

Satellite data shows loss of snow cover, not soot to blame for rapid temperature rise in the Arctic

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A team of researchers from Pacific Northwest National Laboratory, the University of Washington and the University of Wisconsin-Madison has found evidence that shows the rapid rise of temperatures in the Arctic is caused by the loss of snow and ice cover, and not soot. In their paper

published in *Proceedings of the National Academy of Sciences*, the group describes studying satellite data for the region over a 32-year period, and what it showed them about surface temperatures.

Snow and ice reflect sunlight and its accompanying heat strike into space more than darker surface areas—scientists refer to this as the [albedo](#) effect. Prior research has shown that the reason the Arctic is heating up at roughly three times the pace of the rest of the world, is because of changes to the albedo effect in the region. As less heat is bounced back into space, more of it is retained at [ground level](#), reducing [snow](#) and [ice cover](#). And as more reflective cover is lost, less is available to reflect heat back into space, a cycle that will continue, the researchers note, until an external force stops it or there is no more snow and ice. Some studies have suggested this cycle was caused by soot from burning coal and other material making its way to the Arctic and coating the snow and ice, reducing the albedo effect. In this new effort, the researchers tested this theory by studying [satellite data](#), including information regarding the albedo effect, over the years 1982 to 2014.

The researchers report that they found a 1.25-to-1.51 percent per decade absolute reduction in mean surface albedo for the Arctic during the spring and summer seasons. They also found that the reduction in snow and ice cover for sea ice, snow cover over the sea and snow covering the ground contributed equally to the reductions in albedo. They conclude by suggesting that surface temperature warming combined with a reduction in snowfall have been the primary reasons for the rapid increase in temperatures in the Arctic. This finding is in direct contrast to prior studies blaming soot for the decrease in albedo. To back up their claim, the researchers note that soot covering snow in the Arctic has been declining over the past three decades, yet the rise in [surface temperatures](#) has continued unabated.

More information: Rudong Zhang et al. Unraveling driving forces

explaining significant reduction in satellite-inferred Arctic surface albedo since the 1980s, *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1915258116](https://doi.org/10.1073/pnas.1915258116)

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