

Observation of Low-level Wind Field over Ocean with Floating Coherent Doppler Lidar during the passage of Typhoon “Rai”

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The floating Doppler lidar system is of great potential for the assessment of offshore wind resource, ocean dynamics prediction modeling, ocean-atmosphere interaction and flux measurement. A compact automatic floating lidar is joint developed by Ocean University of China, Pilot National Laboratory for Marine Science and Technology (Qingdao) and Qingdao Leice Transient Technology Co, Ltd. Three-dimensional wind field information from 10 m to 300 m above sea level with high spatial and temporal resolution could be achieved by the floating lidar in the Marine Atmospheric Boundary Layer (MABL). The reliability of the system and the availability of wind data have been evaluated by long term observation campaign carried out in the South China Sea since December 2021. The floating lidar performed well during the passage of the 22nd typhoon named “Rai” whose center vortex was less than 10 km away from the floating lidar. The data acquisition rates of floating lidar at all heights are over 90% and the typhoon eye’s structure of wind speed at all heights has been observed completely during the passage of typhoon. The floating Doppler lidar system was verified to be an effective method for the offshore wind observation in areas with severe sea conditions, which is important to ocean-atmosphere interaction study, vertical transport research of substance and energy, marine meteorological disaster monitoring and forecast.