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Monthly Mean Sea Level Fluctuations at Honolulu and San Francisco and the Intervening Geostrophic Currents

James Michael Price

Institut für Meereskunde an der Universität Kiel, 2300/Kiel 1, West Germany

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ABSTRACT

Monthly mean dynamic topography (0/500 db) along the great-circle section between Honolulu and San Francisco reveals four principal current regimes: a northerly flow immediately adjacent to the Hawaiian Islands, a broad southerly interior flow incorporating the California front, and the California and Davidson currents. Monthly mean sea level values at Honolulu and San Francisco, corrected for sea surface pressure, show fair correlations with the surface transport of the individual currents and with the surface transport of the total intervening flow. Sea level values at Honolulu correlate as well with the transports as does the difference in sea levels, Honolulu minus San Francisco values. The sea level at San Francisco correlates the least with the transports.

Energy spectra computed from the time sequences of transport, current width, and sea level show, in addition to the dominant annual signal, spectral peaks at periods of 3–6 months. The spectrum of the transport of the broad interior flow, unlike all the other spectra, does not show a maximum in spectral energy at the annual period. Cross spectra between these time sequences frequently exhibit significant coherence at 12 months and at longer and shorter periods.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693

DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826

amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718

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