

On the statistics of deep zonal jets in the eastern North Pacific in an ensemble of eddy-resolving ocean general circulation model runs

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It has been known for some time that the ocean basins are populated by "deep zonal jets" or "striations". A number of theories have been proposed to explain them, some of them predicting zonal jets at fixed latitudes and others implying that the positions of the jets are random. To investigate how deterministic the zonal jets are in the eastern North Pacific, a ten-member ensemble of long-term integrations of a semi-global, eddy-resolving ocean general circulation model is analyzed.

The figure shows the positions of the axes of eastward zonal jets at 500 m along 140W for all the ensemble members with different colors for different members. The equatorial jets, even their variability, seem to obey deterministic dynamics and some of the tropical jets migrate poleward coherently (similarly between ensemble members), whereas jets further poleward are more or less stochastic. The subtropical jets migrate equatorward and their positions are not very coherent; the subpolar jets are random and without systematic migration. Jets near the coast of North and South America tend to have shorter meridional wavelengths than interior ones. There are a few quasi-barotropic jets which are anchored to steep bottom topographic features and which also appear to trap shallower counter-flows on their poleward and equatorward flanks.

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