PERFORMANCE SURFACE FOR METOC IMPACTS ON RADAR IN NAVAL OPERATIONS

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Naval warfare operations require knowledge of atmosphere EM/EO transmission from the object to sensor for detection vulnerabilities. As such, it requires timely (for planning & execution) atmospheric and ocean surface descriptions for propagation and effects models. Bulk models using single level airflow mean wind, temperature, humidity and sea-surface temperature and calculated roughness have been collaboratively formulated to estimate influencing near-surface atmosphere properties. i.e. parameter values, gradients, fluctuation intensities, and even aerosol size distribution. Such models and available METOC data sources were used in a "Proof of Concept" Performance Surface for evaporation duct impact on submarine periscope detection by radar. It could have been applied to other type sensors and near-surface targets. The "Proof of Concept" was of the NPS bulk model being to estimate near-surface refractive gradients given NRL-Monterey COAMPS surface layer and ocean surface predictions, with application of the SPAWAR Systems Center (SSC) Advanced Propagation Model (APM). The operational METOC data-based "Proof of Concept" was constructed 1st on a previous field test off wallops Island and then demonstrated for Fleet Exercise Valiant Shield 2007 (VS 07). The field test was joint METOC–radar and held at Wallops Island, VA in the spring of 2000 (Wallops 2000). Wallops 2000 propagation estimates with collected METOC data are used as "truth" and the observed propagation data establish errors associated with Climatological, and COAMPS data. Special In situ collection of Sea Surface Temperature, identified as most likely to degrade COAMPS® values, was performed on 4 separate ships with IR techniques. Utilities and weakness are identified in the operational situation for (1) acquiring METOC data from in situ platforms, from central facilities such as FNMOC/NAVOCN, and then (2) incorporating these data into various physical models that provide propagation effects.