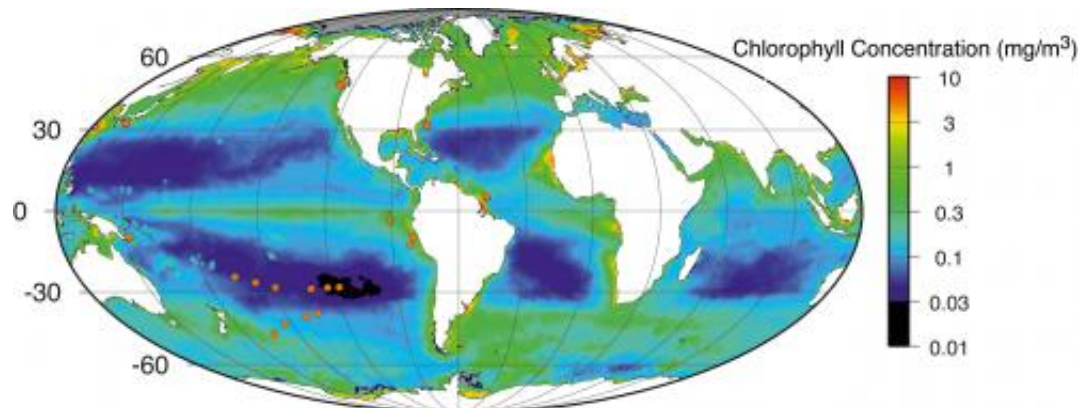


New estimate of living biomass: One third less life on planet Earth

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Satellite measurements of the nutrient content of the oceans. Dots mark places where seaborne measurements were taken. In the southern Pacific a vast area is found where nutrient contents were not existent. © GFZ, Jens Kallmeyer

Estimates of the total mass of all life on Earth should be reduced by about one third, based on the results of a study by a team of scientists at the University of Rhode Island's Graduate School of Oceanography and colleagues in Germany.

The research was published this week in the *Proceedings of the National Academy of Science*.

According to previous estimates, about one thousand billion tons of carbon is stored in living organisms, of which 30 percent is in single-cell

microbes in the ocean floor and 55 percent reside in land plants. The researchers have now revised the number downward. Instead of 300 billion tons of carbon in subseafloor microbes, they estimate these organisms contain only about 4 billion tons. This reduces the total amount of carbon stored in living organisms by about one-third.

"Previous estimates of microbial biomass in the ocean sediments were hindered by a limited number of sample locations preferentially located in near-shore, high-productivity regions," explained Rob Pockalny, URI associate marine research scientist. "With support from the National Science Foundation, we were able to obtain samples from the middle of the Pacific Ocean in some of the lowest productivity regions in the ocean."

Earlier estimates were based on drill cores that were taken close to shore or in very nutrient-rich areas.

"About half of the world's ocean is extremely nutrient-poor. For the last 10 years it was already suspected that subseafloor biomass was overestimated," explained Jens Kallmeyer at the University of Potsdam, Germany. "Unfortunately there were no data to prove it."

So the research team, which also included URI oceanographers David Smith and Steven D'Hondt, collected sediment cores from areas that were far away from any coasts and islands. The six-year work showed that there were up to 100,000 times fewer cells in sediments from open-ocean areas, which are dubbed "deserts of the sea" due to their extreme nutrient depletion, than in coastal sediments.

Pockalny said that the scientists were able to make predictions about microbial distributions in some regions of the world's oceans based on simple parameters like sediment accumulation rate and distance from shore.

With this new data, the scientists recalculated the total biomass in marine sediments and found drastically lower values. The new findings contribute to a better picture of the distribution of living biomass on Earth.

Despite of the high logistical and financial efforts for marine drilling operations, there are more data about the abundance of living biomass in the sea floor than about their abundance on land.

More information: Jens Kallmeyer et al.: "Global distribution of microbial abundance and biomass in subseafloor sediment", *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1203849109

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