



Abstract View

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Wintertime Winds and Coastal Sea-Level Fluctuations in the Northeast China Sea. Part I: Observations

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ABSTRACT

Analyses of low-pass filtered coastal sea-level data and geostrophic winds derived from surface pressure charts for the period of 1 December 1980 through 31 March 1981 indicate that the wintertime dynamics in the Northeast China Sea is strongly influenced by the passage of rapidly moving cold fronts from northwest to southeast across the region. Along the west coast of Korea, sea-level fluctuations are highly coherent with the north–south wind in two bands centered, respectively, at about 0.17 and 0.36 cpd, and propagate to the south for the low-frequency band. Removal of the wind-forced component of the sea-level signal yields freely propagating fluctuations in bands centered at about 0.20, 0.34 and 0.50 cpd, that travel northward at approximately the phase speed expected for barotropic Kelvin waves, indicative of a relaxation in the sea-level field following the successive passages of cold fronts. Coherence studies of winds and sea-level differences in the Tsushima Strait indicate a correlation, at low frequencies ($\omega < 0.25$ cpd), between the along-strait sea-level slope and winds oriented north–south, indicative perhaps of the difference in sign in offshore Ekman transports, under a broad-scale north–south wind, between the east and west coasts of Korea. For $0.5 > \omega > 0.08$ cpd, fluctuations in sea-level records from stations in the Ryukyu island chain are wind-forced and propagate eastward with similar speeds as the wind forcing, while for $\omega < 0.08$ cpd the island sea levels are not well correlated with the winds. These latter fluctuations propagate eastward with much smaller phase speeds and may be associated with fluctuations in the Kuroshio.

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