



GNSSProbe, penetrating GNSS signals for measuring soil moisture

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Soil moisture content (SMC) is an essential parameter from both a scientific and economical point of view. On one hand, it is key for the understanding of hydrological. Secondly, it is a most relevant parameter for agricultural activities and water management.

Wide research has been done in this field using different sensors, spanning different parts of the measured electromagnetic spectrum, leading thus several methodologies to estimate soil moisture content. However complying with requirements in terms of accuracy and spatial resolution is still a major challenge.

A novel approach based on the measurement of GNSS signals penetrating a soil volume is proposed here. This model relates soil moisture content to the measured soil transmissivity, and attenuation coefficient, which are a function of the soil characteristics (i.e soil moisture content, soil type, soil temperature, etc).

A preliminary experiment has been performed to demonstrate the validity of this technique, where the signal received by a GNSS-R L1/E1 RHCP antenna buried at 5, 10, and 15 cm below the surface, was compared to the one received by a GNSS-R L1/E1 RHCP antenna with clear sky visibility. Preliminary results show agreement with theoretical results based on transmissivity and with previous campaigns performed where the soil moisture were collected at two different depths (5 and 15 cm).

Details related to the GNSS soil moisture modeling, instrument preparation, measurement campaign, data processing and main results will be presented at the conference.