

Abstract Submitted
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Multiple-Scale Asymptotics for Oceanic Fluid Dynamics: Coupled Planetary- and Quasi-Geostrophic Equations¹ IAN GROOMS, KEITH JULIEN, University of Colorado, Department of Applied Mathematics, BAYLOR FOX-KEMPER, University of Colorado, CIRES — The planetary geostrophic (PG) equations for large-scale oceanic flow are linked to the quasigeostrophic (QG) equations for mesoscale flow in a multiple-scales asymptotic expansion. The model describes the coupling of planetary-scale and mesoscale dynamics: eddy kinetic energy is generated by baroclinic instability of the planetary flow, and the resulting eddy buoyancy fluxes feed back on the planetary flow. Anisotropy of the planetary flow is seen to play a key role in allowing the two-way coupling. The resulting equations are amenable to theoretical and computational investigation of the interaction of mesoscale and planetary scale dynamics.

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