Geophysical Research Abstracts
Vol. 17, EGU2015-14243, 2015
EGU General Assembly 2015

LiDAR observation of the flow structure in typhoons

Yu-Ting Wu (1,3), Chung-Yao Hsuan (2,3), Ta-Hui Lin (2,3)

(1) Engineering Science Dept., National Cheng-Kung University, Tainan, Taiwan (bulawu@gmail.com), (2) Mechanical Engineering Dept., National Cheng-Kung University, Tainan, Taiwan, (3) Research Center for Energy Technology and Strategy, National Cheng-Kung University, Tainan, Taiwan

Taiwan is subject to 3.4 landfall typhoons each year in average, generally occurring in the third quarter of every year (July-September). Understanding of boundary-layer turbulence characteristics of a typhoon is needed to ensure the safety of both onshore and offshore wind turbines used for power generation. In this study, a floating LiDAR (Light Detection and Ranging) was deployed in a harbor to collect data of wind turbulence, atmospheric pressure, and temperature in three typhoon events (Matmo typhoon, Soulik typhoon, Trami typhoon). Data collected from the floating LiDAR and from meteorological stations located at Taipei, Taichung and Kaohsiung are adopted to analyse the wind turbulence characteristics in the three typhoon events. The measurement results show that the maximum 10-min average wind speed measured with the floating LiDAR is up to 24 m/s at a height of 200 m. Compared with other normal days, the turbulence intensity is lower in the three typhoon events where the wind speed has a rapid increase. Changes of wind direction take place clearly as the typhoons cross Taiwan from East to West. Within the crossing intervals, the vertical momentum flux is observed to have a significant pattern with both upward and downward propagating waves which are relevant to the flow structure of the typhoons.