High-Resolution Density and Velocity Surveys over the Continental Margin in an Eastern Boundary Current.

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During May and July 1992 two week-long surveys of the upper-ocean density and velocity fields were conducted off Oregon between 42 and 45°N. In this region of the eastern boundary current, the complex circulation includes contributions from a traditional coastal upwelling jet as well as offshore and onshore flowing upper-ocean jets located farther seaward. High-resolution, synoptic hydrographic data were obtained using SEASOAR, a towed, undulating vehicle equipped with a SeaBird CTD. The SEASOAR was cycled 6-7 times per hour between 0 and 340 m so that at the 8 kt tow speed, horizontal alongtrack resolution is roughly 2 km. One continuous tow covered over 1000 km in 70 h. Shipborne ADCP data were also collected from 14 to over 400 m, so that both directly measured velocity and density information are available on commensurate time and space scales. Satellite SST images are used to help interpret the in situ data. Traditional CTD stations were occupied across the shelf at two locations (Newport and Coos Bay) where historical data exists to allow comparisons of the present data, taken during the 1992 El Niño, with the long term mean and the 1982-83 El Niño. The integrated data sets are used to describe the complex circulation in an eastern boundary current region over the continental shelf and the adjacent deep ocean. The data include 7 nearly orthogonal crossings of upper-ocean jets in the vicinity of Cape Blanco. These include a section across a surface-intensified coastal upwelling jet over the continental shelf (southward speed in excess of 50 cm s⁻¹) overlying a 20 cm s⁻¹ poleward undercurrent centered around 200 m depth over the continental slope. Farther seaward, the SEASOAR/ADCP sections reveal strong, surface-intensified jets flowing both offshore and onshore. Satellite SST images and water mass analyses are used to help identify continuous circulation features. The high-resolution SEASOAR CTD sections reveal thermohaline features with small spatial scales (5-10 km horizontally and 30-50 m vertically), including temperature inversions on the offshore side of an upwelling front.