

## **Inference of surface wind speeds during Tropical Cyclone Marcia based on damage observations**

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The Fujita Scale, and subsequently the Enhanced Fujita Scale, were developed to enable maximum probable wind speed estimation following tornadoes where no formal measurements were possible. These scales rely on predetermined relationships between wind speed and resultant damage to, for example, buildings and foliage so localised maximum wind speeds can be estimated. More recently, these relationships have been coupled, along with detailed post-event damage survey information, into complex numerical models so that general storm characteristics as well as their localised intensities can be estimated. An example of this is the use of observed tree fall information after the 2011 Joplin tornado to estimate wind speeds throughout the impacted region (Lombardo et al., 2015). These concepts are not limited to use with localised wind events and may be applied to large-scale storms such as tropical cyclones.

Following the landfall of Tropical Cyclone Marcia in February 2015, a damage survey team from James Cook University, the University of Queensland and Risk Frontiers undertook a field survey of damage to buildings and foliage throughout the impacted regions of Rockhampton, Yeppoon and the surrounding areas. Aerial imagery was used to aid the characterisation of damage patterns, as too was observed damage to simple structures such as failed road signs. Estimates of probable maximum surface wind speed and direction have been made considering these data in conjunction with data recorded at AWS stations throughout the region. An analysis of tree-fall in areas North of Yeppoon, nearer to the landfall of TC Marcia, was also undertaken to estimate the probable maximum wind speed and storm structure. The analysis procedure, findings and limitations will be discussed.

Lombardo, F.T., Roueche, D.B., Prevatt, D.O. (2015) Comparison of near-surface wind speed estimation in the 22 May, 2011 Joplin, Missouri Tornado. *J. Wind Eng. Ind. Aero.* 138, pp87-97.