Observations of the Poleward Undercurrent Along the Eastern Boundary of the Mid-latitude Pacific

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We examine several recent data sets which improve our view of the subsurface poleward undercurrent along the continental margin of North America. First, during the 1995 upwelling season, two studies provided direct evidence of the appreciable transport \( [O(1Sv)] \) and alongshore continuity \( [O(1000 \text{ km})] \) of the poleward flow. A NMFS Pacific whiting survey made ADCP sections across the shelf break from 32-47\(^\circ\)N at about 20 km N-S spacing. In 65 of the 80 transects, a poleward undercurrent with speed \( \approx 5 \text{ cm/s} \), width \( \approx 10 \text{ km} \), and thickness \( \approx 100 \text{ m} \) at 200 m was evident. In these sections the core velocity ranged from 6-46 cm/s with a mean of 24 cm/s. The data suggest continuity of the undercurrent over the entire latitudinal range, with a slight poleward weakening and deepening. A nearly simultaneous study in August 1995 focused on the coastal upwelling region near Cape Blanco, Oregon (43\(^\circ\)N) and included both ADCP and high-resolution CTD on Seasoar. This data set allows for a detailed study of the undercurrent in the vicinity of the Cape, where it meanders offshore and crosses underneath the equatorward coastal jet. In addition to evidence of the alongshore extent of the undercurrent, we also have good evidence of its continuity in time: the Eastern Boundary Current moored array at 38.5\(^\circ\)N measured currents for 22 months at 5 cross-shore locations extending from the inner slope (410 m depth) to the abyssal plane (3650 m depth) at 14 km spacing. Mean poleward flow was observed at depths greater than 100 m, with the maximum poleward flow at the innermost mooring at about 175 m. The poleward flow decreases offshore with an e-folding width of 24 km.