

REDUCED INSTRUMENT SIZE; GREATER CAPABILITY

Passive Microwave Radiometry is a key technique for measuring environmental variables such as tropical cyclone intensity, soil moisture, and ocean surface vector winds under all-weather conditions. One of the limitations of these instruments are the large antennas they require. The Microwave Single Pixel Imager (MSPI; image below) is a project to test the limits of compressive sensing to meet the needs of space based environmental monitoring. MSPI is enabled by a unique meta-surface reflector developed and patented at NRL. This reflector can reconfigure to create many different sensing patterns to provide the required information for the compressive sensing imaging algorithm.

From a moving platform, this technique also provides additional information at a variety of viewing geometries to reduce ambiguities in scene retrievals.

IMPACT: Successful demonstration of MSPI will result in a tool that will significantly simplify mounting microwave radiometers on platforms such as small satellites. It will further provide information not currently available from systems on orbit. This will allow the Navy to have more timely and responsive missions to guarantee access to critical battlespace environmental characterization.

