

OSSET

Observing System Simulation Experiment Tool



OSSET

OSSET can help decision makers avoid wasting money either by deploying sensors that do not add significantly to their capability, or by deploying them in sub-optimal locations.

IMPORTANCE

Terrestrial weather and space weather modeling are critical considerations for Department of Defense (DOD) Multi-Domain Operations. Because ionospheric space weather can cause disruption, degradation or denial of service on crucial DOD operational systems, incorrect or incomplete forecasts of weather impacts on over-the-horizon (OTH) radar effectiveness and high-frequency (HF) communications availability can lead to mission failure or loss of assets, including human lives. Given these high stakes, decision-makers must carefully choose where to deploy ionospheric sensors as well as the type and quantity of measurements to conduct to develop accurate models of the ionosphere.

INTRODUCING OSSET

Orion Space Solutions' Observing System Simulation Experiment Tool (OSSET) is a first-of-its-kind set of software used to perform ionospheric OSSEs, which are numerical experiments that can provide critical decision support to complicated and expensive operations choices. OSSET can be used for any complex modeling and simulation scenario where digital modeling, simulation and analysis, trade studies, government-owned standard development and maintenance, and potential concept development and refinement are required.

Orion has recently upgraded OSSET to include a more realistic truth model that contains the same types of variabilities as the real ionosphere, enabling the most accurate OSSEs. Unlike other truth models

that do not have these variabilities and therefore overpredict the performance of a sensor system, OSSET's truth model allows the warfighter to effectively specify the ionosphere to accurately predict OTH radar and HF communications.

SUPPORT FOR OPERATIONAL TESTING

OSSET can be implemented like a toolchain, not just a single tool and has the unique capability to view and test each component of a model toolchain independently, apply precise metrics and deliver quantified results within the context of a specific use case to inform operations decisions.

From an operational test perspective, models that are used in a simulation can have multiple configurations, and the interaction of these configurations with other tools in the toolchain can be very complex. OSSET has the ability to consider metrics like feasibility, usability, supportability and maintainability as the various configurations of the system are evaluated.

HOW OSSES WORK

- 1 An observation system consisting of any combination of instruments (such as ionosondes, GPS ground stations or satellite-based radio occultation) is specified and the measurements are simulated using the truth model, which contains the electron density at every location and time
- 2 These simulated measurements are provided to an assimilator, which uses them to update a background model and create an analysis.
- 3 The analysis and the background model are compared to the truth model. The degree to which the analysis improves relative to the background indicates the value of the simulated measurements

This process can be repeated for multiple combinations of instruments to compare the relative impact of different datasets.

OSSET UTILIZATION

New realistic truth model for OSSET compared to old smooth truth model. OSSET allows simulations of various combinations of sensors to be investigated, in advance of procurement action, to show how each sensor and its location can be optimized to provide maximum benefit to the warfighter.

