

# Arctic ice may all melt in summer by 2040 - study

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By Adam Tanner

SAN FRANCISCO, Dec 11 (Reuters) - Global warming could melt the Arctic's ice during the summer as early as 2040, raising serious environmental as well as commercial and strategic issues, experts said on Monday.

"The effects of greenhouse warming are starting to rear their ugly head," said Mark Serreze, a scientist at the National Snow and Ice Data Center at the University of Colorado in Boulder.

Marika Holland, a scientist at the National Center for Atmospheric Research, projects a slow, steady decline of Arctic ice as global warming continues, with a dramatic "tipping point" in about two decades.

The research, to be published by the scientific journal *Geophysical Research Letters* on Tuesday, found that the extent of sea ice each September could be reduced so abruptly that, within about 20 years, it may begin retreating four times faster than at any time in the observed record.

"The ice is actually quite stable until 2025 and then boom, it goes," Holland told the fall meeting of the American Geophysical Union in San Francisco.

That means that the famous white spot at the top of the globe could be ice-free in summer as early as 2040, according to modeling done on supercomputers. In one simulation, the September ice shrinks from about 2.3 million square miles (6 million square km) to 770,000 square miles (2 million square km) in a 10-year period. By 2040, only a small amount of perennial sea ice would remain along the north coasts of Greenland and Canada, while most of the Arctic basin would be ice-free in September.

## ENVIRONMENTAL AND STRATEGIC IMPACT

Although geographically remote from most of the inhabited world, melting Arctic ice could change the world's ecosystem including sea and surface life, weather, shipping patterns and even national defense needs.

"There are winners and losers in this game but on balance I think it's negative," Serreze said.

For Russia, "the shipping routes are going to open, they will see economic benefit from that," he continued. "For Canada, this could be an economic boom." Massive Arctic melting could create a host of problems as well, from how wildlife and fish adapt to how nations respond to the new frontiers.

"It will have all these other geostrategic issues," Mead Treadwell, chair of the U.S. Arctic Research Commission in Anchorage, Alaska, said in an interview. He said, for example, that the United States might have to patrol its northern Alaskan border, and prepare for remote oil spills as new shipping routes open. A U.S. Geological Survey last month found that polar bear cubs in Alaska's Beaufort Sea are much less likely to survive compared to about 20 years ago because of the melting sea ice.

Further afield, the lack of cooling weather from the Arctic ice could change weather patterns elsewhere, for example, curtailing skiing opportunities in Colorado, or changing planting seasons, Colorado resident Serreze said.

Scientists say limiting human greenhouse gas emissions could slow the rate of Arctic ice melting.

(Additional reporting by Alice Hung in Toronto)