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Observational Evidence of Surface Wave-Generated Strong Ocean Turbulence

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By using an acoustic Doppler velocimeter mounted on the seabed of the continental shelf of the northern South China Sea, high frequency velocity fluctuations were measured for 4.5 days. The turbulent kinetic energy dissipation rate was estimated. During the observation, the strong ocean response to Typhoon Rammasun was recorded to compare the turbulent characteristics before and during the typhoon. The results show that the turbulence near the seabed is mainly generated by the tidal current shear and exhibits a quarter diurnal variation during the period before the typhoon. During the typhoon period, the dissipation rate ϵ dramatically increased from 1×10^{-6} to $1 \times 10^{-2} \text{ m}^2 \text{ s}^{-3}$ within a short time, and the significant wave height and the surface wave orbital velocity showed the same tendency. This finding suggests that the turbulence is dominantly generated by the surface waves near the seabed.