

# Scientists believe open water in summer has become key to declining arctic ice

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As researchers Wednesday announced the lowest amount of ice cover in more than a century in the Arctic, the fourth consecutive year of record and near-record lows, two polar scientists at the University of Washington's Applied Physics Laboratory say they believe a tipping point has been reached.

Too much open water in the summers -- not so much warmer air temperatures -- is now driving the amount of ice that is able to form each winter, hypothesize Ron Lindsay and Jinlun Zhang in a paper in press at the Journal of Climate.

Ice is like a shield over the ocean in summer with its hard bright surface reflecting much of the sun's energy back into space -- a quality researchers call high albedo. Open water, on the other hand, has a low albedo because it readily absorbs the sun's radiation instead of reflecting it.

An Arctic Ocean at the tipping point of having too much open water in summer will go into winter with less and less ice and with water too warm to develop an ice cover as thick as past ones, Lindsay says. The next summer, predictably, the ice is less extensive so there is even more open water to absorb the sun's heat.

Lindsay and Zhang believe the Arctic got into this situation of a "positive ice-albedo feedback" because:

❓ The ice was preconditioned by 50 years of gradually increasing fall, winter and spring air temperatures that caused newly formed ice to be less thick at the end of spring.

❓ There was a triggering event when wind patterns in the late 1980s and early 1990s temporarily shifted, flushing older, thicker ice out of the Arctic and down the east coast of Greenland, where it melted.

"The reduction in the thickness and extent of the ice continues unabated in spite of the fact the wind circulation patterns have returned to near normal conditions," Lindsay says.

"Only time will tell if we have really tipped the system into a new quasi-stable state in which very large extents of summer open water and winter first-year ice are the norm. The old regime may not be regained until there is a prolonged period of cooler temperatures in the Arctic."

Source: University of Washington

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