

Collaborative Experiment to Improve Radar Performance Modeling: Overview

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In September 2014, researchers at the Space and Naval Warfare Systems Center, Pacific (SSC Pacific), Naval Surface Warfare Center, Dahlgren Division (NSWCDD), the Netherlands Defense Materiel Organisation (DMO), and the Netherlands Defense Academy (NLDA), conducted a field experiment in the Netherlands, collecting both one-way and two-way RF propagation data as well as meteorological measurements along the path. This field campaign was conducted over the North Sea from Den Helder, NL, as part of a collaborative effort to a) improve the accuracy of the phased-array radar performance model within the Advanced Refractive Effects Prediction System (AREPS), and b) to determine metrics of the quality of radar performance predictions based on numerical weather prediction (NWP) forecasts, in-situ meteorological observations, and the assimilation of both. The currently-fielded AREPS contains a radar threshold model (RTM) that is not optimized for modern phased-array radars. This collaborative effort is the first step in addressing these shortcomings to the AREPS RTM.

The one-way propagation data consists of measurements at S-Band and X-Band from a Royal Netherlands Navy (RNLN) tug on an over-water path. A Fast Raiding Interceptor and Special Forces Craft (FRISC) was outfitted with a corner reflector, and observed tracks of the FRISC along an outbound/inbound radial made by the RNLN's X-Band Advanced Phased Array Radar (APAR) comprise the two-way propagation data. Radiosonde and surface layer measurements were made onshore near the APAR as well as from the tug.

An overview of the field campaign and experimental set-up will be presented, along with the initial approach of how the underlying propagation model is used to accommodate a more complex RTM. Results of the RF and meteorological analysis will be presented in more detail in the companion papers in this session (K. Horgan, et al., R. Navarro, et al., AV.v. Leijen, et al.).