



## Diurnal variation of vegetation dielectric properties as an indication of water stress

Tim van Emmerik (1), Susan Steele-Dunne (1), Jasmeet Judge (2), and Nick van de Giesen (1)

(1) Delft University of Technology, Delft, Netherlands (t.h.m.vanemmerik@student.tudelft.nl), (2) University of Florida, Gainesville, USA

Currently, vegetation is considered a barrier to soil moisture retrieval by both passive and active remote sensing remote sensing missions. Microwave emission and backscattering of vegetation is determined by the vegetation's dielectric constant, which is a function of vegetation water content. The latter is a measure of root zone water availability. Understanding the variation in dielectric properties of vegetation will contribute to soil moisture retrieval using microwaves in vegetated areas. This study presents a unique dataset of the diurnal pattern of the leaf dielectric properties, which was linked to vegetation water content. Dielectric property measurements were conducted with a microstrip line sensor, on maize from 8 to 19 October 2012. A correlation was found between the resonant frequency of the microstrip line and the leaf water content of maize. This showed that a decrease of leaf water content during the day led to an increase of the resonant frequency. Furthermore, the diurnal difference in resonant frequency increased in similar fashion as the soil tension, which indicates a correlation between water stress and vegetation dielectric properties. A water cloud model is used to demonstrate the impact of changing vegetation water content on backscatter from a vegetated surface at different frequencies and polarizations.