

Greenland's Melting Ice Unexpectedly Nurtures Marine Life – New Discovery from NASA

Rapid ice melting in Greenland is not only causing sea levels to rise, but also fueling life in the oceans.

Greenland's rapid ice melt is not only raising sea levels, it's also fueling ocean life. Scientists have found that meltwater from the Jakobshavn Glacier can 'pull' nutrient-rich deep waters to the surface, increasing summer algae blooms by up to 40%.

Meltwater from ice brings nutrients to the sea surface

Research published in the journal *Nature Communications: Earth & Environment* shows that meltwater from Greenland's massive ice sheet is stirring up nutrients from the seafloor, creating conditions for plankton to thrive. These are microscopic, plant-like organisms that play a vital role in marine ecosystems: they absorb CO₂ and underpin global fisheries.

Greenland's ice sheet, which is up to a mile thick in places, is losing an estimated 293 billion tons of ice each year. At the height of summer, more than 300,000 gallons (1,200 m³) of fresh water from the Jakobshavn (Sermeq Kujalleq) glacier flows into the ocean every second. The water plunges hundreds of meters below the surface before mixing with surrounding streams.

As the glacier's surface melts, water drills holes down to the bottom, flows between the ice and bedrock, and then shoots out at the base of the glacier, forming a 'column' of water that flows into the ocean.

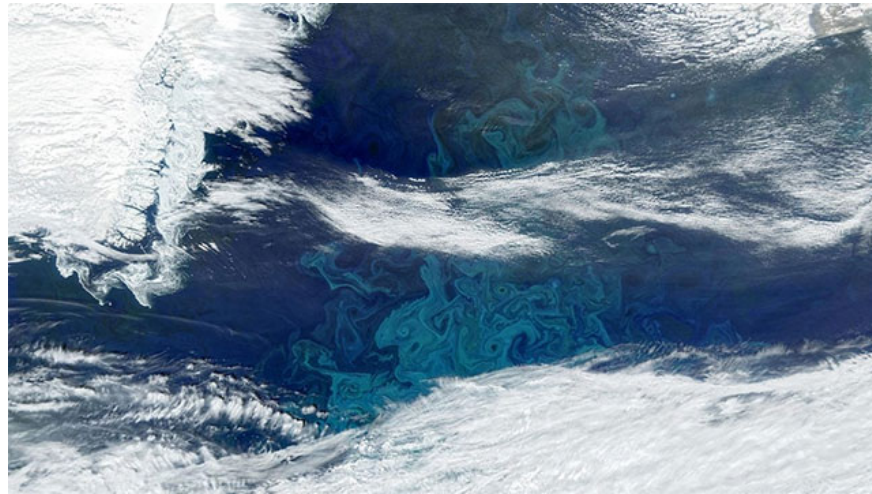
Because it is lighter than saltwater, this meltwater, when it rises, will carry important nutrients such as iron and nitrate (the main ingredient of fertilizer) to the surface layer, where plankton algae are floating.

Plankton, though smaller than the tip of a pin, feeds other plankton such as krill, which in turn provide food for fish, whales and many other large marine species.

Arctic Algae Blooms and the Research Challenge

NASA satellite data shows that the growth rate of plankton in the Arctic increased by 57% from 1998 to 2018. For Greenland, nitrate from the seabed is especially important in the summer, after most of the nutrients have been 'consumed' during the spring bloom.

However, testing this hypothesis is not easy, due to the remote terrain, huge icebergs and difficult long-term observation conditions.



To get a 'peek' into what's happening in the waters around Jakobshavn Glacier, the team used the ECCO-Darwin ocean model, developed by NASA JPL and the Massachusetts Institute of Technology (MIT). The model incorporates nearly every ocean measurement over the past 30 years—from temperature to salinity to seafloor pressure—with billions of data points.

Scientists created a 'model within a model' to simulate in detail the fjord area just below the glacier. Using the supercomputer power at NASA's Ames Research Center, they calculated that the nutrients 'pulled' up from the seafloor by the meltwater could help summer algae grow by 15–40%.

Melting ice not only changes the temperature and chemistry of ocean waters, making them less able to dissolve CO₂, but also contributes to the increased amount of CO₂ absorbed by more photosynthetic algae. These two effects are roughly balanced.

Will this benefit Greenland's wildlife and fisheries? Scientists say it will take time to fully understand the impact, especially as the rate of ice loss is expected to accelerate in the coming decades.

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