Abstract View

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The Equatorial Waves of Balanced Models

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ABSTRACT

An analysis is made of the linear waves of the Balance Equations and the global Balance Equations on an equatorial β-plane. We consider both finite and infinite meridional domains and show the effect of different choices of boundary conditions in a finite domain. The infinite domain is similar to a complete spherical domain, a problem studied by Moura. We find analogies to several of his results: for example, the Balance Equations have no eastward traveling waves, whereas the global Balance Equations do. We also make an extensive study of the long-wave limit, which is relevant for ocean domains whose width greatly exceeds the Rossby radius of deformation. This limit is singular for many of the wave solutions. In general, however, the balanced models provide reasonably good approximations to the low-frequency waves of the primitive equations. The global Balance Equations do have high-frequency waves, but they are very different from those of the primitive equations.