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PII: S0967-0637(14)00232-5
DOI: http://dx.doi.org/10.1016/j.dsr.2014.12.005
Reference: DSRI2438

To appear in: *Deep-Sea Research I*

Received date: 30 May 2014
Revised date: 7 December 2014
Accepted date: 11 December 2014

Cite this article as: Xiaodong Shang, Qian Liu, Xiaohui Xie, Guiying Chen, Rongyu Chen, Characteristics and seasonal variability of internal tides in the southern South China Sea, *Deep-Sea Research I,* http://dx.doi.org/10.1016/j.dsr.2014.12.005

Characteristics and seasonal variability of internal tides in the southern South China Sea

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Abstract

Two sets of current mooring records at the same location are used to investigate the generation and temporal variation of internal tides (ITs) near reefs in the southern South China Sea (SCS). The total records covered more than 900 days. ITs in this region are dominated by mode-1 diurnal motions, which are mainly composed of O_1, P_1 and K_1 constituents. The major axes of both diurnal barotropic and baroclinic tidal ellipses are oriented in the northeast-southwest direction. The ITs over the entire observation period clearly show an approximately 14-day spring-neap cycle. Meanwhile, the diurnal ITs also displayed an evident seasonal change: their energy was higher in summer and winter than in spring and autumn. The modal decomposition of diurnal motion shows that their time-averaged kinetic energy in summer and winter was about 1.2 KJ/m^2, which was approximately 60% higher than the values in spring and autumn. The same seasonal variation also occurred at the diurnal barotropic tides with prominent O_1, P_1 and K_1 constituents. Because stratification does not show a significant seasonal variation in the southern SCS, the enhanced diurnal ITs in winter and summer can be attributed to the barotropic forcing