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西沙海域内潮与近惯性内波的相互作用

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Interaction between internal tides and near-inertial waves at Xisha area

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摘要

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摘要

通过使用西沙海域锚定潜标的测流数据,分析了距浣熊台风路径100 km处海流受浣熊台风影响前后的动能谱、旋转谱和流剪切谱,从而阐明近惯性波,以及近惯性波与全日内潮波的相互作用机制.台风浣熊之后所引起的近惯性波主要在上250 m较强,其能量是普通风场所引起的40倍.近惯性波的能量向下传播至450 m左右,与此同时,强的近惯性流的剪切驱动着惯性波与全日内潮波之间的相互作用,从而产生强的近惯性波与全日内波的耦合波($f+D_1$).此三波耦合机制为Davies的波波相互作用理论提供了观测依据,同时,近惯性内波与全日内潮波之间的非线性相互作用,揭示了南海近惯性波能量耗散的一种机制.

关键词 近惯性内波, 内潮, 浣熊台风, 南海西沙海域

Abstract:

To study the behaviors of near-inertial waves and the physical mechanism of nonlinear interaction between near-inertial waves and diurnal internal tidal waves by employing the data collected by moored ADCP in the northwestern South China Sea, the authors analyzed kinetic energy spectra, rotary spectra and the spectra of horizontal component difference in vertical direction. The authors investigated the upper-ocean responses after Typhoon Neoguri in the South China Sea (SCS) in April, 2008, and found that the intense energy of near-inertial waves after Typhoon Neoguri was dominant in the upper 250 m, which is about 40 times of the average value of near-inertial waves induced by winds (excluding Typhoon Neoguri). The energy of near-inertial waves can propagate downward to ~450 m. Furthermore, the intense horizontal flow difference drives interaction between near-inertial waves and diurnal internal tidal waves, and ($f+D_1$) were observed. The wave-wave couple mechanism provides observational evidence for theoretical results. The process of nonlinear interacting reveals a significant energy dissipation mechanism in SCS.

Keywords [Near-inertial motions](#), [Internal tides](#), [Typhoon Neoguri](#), [Xisha area in the SCS](#)

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