

## SMAPVEX08 : SOIL MOISTURE ACTIVE PASSIVE VALIDATION EXPERIMENT 2008

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The Soil Moisture Active Passive Mission (SMAP) is currently addressing issues related to the development and selection of retrieval algorithms as well as refining the mission design and instruments. Some of these issues require resolution as soon as possible. Several forums had identified specific questions that required supporting field experiments. The SMAP Validation Experiment 2008 (SMAPVEX08) was designed and conducted to address some of these issues. Experiments incorporated into SMAPVEX08 included evaluation of how well new alternative radio frequency interference (RFI) suppression techniques under consideration for SMAP work over RFI contaminated land areas, providing more robust sets of concurrent passive and active L-band observational data including temporal change for algorithm development and validation, evaluating the impact of azimuthal orientation on alternative radar retrieval algorithms, understanding the scaling of high resolution synthetic aperture radar (SAR) to lower resolution radar data of SMAP, and a more thorough evaluation of less studied land covers such as urban and forest

A series of aircraft-based flights was conducted on the Eastern Shore of Maryland and Delaware in the fall of 2008. The study site selected consisted of a mix of mostly senescent/harvested crops and mostly deciduous forest. Two aircraft (a Twin Otter and a P-3B) carrying prototypes of the SMAP instrumentation (combined active and passive microwave) were flown concurrent with ground sampling. A ground based active-passive instrument (Comrad) was also deployed for the campaign. The Twin Otter supported the Passive Active L-Band System (PALS) instrument that provides fully polarimetric radar/radiometer data for a single fixed incidence angle footprint (40 degrees backward looking). PALS has been used in several previous experiments and for SMAPVEX08 included several RFI suppression approaches. For most of the flights the ground resolution of the sensor was 1000 m.

The P-3B supported several new L band instruments. These included the MSFC Airborne Passive Imaging Radiometer (MAPIR) that was configured for conical scanning and the GSFC Digital Beam-forming Radar (DBSAR). This was the first mission for both sensors and SMAPVEX08 was considered a demonstration. The spatial configuration of the data collection was quite complex. In addition, a GPS Reflectometer was part of the payload.

SMAPVEX08 began following an extended rainfall event that was followed a few days later by another large event. Following this there was no rainfall, however, cloud cover

and cool temperatures resulted in a relatively slow but consistent drydown. A series of seven aircraft flights was conducted over ten days that tracked this drying. A review of the preliminary radiometer data from PALS reflected the geophysical features and meteorological trends. The resulting data set will be a valuable addition to the few active-passive data sets that exist.

Extensive flights with PALS to study RFI features were also successful. As part of these flights a significant amount of data was collected over urban/suburban areas of New Jersey, New York, and Pennsylvania. Data collected to analyze azimuthal features and radar scaling are still being processed.

As noted, data processing for all flights and sensors is ongoing and will be completed shortly. Preliminary product reviews indicate that SMAPVEX08 was highly successful and will contribute to resolving the experiment objectives and contributing to the design and implementation of the SMAP mission.

## **Bibliography**

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