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Study: Ocean warming boosts deep sea phytoplankton, threatening marine ecosystems

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By Responsible Seafood Advocate

New study indicates deep sea phytoplankton thrive with ocean warming, raising marine ecosystem concerns

A new study from the University of Exeter shows that an “invisible forest” of phytoplankton thrives in deeper ocean layers due to ocean warming. The findings raise concerns about the health of marine ecosystems and the broader impacts on biodiversity and climate change.

“Changes at the base of the food web can have cascading effects on marine life, from tiny zooplankton to large fish and marine mammals,” said Dr. Bob Brewin, the study’s co-author. “So the future of phytoplankton will have major implications for biodiversity, as well as climate change.”

Phytoplankton, the tiny drifting organisms that play a crucial role in the Earth’s ecosystem, are responsible for about 50 percent of the planet’s “primary production” through photosynthesis.

The study, published in *Nature Climate Change*, examined how phytoplankton behave at the ocean’s surface and in a separate layer of water below (the “subsurface”). The goal was to understand how climate changes affect these important organisms.

A new study indicates deep sea phytoplankton thrive with ocean warming, raising concerns about marine ecosystems. Photo credit: Dr. Bob Brewin.

Findings revealed that the two groups of phytoplankton react differently to these changes, which raises significant concerns about ocean health and marine ecosystems.

“It’s important to understand these trends because phytoplankton are the foundation of the marine food web, and play a key role in removing carbon dioxide from the atmosphere,” said Dr. Johannes Viljoen from the University of Exeter. “Our findings reveal that deep-living phytoplankton, which thrives in low-light conditions, respond differently to ocean warming and climate variability compared to surface phytoplankton.”

Over the past 10 years, the amount of living material (or “biomass”) in subsurface phytoplankton has increased due to ocean warming. Meanwhile, surface phytoplankton now has less chlorophyll – making it less green – but the total biomass remains stable.

Using 33 years of data from the Bermuda Atlantic Time-series Study (BATS) in the Sargasso Sea, findings also indicated that the "surface mixed-layer" (the area of turbulence at the ocean's surface) has become shallower as the ocean has warmed.

"We typically rely on satellite observations to monitor phytoplankton, but the subsurface is hidden from satellite view," said Viljoen. "Our study highlights the limitations of satellite observations, and underscores the urgent need for improved global monitoring of phytoplankton below what satellites can see."

Read the full study here. (https://www.nature.com/articles/s41558-024-02136-6)

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