MASTER OF SCIENCE
IN
METEOROLOGY AND PHYSICAL OCEANOGRAPHY

DIFFICULTIES IN IDENTIFYING AND EVALUATING SURFACE-BASED AND EVAPORATIVE DUCT IMPACTS

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RF /EO propagation depends on environmental variability and is critical to weapons system employment. This study is based on combined METOC and radio frequency (RF) loss data collected off the east U.S. coast, Wallops Island, VA. Addressed are atmospheric measurement, propagation modeling, and interpretation errors and their impact on the ship's operations. Examined are the determination of the presence and character of surface-based and/or evaporative ducts, and the interpretation of the conditions using current generation TDAs. Questions raised are a) "How closely can we describe the propagation conditions from surface combatants?" and, b) "Can the operator, who is neither a meteorologist nor a propagation expert, produce meaningful products for himself, independent of outside support?" Environment horizontal variability was a critical limiting factor in predicting observed RF losses with operational METOC measurements using an operational propagation model. In addition to surface~ mounted METOC sensors aboard operational ships, rocketsondes were necessary to describe those features that limited predictability of observed RF losses. The results address the assumption of reciprocity for modeling/analyses purposes with horizontal variation. A conclusion is that the weapons systems operators' training must include familiarization with environmental awareness and self-assessment to utilize and exploit combined METOC data and propagation model predictions.

DoD KEY TECHNOLOGY AREAS: Battlespace Environments, Sensors, Computing and Software, Modeling and Simulation, Electronic Warfare

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