Abstract View

Volume 8, Issue 5 (September 1978)

Journal of Physical Oceanography
Article: pp. 846–860 | Abstract | PDF (1018K)

The Separation of Wave-Induced and Intrusive Oceanic Finestructure

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(Manuscript received July 18, 1977, in final form May 23, 1978)

DOI: 10.1175/1520-0485(1978)008<0846:TSOWIA>2.0.CO;2

ABSTRACT

Two hundred miles southwest of San Diego a conductivity/temperature/pressure instrument (CTD) was repeatedly raised and lowered to varying depths above 1000 m while under ship tow. Finestructure measurements made on two separate days of vastly differing surface conditions were analyzed to estimate the spectral levels of finestructure induced, on one hand, by internal wave straining and on the other by a passive distortion of the *T-S* relationship, assumed to be an intrusion. On a day of moderate sea and wind, spatial evolution of successive profiles in *x-z* space shows ubiquitous steps and layers, none of which are quasi-permanent. Comparisons of displacement profiles inferred from the temperature and density signals indicate wave-induced finestructure dominance for all vertical scales down to 5 m, beyond which instrument resolution was sufficiently poor to limit a structure separation at these scales. Comparison of the ensemble displacement spectrum to the model spectrum of Garrett and Munk (1975) shows good agreement, but a definite break in slope at 0.1 cpdb (cycles per decibar).

In this same area, on a day of rough sea and strong wind, spatial evolution of successive profiles in *x-z* space again showed ubiquitous steps and layers. Unlike the transient structures that appeared on the day of moderate sea and wind, these layers had very large horizontal extensions (at least 6 km) and were of long duration (at least 3½ h). They are suggested to be the result of vertical straining of near-inertial internal waves. At low wavenumbers the ensemble spectrum is a factor of 4–5 above the OM spectrum and also shows a break in slope at 0.1 cpdb. Although again internal wave dominance is suggested, this break in slope at the 10 db scale indicates possible changes in the internal wave dynamics as reported by Gregg (1977).

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