## Abstract View

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# The Local Baroclinic Instability of Geostrophic Spirals in the Eastern North Pacific

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ABSTRACT

We analyze the pre-1975 hydrographic data of the Northeast Pacific and compute the large-scale two-dimensional geostrophic flow with respect to 3000 m. Using a linear three-level quasi-geostrophic model of large-scale spiraling flow and vertical density gradient, we evaluate the complex dispersion relationships for quasi-geostrophic waves. We find baroclinically unstable waves with maximum *e*-folding times of 1–3.3 years, wave-lengths of 120–500 km and periods of 1.4–13.2 years. Growth rates strongly depend upon the shear magnitude and direction and the wave direction. Computations with a 34-level model of the spiraling flow reveal that *e*-folding times and periods are 50–200 days and 60–200 km wavelengths. The growth rates increase at the south as do the wavelengths. In general, the most rapidly growing waves have a subsurface maximum of kinetic energy at 200–800 m and a component of the most rapidly growing wave is in a direction encompassed by the spiraling shear. At least a six-level model is required to mimic the continuous model energetics. Our calculations indicate that the geostrophic circulation of the eastern Pacific can locally convert potential energy to mesoscale kinetic energy comparable to the observed space and time scales and should be a source of eddy energy, distant from the eddies spawned by the Kuroshio and near topographic features.

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