

Measuring wide-range soil water content using GPS signals

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For prediction of the amount of irrigation water during a crop growing period, estimation of groundwater recharge amount, landslide forecast, and others, measurement of a wide range of soil moisture content is indispensable. Since the introduction of TDR moisture meter by Topp et al. in 1980, measurement of soil water content at a certain point has become possible with high precision, and remote automatic data acquisition. However, when measuring a wide range of soil moisture content as conventional measurements using satellites or cosmic rays, there are concerns on resolution and measurement accuracy so that it has not been applied to routine observation. In 2008 Larson and colleagues reported that there is a significant relationship between the ground reflected wave intensity contained in the GPS signal and the soil moisture content around the GPS antenna. Since GPS satellites are operated to be observed at any location on the earth for 24 hours a day, if we could measure soil moisture content using GPS signals, applicability of this method would be immeasurable. In this report, we outline the principle and examples of wide area soil moisture content measurement using GPS signals.

Keywords: soil moisture, GPS satellite, signal noise ratio

