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Melting ice dilutes northern seas

By Elli Leadbeater

Freshwater pouring into northern oceans is slowly turning high-latitude waters less salty.

Shrinking ice sheets and melting glaciers are partly responsible for the freshening effect, a review in the journal Science has confirmed.



Shrinking ice sheets play a part in the changes

If salinity levels continue to drop, dramatic changes to the North Atlantic currents could occur.

But more work is needed to be sure that rising global temperatures are to blame, say the authors.

"For the last 50 years, oceanographers have been cruising seas at northern latitudes taking vertical profiles of salinity, and they have observed gradual declines," said lead author Bruce Peterson, of the Marine Biological Laboratory, Woods Hole, US.

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"The salt water, although still very salty, is getting fresher."

Warm shallows, cold depths

The volume of fresh water is a good match for the amount which rivers, precipitation, sea-ice melt and glacier melt are producing. Run-off from these sources must be creating the dilution effect, the researchers conclude.

The measurements are taken from the Nordic seas and Atlantic Sub-polar Basins.

Cold water from the Arctic is usually exchanged for warm water from the tropics in a self-propelling cycle.

In the north, the warm water arriving via surface currents sinks and flows back to warmer climes through the deep ocean. Because fresher water is less dense, it does not sink so far as salty water would at the same temperature.

If the trend continues, the changes to this current system may be significant. "It is expected that the North Atlantic circulation will slow down," said Professor Peterson.

Global warming or not?

But how likely is the trend to continue? It is not yet possible to be sure to what extent global warming can be blamed for the changes, say the authors.

Fluctuating salinity could potentially result from a normal periodical weather pattern known as the North Atlantic Oscillation index. If this index is high, seas in the north are less salty than average.

Until 1995, the changes were in line with what would be expected under the climatic conditions; but when the index changed recently, becoming low or neutral, the proportion of fresh water did not go down accordingly in some places.

So the greater bulk of fresh water running into the sea is probably - at least in part - due to rising global temperatures. "I suspect parts of it are due to global warming. It's a difficult quandary," said Professor Peterson.

If salt levels continue to decline, and currents change, the implications for aquatic ecosystems would be dramatic.

"The organisms in the oceans are affected by the distribution of sea ice, and by temperatures and salinity fields, and all of these would change," the author explained.

"Changes in these currents would have tremendous impact for fisheries and other species important to man."

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