EGU2020-20744
https://doi.org/10.5194/egusphere-egu2020-20744
EGU General Assembly 2020

Assessing simultaneous mono- and bistatic airborne radar observations for soil moisture retrieval

Emma Tronquo[1], Hans Lievens[1,2], and Niko E.C. Verhoest[1]
[1]Laboratory of Hydrology and Water Managment, Ghent University, Coupure Links 653, B-9000 Ghent, Belgium (emma.tronquo@ugent.be)
[2]Department of Earth and Evironmental Sciences, KU Leuven, Celestijnenlaan 200 E, B-3001, Heverlee, Belgium

Current radar systems are generally monostatic. However, some theoretical research indicated the potential of bistatic radar measurements to improve applications. In the research presented, we explore the use of InSAR/PolInSAR mono- and bistatic measurements acquired in L-band for soil moisture monitoring. The main objective of this study is to compare the performance of soil moisture retrieval from monostatic with that obtained through bistatic observations.

The recent BelSAR campaign (in 2018) provided time series of airborne mono- and bistatic measurements at L-band, recorded during the growing season including bare soil conditions. In addition, in situ measurements of soil moisture and surface roughness were acquired concurrently with the airborne flights. Here, we provide an initial assessment of the sensitivity of the scatter observations with respect to soil moisture and surface roughness. The literature suggests that the impact of surface roughness on the retrieval of soil moisture decreases due to the simultaneous use of the mono- and bistatic measurements. However, our preliminary results show that the bistatic data do not provide substantial added value to reduce the impact of surface roughness on soil moisture retrieval. Further, we validate both mono- and bistatic scatter simulations from the Advanced Integral Equation Model (AIEM) using the airborne measurements. The AIEM allows additional investigations with respect to the sensitivity towards surface roughness and soil moisture of both mono- and bistatic scattering signals, as well as the impacts of sensor-related parameters such as the incidence angle, the bistatic configuration (e.g. the location of the second sensor), the frequency and the polarization.