

Advances in Ocean Dynamics Resulting from the TOPEX/Poseidon Mission

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The sea surface height variability observed by TOPEX/Poseidon (T/P) since October 1992 has provided a unique source of information for the study of ocean dynamics over a wide range of space and time scales. On interannual time scales, the evolution of the El Niño Southern Oscillation cycles has been the focus of study. The heat content of the entire global ocean increased during the peak of the 1997-98 El Niño. Numerical models that assimilate the T/P data have proven an effective tool for studying the dynamics and thermodynamics of the underlying processes. On seasonal time scales, the T/P data provide a well-sampled database for constructing the climatology of the seasonal cycles against which "anomalies" can be defined. The amplitude and phase of the seasonal cycle reflect the coupling of the ocean with the atmosphere at the most fundamental period of climate change and thus provide a critical test of the performance of coupled ocean-atmosphere models. On intra-seasonal time scales, the ocean exhibits drastically different behaviors in the tropics versus the high-latitudes. In the former, the variability is primarily baroclinic in the form of Kelvin and Rossby waves in response to wind forcing at periods of 20-100 days. In the latter, the variability is primarily barotropic in response to atmospheric pressure and wind forcing with significant variability at periods from a few days to 50 days.