Monitoring Upper-Ocean Currents Along the Pacific Equator

D. Halpern (Jet Propulsion Laboratory, Pasadena, CA 91109; halpern@pacific.jpl.nasa.gov), M. Ji, A. Leetmaa and R. W. Reynolds (all at National Centers for Environmental Prediction, Camp Springs, MD 20742.)

In the equatorial Pacific, ocean currents strongly influence seasonal-to interannual variations of the amount of biological production, intensity of carbon dioxide degassing, and sea surface temperature. The only method to monitor ocean currents in the 2°S - 2°N wave guide of nearly 15,000 km in length is by general circulation model simulation. Currents along the Pacific equator were simulated with an ocean general circulation model for April 1992 - March 1995, and compared with moored buoy and research vessel measurements. Simulations were made with and without assimilation of subsurface temperature measurements. Several wind data products were employed. Assimilation of subsurface temperature data shifted the longitude of the EUC maximum speed 1000-km eastward to 125°W and created a stronger EUC in the eastern Pacific, where the EUC core speed was 30% larger and the EUC transport per unit width was nearly 100% greater. With data assimilation, simulations of EUC core speed and transport per unit width east of 140°W were highly sensitive to the type of wind data product. West of 140°W, simulations of EUC core speed and transport per unit width with and without data assimilation were nearly the same as those observed, independent of wind forcing. Data assimilation intensified the east - west slope of the thermocline along the equator in the 140°W to 110°W region, which accounted for the eastward shift and intensification of the EUC. Data assimilation produced a thicker and more intense westward-flowing South Equatorial Current in the western Pacific because data assimilation increased the north-south slope of the thermocline in the western Pacific. Currents simulated with data assimilation were more representative.