First Results from the Tropical Air-Sea Propagation Study (TAPS) campaign

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The TAPS field campaign focuses on the modeling and measurement of RF phenomenology in the tropical littoral environment in order to improve capabilities for predicting the atmospheric refractive index structure and radio-frequency coverage across the spectrum from VHF to EHF. The campaign focuses on an intense atmospheric and RF propagation measurement and modeling schedule between November 25th and December 6th, 2013. The study area covers the coastal plains between Townsville and Hinchinbrook Island, Australia and extends out to sea to the eastern edge of the Great Barrier Reef.

Airborne measurements of momentum, heat and moisture fluxes over land and sea have been supplemented by flux measurements from instrumented towers located 6km out to sea on the end of Lucinda Jetty, in an investigation of the transition in surface layer properties from land to sea. A detailed study of the surface layer is necessary for understanding the refraction of radio-waves and radio emission coverage. In the tropical littoral environment, propagation conditions may be sub-refractive over land, while exhibiting strong ducting over the sea. In forecasting refractive index structure, of critical importance is the ability to blend surface layer details with atmospheric modeling of the boundary layer based on mesoscale NWP approaches. The TAPS campaign offers to provide a detailed data set for the development and subsequent validation of blending techniques.

Beyond line of sight propagation at microwave and millimeter wave frequencies results from typically strong evaporation ducting conditions over tropical waters. A study of this phenomenology is carried out with the use of both fixed and variable range propagation links, while range dependent refractive index profiles are obtained from shipboard radiosonde launches and airborne measurements. The data will be used to validate PEM propagation models for the case of beyond line of sight (BLOS) propagation.

First results of the airborne and tower based flux and atmospheric profile measurements are presented here. A summary is also given of the other measurements carried out during TAPS and an outline of the detailed data analysis that is now underway and that is planned for the near future.