

and a nutrient-enriched substrate with the presence of plant roots. By measuring two key parameters, the sensor is able to monitor both the volumetric water content and salinity of the nutrient solution in bulk media.

Many commercially available moisture sensors are point sensors, making localized measurements over a small volume at the point of insertion. Consequently, they are more prone to suffer from interferences with air bubbles, contact area of media, and root growth. This makes it difficult to get an accurate representation of true moisture content and distribution in the bulk media. Additionally, a network of point sensors is required, increasing the cabling, data acquisition, and calibration requirements.

A vessel with electrodes was devised to measure the dielectric properties of

a material in the annular space of the vessel. Because the pore water in the media often has high salinity, a method to measure the media moisture content and salinity simultaneously was devised. Characterization of the frequency response for capacitance and conductance across the electrodes was completed for 2-mm glass bead media, 1- to 2-mm Turface (a clay like media), and 1- to 2-mm fertilized Turface with the presence of root mass. These measurements were then used to find empirical relationships among capacitance (C), the dissipation factor (D), the volumetric water content, and the pore water salinity.

Conventional moisture sensors only measure moisture over a small volume. Since water will stratify in the media due to gravity, the sensors will not accurately

represent the moisture available to a plant growing in a container containing such a sensor. The sensor described here uses electrodes on the inside of the growth container to measure capacitance and conductance over the enclosed bulk volume. These measurements are then used to determine the volumetric water content and salinity of nutrient solution available to the plant. From preliminary plant growth tests, it appears that the sensor is insensitive to the presence of root mass, a problem that affects many sensors available on the market today.

This work was done by Mark Nurge of Kennedy Space Center; and Oscar Monje, Jessica Prenger, and John Catechis of Dynamac Corporation. For more information, contact the KSC Applied Physics Laboratory at (321) 861-9068. KSC-13039

Change-Based Satellite Monitoring Using Broad Coverage and Targetable Sensing

NASA's Jet Propulsion Laboratory, Pasadena, California

A generic software framework analyzes data from broad coverage sweeps or general larger areas of interest. Change detection methods are used to extract subsets of directed swath areas that intersect areas of change. These areas are prioritized and allocated to targetable assets.

This method is deployed in an automatic fashion, and has operated without human monitoring or intervention for sustained periods of time (months).

This work was done by Steve A. Chien, Daniel Q. Tran, and Joshua R. Doubleday of Caltech; and Thomas Doggett of Arizona

State University for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Dan Broderick at Daniel.F.Broderick@jpl.nasa.gov. Refer to NPO-48147.