



Abstract View

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Interannual Variability in the Heat Content of the Kuroshio Extension Associated with the 1982 ENSO Event

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ABSTRACT

Interannual variability in vertically averaged temperature over the upper 400 m of ocean (i.e., upper ocean heat content) in the vicinity of the Kuroshio Extension experienced significant changes during the 1982 ENSO year, as compared to the preceding three years. Interannual variability was dominated by a mesoscale anomaly pattern, whose variance increased by 40% on average, in early 1982 over what it had been the previous three years. This was accompanied by a general anomalous cooling south of the Kuroshio Extension and an anomalous warming north of the current, associated with a decrease in the intensity of the Kuroshio Extension east of 150°E. This activity occurred at the same time that the tropical and equatorial western North Pacific was experiencing a rapid reduction in upper ocean heat content. Mesoscale anomalies of vertically averaged temperature in the Kuroshio Extension during the 1982 ENSO year were comparable in magnitude (i.e., 3°C) with maximum anomalous vertically averaged temperatures reported in the equatorial Pacific off the coast of Ecuador and Peru.

The variance of the mesoscale anomaly pattern did not change seasonally, but the average absolute time rate of change in the mesoscale anomaly pattern was maximum in winter, minimum in summer. The variance of the mesoscale anomaly pattern was relatively uniform along the axis of the Kuroshio Extension from 140°–160°E, but the absolute time rate of change was much larger near the bottom bathymetry features of the continental slope of Japan (140°E) and the Shatsky Rise (160°E). Therefore, the mesoscale anomaly pattern in the Kuroshio Extension was relatively constant through most of the year, with rapid changes in winter, intensified near the Japan coast and the Shatsky Rise. These results lead to a hypothesis of mesoscale formation that is wind-driven in nature, intensified by the presence of bottom bathymetry features.

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