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UAV EM Sensors for Spectrum Sensing and Propagation Environment Assessment

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UAV Electromagnetic Sensors for Spectrum Sensing and Propagation Environment Assessment

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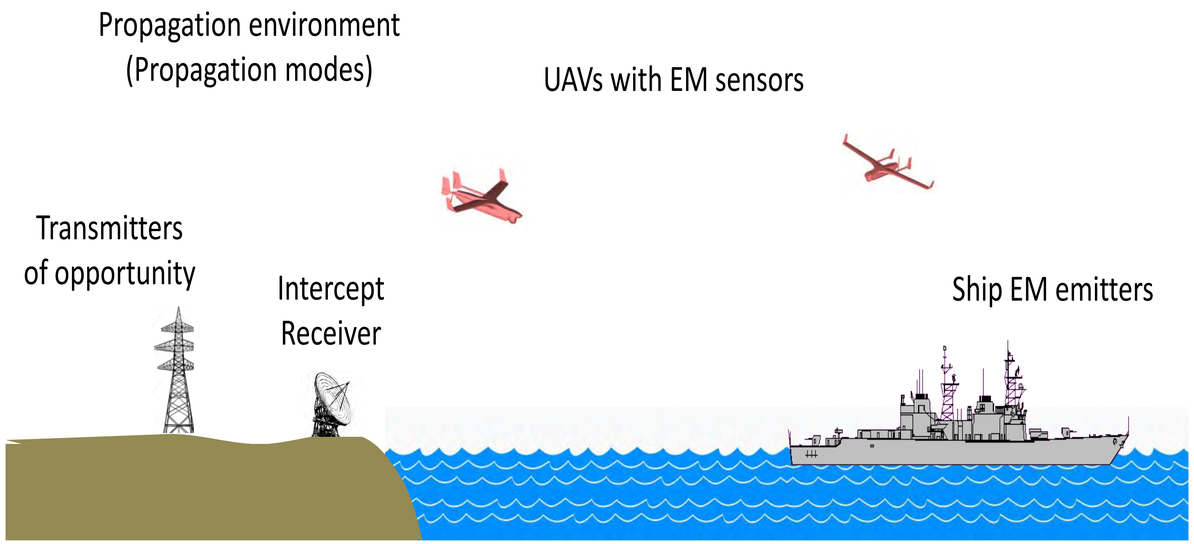

Concept for sensing the EM propagation environment

Approach

- Starting with known propagation environment (refractivity, terrain, etc.) we can use AREPS to predict propagation characteristics.
- These characteristics are used in the EM codes to simulate measured sensor data for a range of parameters (number of transmitters/receivers, locations, frequencies, etc.).
- From the simulated data we attempt to solve the inverse problem. That is, using the simulated data can we reconstruct the original propagation environment used in AREPS? How many UAVs are needed, their locations, and requirements of the hardware onboard?
- Recent developments in commercially available small transmitters and receivers make of outfitting large numbers of UAVs with EM sensors feasible and affordable.

Background

- Measure signal transmission to and from a number of sources and receivers on UAVs to build a picture of the electromagnetic environment and the propagation conditions
- Distributed transmitters and receivers on UAVs can provide a more detailed EM “map” over large distances and a wide frequency band
- The EM data can be used in parallel with meteorological data to enhance the real-time propagation model
- As a first step in demonstrating the concept, we use commercial EM codes to simulate the measured data

Value to the Fleet

- Monitoring the electromagnetic (EM) spectrum
- Collecting data to evaluate the EM propagation environment
- Determining EM emissions by fleet assets (ship’s radiating systems)
- Estimating ship’s emitter detectability by non-cooperative intercept receivers (setting an appropriate EMCON state)