue to alter Arctic ecosystems, increased fire activity could release vast stores of carbon buried in soil, darkening and destabilizing ice sheets, adding global warming gases to the atmosphere, and amplifying the changes already under way.