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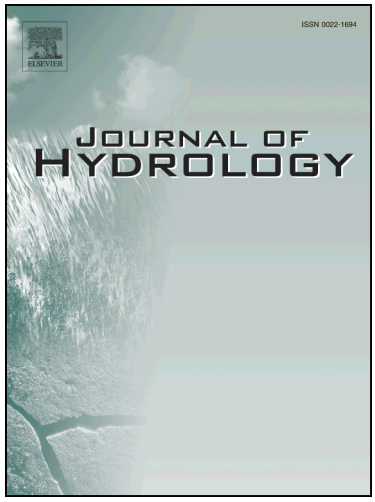

Research papers

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Retrieving topsoil moisture using RADARSAT-2 data, a novel approach applied at the east of the Netherlands

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Abstract ─

This manuscript proposes an approach for estimating soil moisture content over corn fields using C-band SAR data acquired by RADARSAT-2 satellite. An image based approach is employed to remove the vegetation contribution to the satellite signals. In particular, the absolute difference between like and cross polarized signals (*ADLC*) is employed for segmenting the canopy growth cycle into tiny stages. Each stage is represented by a Cumulative Distribution Function (*CDF*) of the like polarized signals. For periods of bare soils and vegetation cover, *CDFs* are compared and the vegetation contribution is quantified. The portion which represent the soil contributions (σ°_{HHsoil}) to the satellite signals; are employed for inversely running Oh model and the water cloud model for estimating soil moisture, canopy water content and canopy height respectively. The proposed approach shows satisfactory performance where high correlation of determination (R^2) is detected between the field observations and the corresponding retrieved soil moisture, canopy water content and canopy height (R^2 = 0.64, 0.97 and 0.98 respectively). Soil moisture retrieval is associated with root mean square error (*RMSE*) of 0.03 m^3 m^{-3} while estimating canopy water content and canopy height have *RMSE* of 0.38 kg m^{-2} and 0.166 m respectively.

Keywords:

Soil moisture, C-band, SAR, RADARSAT-2, Vegetation Contribution, *ADLC*, *CDF*, Signal correction, Oh model, Water Cloud model

1. INTRODUCTION

Surface soil moisture (*sm*) is a key state variable influencing various hydrological and meteorological applications (Lievens and Verhoest, 2012). It affects both fluxes between soil and atmosphere, and the water and energy balance (Kornelsen and Coulibaly, 2013). It is an important component controlling the partitioning between infiltration and runoff (Seneviratne et al., 2010) which impacts flooding and droughts (Kornelsen and Coulibaly, 2013). Thus, getting sufficient information on the spatial and temporal

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