



## Abstract View

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# Fluctuations of Sea Level in the Western North Pacific and Inferred Flow of the Kuroshio

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### ABSTRACT

Monthly sea-level elevations at Naze and Aburatsu, sites on either side of the Tokara Strait through which the Kuroshio flows, were analyzed for the period 1963–74. The sea-level elevations were adjusted to uniform atmospheric pressure using a barometric factor of  $1 \text{ cm mb}^{-1}$ . The adjusted elevations are presented as 1) long-term mean seasonal values and 2) deviations from the long-term means. Differences in the elevations between the two sites were then used as indices of the transport of the Kuroshio.

The seasonal amplitude of the elevation differences across the Kuroshio, Naze minus Aburatsu, is  $\sim 13\%$  of the mean surface geopotential anomaly difference of  $0.6 \text{ dyn m}$  ( $0/1000 \text{ db}$ ). The phase of this difference signal indicates maximum northward flow in summer. Zonally integrated wind-stress curl at this latitude in the Pacific interior, however, is most anticyclonic during winter. Instead, the seasonal fluctuations of the Kuroshio are more nearly in phase with the fluctuations in the latitudinal gradients of Ekman pumping in the western North Pacific. The seasonal winds between  $7$  and  $15^\circ\text{N}$  drive a westward interior flow to the western boundary, and winds north of  $15^\circ\text{N}$  drive flow away from the western boundary. We speculate that this mechanism effects the seasonal fluctuations of the Kuroshio. The seasonal cycle of Ekman pumping, particularly between  $11$  and  $19^\circ\text{N}$ , is not constant across the Pacific, which helps to reconcile seasonal differences in the fluctuations of the Kuroshio and the North Equatorial Current.

Significant interannual variations are observed in the Kuroshio and at sea-level stations within the North Equatorial Current, e.g., at Guam and Legaspi (Philippines). However, there are fluctuations clearly associated with El Niño at Legaspi, Guam and San Diego which do not appear in the Kuroshio during the 12-year period we examined.

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