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How well mesoscale eddies are represented in oceanic models?

The ocean is a fundamentally turbulent system characterizes by the presence of several processes occurring at different scales, particularly mesoscale (ranging from 5km up to several hundreds of kilometers) which is the most energetic scale in the ocean.The latter dominates the ocean's circulation by a variety of physical structures comprising eddies, meandering currents, filaments, and jets. The term mesoscale is often followed by the word "eddies"which reflects their predominance in the ocean.
Over the past 20 years, the combination of satellite remote sensing and ocean models have shown the ubiquity of mesoscale eddies and the key role they are playing in the climate machinery.
In fact, these physical structures form the main source of the ocean's kinetic energy and can have a crucial impact on it. In addition to their ability to stir and mix surrounding water, they also play a major role in climate change, which arises from their influence on the circulation by controlling the distribution of water properties and modulating the energy and momentum.
However, these processes were mostly studied "heuristically"in the Eulerian perspective where persistent correlations between flow quantities are sought in a fixed spatial domain.
The aim of this work is to evaluate how well mesoscale eddies are observed and adequately represented in the climate prediction models from a Lagrangian viewpoint. Here, we use a recent Lagrangian method from the nonlinear dynamics field and evaluate the impact of data assimilation on these fine-scale oceanic processes. We do this by revealing several of their physical processes, each time from oceanic outputs with and without assimilation, and from satellite geostrophic currents, then we carry on a statistical comparison to evaluate the role played by data assimilation in the realistic representation of fine-scale oceanic processes.

Which theme does your abstract refer to?

Development and assessment of data assimilation in forecasting applications (global and regional)

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