Geophysical Research Abstracts,
Vol. 11, EGU2009-12683, 2009
EGU General Assembly 2009

GPS Receivers as Soil Moisture Instruments

K. Larson (1), E. Small (2), E. Gutmann (3), J. Braun (4), V. Zavorotny (5), and A. Bilich (6)

(1) Univ. Colorado, Aerospace Engineering Sciences, Boulder, United States (kristinem.larson@gmail.com, 1 303 492 7881), (2) Univ. Colorado, Geological Sciences, Boulder, United States, (3) NCAR, Boulder, United States, (4) UCAR, Boulder, United States, (5) NOAA, Boulder, United States, (6) NGS, Boulder, United States

Measurements of soil moisture, both its global distribution and temporal variations, are required to study the water and carbon cycles. A global network of in situ soil moisture stations is needed to supplement datasets from satellite sensors. In this study we demonstrate that signals routinely recorded by Global Positioning System (GPS) receivers for precise positioning applications can also be related to surface soil moisture variations. Over a six month interval, GPS-derived estimates from a 300 square meter area closely match soil moisture fluctuations in the top 5 cm of soil measured with conventional sensors, including the rate and amount of drying following multiple precipitation events. There are currently more than 5000 GPS receivers around the world that produce publicly available data used in precise positioning. If they are located above natural surfaces and away from urban structures, many of these GPS receivers could also be used to estimate soil moisture at no additional cost. GPS data from these sites are available in near real-time, with L-band signals that complement future satellite missions.