First direct measurement of the overall impact of ocean eddy killing

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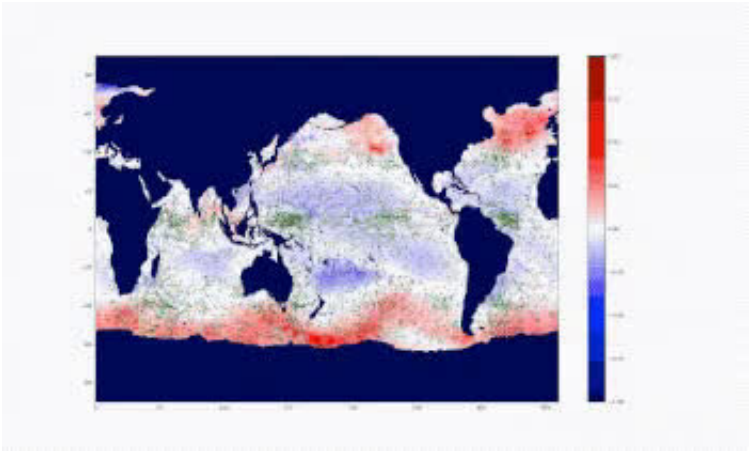

Ocean currents, propelled by kinetic energy from the wind, are the great moderators of our climate. By transferring heat from the equator to polar regions, they help make our planet habitable.

And yet, the large-scale models used by scientists to study this complex system fail to accurately account for the impact of wind on the ocean's most energetic components: swirling, mesoscale eddies. These temporary, circular currents of water 50 to 500 kilometers in size are critical to determining the trajectory of larger ocean currents like the Gulf Stream.

In a recent paper in *Science Advances*, researchers from the University of Rochester and Los Alamos National Laboratory document for the first time how the wind, which propels larger currents, has the opposite effect on eddies less than 260 kilometers in size—resulting in a phenomenon called "eddy killing."

They also provide the first direct measurement of the overall impact of this eddy killing: a continual loss of 50 gigawatts of kinetic energy—equivalent to the detonation of a Hiroshima nuclear bomb every 20 minutes, year-round.

"For the first time we are able to unravel eddy killing by direct measurement from satellite observations, with minimal assumptions," said corresponding author Hussein Aluie, Associate Professor of Mechanical Engineering at Rochester.

Aluie will present the results at the 74th Annual Meeting of the APS Division of Fluid Dynamics.

This method provides a more detailed spatial analysis than is possible with the ones used by most oceanographers, which concentrate on temporal fluctuations, Aluie says. Those methods either fail to account for the impact of eddy killing or provide wildly varying estimates.

"On the one hand the wind is making the ocean move, and yet it is killing the part of it that is the most energetic. So, it is counterintuitive and something that had not been directly measured before because people were using the wrong tools," said Aluie.

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