# Study reveals new patterns of key ocean nutrient

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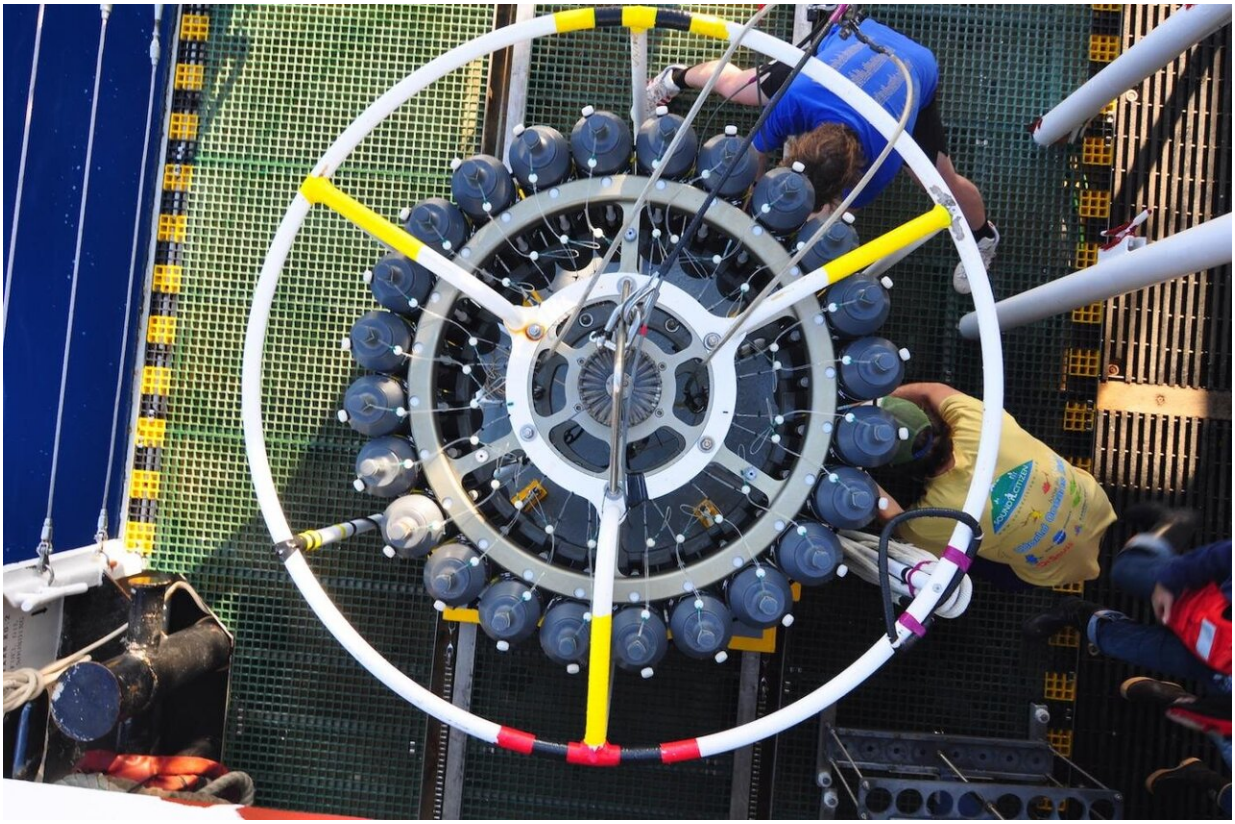

Researchers retrieve samples in order to analyze how water chemistry in the Sargasso Sea may be changing. A new paper in Science Advances reveals that the important nutrient phosphate may be more abundant throughout the global ocean than previously thought. Credit: Andrew Collins

The important nutrient phosphate may be less abundant in the global

ocean than previously thought, according to a new paper in *Science Advances*. The researchers compiled data collected using highly sensitive techniques that measure phosphate to create a more accurate dataset to power global ocean models.

"This is a bit of a wake-up call that, as technology advances, we need to update the underlying data and processes that fuel ocean models to ensure they yield the best possible predictions," said Mike Lomas, senior research scientist at Bigelow Laboratory for Ocean Sciences and an author of the paper. "Models are our best chance to predict the many ways the oceans will respond as climate changes, but our predictions are only as good as the data underlying them."

Lomas and his coauthors found that data collected using high-sensitivity measurements reveal that phosphate in the surface ocean is less abundant than traditional measurements and models suggest. They also discovered previously-unknown patterns in phosphate levels in major ocean basins in both the Atlantic and Pacific. Ocean algae depend upon the mineral phosphate, which is essential to all life on Earth. Lower phosphate levels pose challenges for algae, which are already predicted to suffer as climate change makes ocean nutrients scarcer.

The research team compiled high-sensitivity phosphate datasets collected throughout the global ocean, including measurements Lomas collected over nearly two decades of intensive study in the Sargasso Sea. They mapped this new, more accurate dataset, and compared the result to that yielded by more common, lower-sensitivity methods. These methods are used widely because they require less time and less sophisticated equipment, but they don't allow researchers to detect phosphate levels as accurately.

"The reality is that we've been operating with a skewed view of ocean phosphate," Lomas said. "With this improvement, we will be able to

make our models a little bit more realistic and better able to predict this aspect of climate change's impact on our oceans."

The element phosphorus is a key ingredient in the fundamental molecules of life, including the genetic code DNA and the molecule ATP, which provides the energy to fuel cells. It is rare in the ocean, and, unlike most other essential nutrients, the amount of phosphorus on Earth is finite. Knowing the true availability of phosphorus in the ocean is essential to accurately describing how the base of the food web functions—and how it will respond as climate change alters ocean chemistry.

Lomas hopes to continue this research by studying how ocean algae take in organic phosphorus dissolved in seawater, another potentially important—and poorly understood—source of the element. He believes this phosphorus may help support algae in low-phosphate regions, and that understanding its role has the potential to improve ocean models even further.

"There is a vast sea of existing data to explore, and it likely holds as many undiscovered truths as the bottom of the ocean," Lomas said. "As a global scientific community, we need to support more projects that help us capitalize on this trove for important insights into the ocean."

**More information:** Adam C. Martiny et al, Biogeochemical controls of surface ocean phosphate, *Science Advances* (2019). DOI: 10.1126/sciadv.aax0341

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