

BALANCED ASYMMETRIES OF WAVES ON THE TROPOPAUSE

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Tropopause disturbances have long been recognized as important features for extratropical weather since they produce organized vertical motion in the troposphere. Observations of cyclonic tropopause disturbances show localized depressions of the tropopause with stratospheric values of potential vorticity extending to lower altitudes; anticyclonic disturbances are associated with comparatively smaller upward deflections of the tropopause. Analytical solutions for nonlinear interfacial wave motions are derived for intermediate balanced dynamics based on small Rossby-number asymptotics. Beyond quasigeostrophy, traveling edge wave solutions reveal realistic asymmetries such that cyclones are associated with greater deflections of the interface, as well as larger anomalies in pressure and vertical motion as compared to anticyclones.