Abstract View

Volume 18, Issue 3 (March 1988)

Journal of Physical Oceanography
Article: pp. 459–468 | Abstract | PDF (562K)

Exploration of the Eddy Field in the Midlatitude North Pacific

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(Manuscript received July 1, 1987, in final form September 28, 1987)

DOI: 10.1175/1520-0485(1988)018<0459:EOTEFI>2.0.CO;2

ABSTRACT

Fourteen moorings were deployed across the midlatitude North Pacific 165°E to 152°W, for approximately 2 years during 1983–85. Ten mooring sites had previously been occupied at similar latitudes (30°–40°N nominal) for roughly two years (1980–82) along 152°E. Taken together, these observations form the basis for the first systematic basinwide zonal exploration of the eddy field based on moored instrument techniques in the midlatitude North Pacific along the Kuroshio Extension System and North Pacific drift. Eddy kinetic energy (K_E) at abyssal depths decays sharply moving east from 152°E, and has decreased by a factor of 4 by 165°E. There is a plateau in abyssal K_E of about 10 cm^2 s^{-2} across the Emperor Seamounts from 165° to 175°E. Abyssal K_E drops to roughly 5 cm^2 s^{-2} at 175°W and 1 cm^2 s^{-2} at 152°W, for a total decay of a factor of about 50 across the midlatitude North Pacific. Upper level K_E decreases by a total of roughly two orders of magnitude (approximately 10^3 to 10^1) from 152°E to 152°W.

The most energetic sites at 152° and 165°E have essentially the same vertical structure (shape), with the deep and near surface amplitudes at 152°E being 4 and 3 times higher, respectively. In fact, the same type of vertical profile for K_E is appropriate as a first approximation across the entire midlatitude North Pacific, with amplitudes generally decreasing eastward and away from the Kuroshio Extension. Distributions of K_E with frequency are typically peaked somewhat at the mesoscale near the Kuroshio Extension, and generally become more “red” proceeding east and/or toward lower energy areas, although examples of essentially every type of partitioning are available. The K_E values at 165°E are generally the most stable from year-to-year that have ever been measured in energetic regions of the open ocean, at all depths.

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