

Evaporation ducts observed during the TAPS 2013 campaign

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The Tropical Air-Sea Propagation Study (TAPS) was an experimental campaign that took place in the northern coast of Queensland, Australia between the 25th of November and 5th of December 2013. The main objectives of TAPS concern the validation of mesoscale NWP models (including surface layer models) in a tropical littoral environment and also the validation of clear-air propagation models for several radar bands. In tropical waters, evaporation ducting is common and may even be the dominant ducting mechanism.

Among the various measurements performed during TAPS, we will focus on those obtained from the sensors installed on the Lucinda jetty: momentum, heat and moisture fluxes as well as the “classical” bulk parameters (atmospheric pressure, humidity, wind speed, air and sea temperatures). From these data and applying the Monin-Obukhov similarity theory, we can compute the vertical refractivity profiles characterizing the surface layer and then deduce the evaporation duct heights.

During the TAPS campaign, the Air Sea Temperature Difference (ASTD) was negative so unstable conditions prevailed. The computed duct heights varied between 5 and 20 m. A remarkable fact is that we observe a very good correlation between the duct heights and the average wind speeds.

Moreover, we can also use the bulk parameter values predicted by the NWP models as inputs for the surface layer modelling. This procedure enables us to estimate both spatial and temporal variations of the evaporation ducts. The first data analyzes indicate that the computed duct heights exhibit quite weak spatial variations within the measurement area.

Our presentation will provide a synthesis of all the evaporation duct height estimations related to the TAPS campaign.