Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Submesoscale baroclinic instability and the Balance Equations IAN GROOMS, University of Colorado, Boulder — Ocean submesoscale baroclinic instability is studied in the framework of the Balance Equations. The Balance Equations are an intermediate model that includes balanced ageostrophic effects with higher accuracy than the quasigeostrophic approximation, but rules out unbalanced wave motions; as such, they are particularly suited to the study of baroclinic instability in submesoscale ocean dynamics. The linear baroclinic instability problem is developed in generality and then specialized to the case of constant vertical shear. The primary finding is that at low Richardson numbers the growth rate of some instability modes is increased compared to larger-scale quasigeostrophic dynamics, and that the increase can be attributed to both ageostrophic baroclinic production and shear production of perturbation energy. This suggests that the nonlinear development of submesoscale baroclinic instability will proceed more vigorously than mesoscale/quasigeostrophic, and may include a downscale/forward transfer of kinetic energy.

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Date submitted: 21 Jul 2015 Electronic form version 1.4