

FLUCTUATIONS OF SST AND CHL-A CONCENTRATION CAUSED BY BAROCLINIC
INERTIA-GRAVITY WAVES

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Satellite observations of sea surface temperature and chlorophyll-a concentration permitted detailed statistical analysis of spatial variations of these tracer fields in a broad range of scales. Estimated wavenumber spectra, on scales from a few to hundreds kilometers - as reported by many authors, display a rather unexpected behavior: they strongly disagree with predictions of two-dimensional eddy turbulence theory (which requires the SST spectrum to roll off as k^{-1}) and they exhibit geographic and seasonal trends which have no simple explanation.

Our attention is focused on possible effects of baroclinic inertia-gravity (BIG) wave motions on tracer fields. We present experimental and theoretical results indicating that observed variations are greatly affected by BIG waves, and classical eddy turbulence is not necessarily the main dynamical factor of tracer dispersion. Wavenumber spectra of BIG wave motions are presented along with observed spectra of SST and Chl-a fields. Typical rates of spectra roll-off, ranging between $k^{-1.5}$ and k^{-3} , agree with our theoretical predictions. The fact that BIG wave motions have such a profound effect on fluctuations of ocean tracers has important oceanographic implications.