

## Fine-scale variability of isopycnal salinity in the California Current System

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This paper examines the finescale structure and seasonal fluctuations of the isopycnal salinity of the California Current System from 2007 to 2013 using temperature and salinity profiles obtained from a series of underwater glider surveys. The seasonal mean distributions of the spectral power of the isopycnal salinity gradient averaged over submesoscale (12–30 km) and mesoscale (30–60 km) ranges along three survey lines off Monterey Bay, Point Conception, and Dana Point were obtained from 298 transects. The mesoscale and submesoscale variance increased as coastal upwelling caused the isopycnal salinity gradient to steepen. Areas of elevated variance were clearly observed around the salinity front during the summer then spread offshore through the fall and winter. The high finescale variances were observed typically above  $25.8 \text{ kg m}^{-3}$  and decreased with depth to a minimum at around  $25.3 \text{ kg m}^{-3}$ . The mean spectral slope of the isopycnal salinity gradient with respect to wavenumber was  $0.19 \pm 0.27$  over the horizontal scale of 12–60 km, and 31% to 35% of the spectra had significantly positive slopes. In contrast, the spectral slope over 12–30 km was mostly flat, with mean values of  $-0.025 \pm 0.32$ . An increase in submesoscale variability accompanying the steepening of the spectral slope was often observed in inshore areas; e.g., off Monterey Bay in winter, where a sharp front developed between the California Current and the California Under Current, and the lower layers of the Southern California Bight, where vigorous interaction between a synoptic current and bottom topography is to be expected.

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