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Bottom-Pressure Signature of Annual Baroclinic Rossby Waves in the Northeast Tropical Pacific Ocean

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The annual cycle in bottom pressure (BP) in the northeast tropical Pacific Ocean (NTPO) is studied. Focus is on a zonal section along 11.5˚N between 215-255˚E that is characterized by a strong annual cycle in sea level from satellite altimetry. Estimates of BP from the Gravity Recovery and Climate Experiment (GRACE), an empirical orthogonal function reconstruction (EOFR), a state estimate produced by the Estimating the Circulation and Climate of the Ocean (ECCO) consortium, and a linear Rossby wave model (LRWM) are used. The GRACE NTPO BP annual cycle shows westward propagation, with phase increasing from east to west at a rate of $\sim$0.34 m/s, which is consistent with the behavior of long mode-1 Rossby waves at this latitude, and amplitudes as large as 1 cm water equivalent. The ECCO and LRWM BP estimates corroborate the notion that GRACE reveals the BP signature of annual Rossby waves driven by interior wind stress curl and possibly damped by frictional processes. The EOFR, deriving from a truncated set of spatial patterns from an ocean model, does not reproduce the observed activity of annual Rossby waves in this region. Results have implications for efforts aimed to improve quality of GRACE data for ocean applications and for attempts to constrain global ocean mass using a single point mooring.