The Communication/Navigation Outage Forecasting System (C/NOFS)

The Air Force Research Laboratory's Space Vehicles Directorate has fielded the Communication/Navigation Outage Forecasting System (C/NOFS) to develop and demonstrate techniques for forecasting scintillation impacts on AF systems. Scintillation is the random variation – and sometimes complete loss – in signal strength when radio waves pass through irregular or turbulent regions in the low-latitude ionosphere. Scintillation causes decreased satellite-to-ground signal throughput in UHF SATCOM systems and causes position errors or loss of lock in GPS receivers. C/NOFS will alert users of both UHF SATCOM and GPS systems of impending impacts or outages. Critically, C/NOFS will also assist analysts in determining whether a system failure is due to hardware problems, the natural environment, or hostile action.

The goals of C/NOFS are to detect regions of active scintillation, to forecast regions of scintillation several hours before onset, and to improve estimates of scintillation severity. With the knowledge gained from the mission, the forecasts may be extended to 48-72 hours into the future. C/NOFS is currently serving as the pathfinder for development of a new, operational capability to address scintillation impacts.

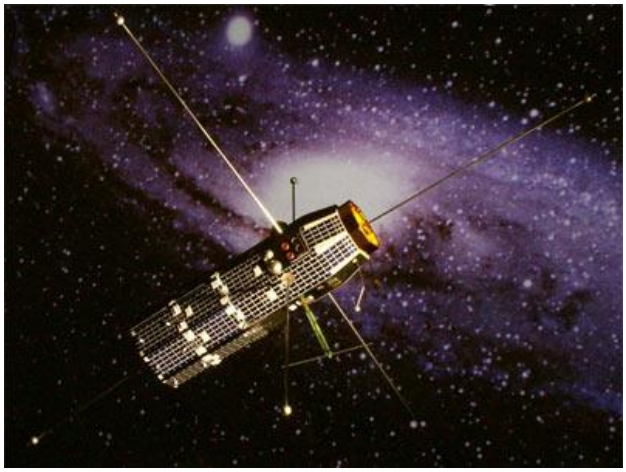
C/NOFS includes three core elements:

1. A satellite with several ionosphere instruments
2. A network of complementary ground instruments
3. Models and user products to provide tailored outage forecast maps

C/NOFS is a joint project of AFRL and the Space Development and Test Directorate of the AF Space and Missile Systems Center .

The C/NOFS satellite was launched into a low inclination elliptical orbit on April 16, 2008 with a three-year mission goal. The satellite has now exceeded that goal and continues to provide critical, real-time information required for nowcasting and forecasting scintillation. The six on-board instrument packages are:

- Planar Langmuir Probe
- Vector Electric Field Instrument
- Neutral Wind Meter
- Ion Velocity Monitor
- GPS Receiver for Remote Ionospheric Sensing.
- Coherent Electromagnetic Radio Tomography



In its first three years, the C/NOFS program has successfully developed a variety of new techniques for forecasting scintillation impacts. It has been closely coupled with the Scintillation Decision Aid network of ground monitors, and has demonstrated improved forecasting skill that could eventually be transitioned into the operational models at Air Force Weather Agency. AFRL continues to explore and exploit transition paths to insure that the improved C/NOFS scintillation forecasts are available to all DOD warfighters.

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