MASTER OF SCIENCE IN METEOROLOGY AND PHYSICAL OCEANOGRAPHY

UNMANNED AERIAL VEHICLE/REMOTELY PILOTED AIRCRAFT DESIGN OPTIMIZATION BASED ON SERVICE-STATED METEOROLOGICAL/OCEANOGRAPHIC REQUIREMENTS

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A decision tool for choosing most efficient unmanned aerial vehicles (UAVs)/remotely piloted aircraft (RPA) for Meteorological/Oceanographic (METOC) data collection is presented. A Microsoft Access database query (written in Structured Query Language) links RPA flight performance parameters to individualized METOC Elements of Measurement, a subset of a larger Joint Service METOC Requirements database table. Successful aircraft performance parameters include vast controllability/programmability ranges, flexible (including shipboard) launches and recoveries, atmospheric profiling capabilities, hover ability, long endurance, and airframes free of propeller or rotor wash. A sampling of existing (or planned) airborne METOC instrumentation, their ranges and accuracies are included, in database form, for further reference.

DoD KEY TECHNOLOGY AREAS: Air Vehicles, Battlespace Environments, Environmental Quality, Sensors

KEYWORDS: Unmanned Aerial Vehicle, UAV, Remotely Piloted Aircraft, RPA, Meteorological Instruments, Meteorological/Oceanographic, METOC, METOC Requirements

ENVIRONMENTAL SENSITIVITY STUDIES ON MINE IMPACT BURIAL PREDICTION MODEL

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The Navy's Impact Burial Prediction Model creates a two-dimensional time history of a bottom mine as it falls through air, water, and sediment. The output of the model is the predicted burial depth of the mine in the sediment in meters, as well as height, area, and volume protruding. Model input consists of environmental parameters and mine characteristics, as well as parameters describing the mine's release. The model user seldom knows many of these parameters, and those that are known may be of questionable precision.

In order to determine which parameters had the greatest effect on the model and which could be simplified or eliminated, a series of sensitivity tests were performed. It was found that the model data ingest could be greatly simplified without sacrificing accuracy too much. However, several parameters including sediment shear strength were found to have a large effect on the model and were investigated further.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Battlespace Environments

KEYWORDS: Modeling and Simulation, Meteorology and Oceanography, METOC, Mine Impact Burial Prediction, Bottom Mine, Decision Making