Abstract View

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Low-Frequency Current Regimes over the Bering Sea Shelf

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ABSTRACT

Using direct current measurements made during the period 1975–81, we describe the general circulation over the southeastern Bering Sea and differentiate it by regimes related to depth and forcing mechanisms. Three regimes are present, delineated by water depth (z): the coastal ($z \leq 50$ m), the middle shelf ($50 < z < 100$ m), and the outer shelf ($z \geq 100$ m). These are nearly coincident with previously described hydrographic domains. Statistically significant mean flow (~ 1 to 10 cm s^{-1}) exists over the outer shelf, generally directed toward the northwest, but with a cross-isobath component. Flow of similar magnitude (1–6 cm s^{-1}) occurs in the coastal regime, paralleling the 50 m isobath in a counterclockwise sense around the shelf. Mean flow in the middle shelf is insignificant. Kinetic energy at frequencies < 0.5 cycle per day (cpd) is greater over the outer shelf than in the other two regimes, suggesting that oceanic forcing is important there but does not affect the remainder of the shelf. Kinetic energy in the band from 0.5 to 0.1 cpd follows a similar spatial pattern, reflecting the greater number of storms over the outer shelf.

Mean flow paralleling the 100 and 50 m isobaths appears to be related to a combination of barocline pressure gradients (associated with frontal systems which separate the regimes) and interactions of tideal currents with bottom slopes located beneath the fronts. Although winds are energetic and they result in higher values of kinetic energy during winter, their highly variable behavior suggests that they are not a primary driving force for mean flow.

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