Abstract View

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On the Annual Rossby Wave in the Tropical North Pacific Ocean

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ABSTRACT

Annual variation in the depth of the 14°C isotherm (i.e., the main thermocline) throughout the tropical Pacific Ocean between 30°N and 30°S is studied on the basis of 156 000 bathythermographs. Large-amplitude variations are confined in the region between 4 and 15°N. Near 6°N the variations in depth propagate westward. Near 12°N they have almost the same phase across the ocean from the American coast to 145°E. These variations are approximately consistent with a simple model that permits an oceanic response to local Ekman pumping, modified by nondispersive, baroclinic Rossby waves forced by the wind. Near 12°N, the rate of change in thermocline depth is nearly in phase with the Ekman pumping velocity, with only a minor but significant contribution coming from Rossby wave propagation. This type of response depends critically on variations in the eastern boundary region. Near 6°N, the westward propagating variations are generated by relatively large variability in Ekman pumping in the eastern Pacific, and apparently travel into the western Pacific as free nondispersive Rossby waves. Deficiencies of the model are also discussed.