2023 Workshop: AtmoSense

Long title
DARPA’s Atmosphere as a Sensor Program
Conveners
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Description

The Defense Advanced Research Projects Agency (DARPA) Atmosphere as a Sensor (AtmoSense) program is a fundamental science program that seeks to understand the propagation of mechanical and electromagnetic energy from the surface through the Earth's ionosphere, caused by transient events such as meteorological sources, geophysical sources, prompt hazards, and more. This energy can propagate all the way to the bottom-side of the ionosphere, and has been detailed in the observational literature using a multitude of electromagnetic measuring techniques. Understanding the basic fundamentals of atmospheric energy propagation from transient events could inform new detection techniques and future hazard forecasting for activities on the Earth's surface.

For the past two years, AtmoSense has sought to understand the evolution of atmospheric perturbations from transient events through the troposphere, stratosphere, and mesosphere , and ionosphere, as well as develop novel sensing techniques to geolocate and detect events of interest beyond line of sight. During the initial phase of the program, which ended in April 2023, performers developed cutting-edge computational, theoretical, and observational advances in the detection of these events. This workshop aims to discuss the capabilities, tools, and scientific insights developed during the program, while exploring their future applications to CEDAR community-wide objectives.

Agenda

16:00 – 16:05: Opening Remarks, Michael Nayak (DARPA)

16:05 – 16:25: "Atmospheric Disturbance Classification and Estimation Using Novel Sensors and Sensor Data Fusion", Jeff Musiak, Jihye Park (Boeing), Daniel Bowman (Sandia National Lab)

16:25 – 16:45: " Atmosphere-Ionosphere Responses to Wave Signals", Jonathan Snively (ERAU)

16:45 – 17:05: "Sensing Tropospheric Events Remotely Using Electromagnetics Optimally", David Bacon (Leidos)

17:05 – 17:25: "AtmoSense Background Characterization (ABC)", Anthony van Eyken (SRI)

17:25 - 17:35: "Analysis of Ukrainian GNSS TEC Data", Larisa Goncharenko (MIT Haystack Observatory)

17:35 - 17:45: "Recent Results of Remote Sensing Explosions with an Ionospheric Radar", Kenneth Obenberger (AFRL)

17:45 - 17:55: "Small Low Power Ionosondes", John Swoboda (MIT Haystack Observatory)

17:55 – 18:00: Closing Remarks, Michael Nayak, DARPA

Justification

Understanding the basic fundamentals of atmospheric energy propagation from transient events could inform new detection techniques and hazard forecasting for activities on the Earth's surface is of fundamental importance to the CEDAR community. CEDAR will be the cornerstone, cumulative event of the AtmoSense program.

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