



Observations of Momentum Flux and Wind Profile in Tropical Cyclones

Henrique Rapizo and Alexander Babanin

The University of Melbourne, Melbourne, Australia (henrique.rapizo@unimelb.edu.au)

Perhaps the most important area of investigation in the air-sea interactions is based on the determination of fluxes of momentum, heat and moisture on the air-ocean interface. In the past 40 years a great number of studies have been dedicated to determining these fluxes and applying appropriate parameterisations to be used in coupled atmosphere-ocean models. The uncertainties naturally increase towards strong winds, especially for wind speeds above 20 m/s for which observations in the open ocean are still scarce. Observations at this wind conditions are particularly relevant to properly estimate the fluxes in Tropical Cyclones, which constitutes the greatest challenge in metocean forecast to date. In this study we analyse the vertical distribution of wind speed and wind stress based for two Tropical Cyclones observed in the northwest shelf of Australia. The measurements are obtained from three Ultrasonic anemometers located at 8.77, 14.77 and 21 m. The first two provide the three components of wind at 20 Hz whereas the highest anemometer was configured to output 1-minute averages. Wind speed ranges from 5 to 25 m/s. The eddy correlation method is applied to estimate wind stress for the lowest anemometers. We observe a well established layer of constant stress. The third anemometer is then added to the analysis to verify the validity of a logarithmic profile. The values obtained for u^* from the profile law against u^* from measurements (eddy correlation method) differ significantly as wind speed increases. The wind stress u^* from profile overestimates in almost twice the measured u^* for winds above 20 m/s.