

Energetics of Eddy-Mean Flow Interactions in Western Boundary Currents: Gulf Stream and Kuroshio

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Mesoscale eddies are most energetic along Western Boundary Currents, such as the Gulf Stream in the North Atlantic and the Kuroshio in the North Pacific. A better understanding of the eddy dynamics and variability is essential for prediction of ocean states and evaluating the ocean contributions to the climate system. We derive a full set of eddy energetics analysis framework that provides quantitative description of the energy sources, sinks, and exchanges among different energy reservoirs. We perform detailed energetics analysis of the Gulf Stream eddies using our high-resolution ROMS simulation of the Northwest Atlantic as well as the Kuroshio eddies using the OFES quasi-global ocean simulation. Through the combination of theoretical and numerical analysis, we investigate eddies' generation, spatio-temporal variability and the underlying dynamics in these two eddy-prominent Western Boundary Current regions.