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Soil moisture retrieval through a merging of multi-temporal L-band SAR data and hydrologic modelling

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Abstract. The objective of the study is to investigate the potential of retrieving superficial soil moisture content (m_v) from multi-temporal L-band synthetic aperture radar (SAR) data and hydrologic modelling. The study focuses on assessing the performances of an L-band SAR retrieval algorithm intended for agricultural areas and for watershed spatial scales (e.g. from 100 to 10 000 km²). The algorithm transforms temporal series of L-band SAR data into soil moisture contents by using a constrained minimization technique integrating a priori information on soil parameters. The rationale of the approach consists of exploiting soil moisture predictions, obtained at coarse spatial resolution (e.g. 15–30 km²) by point scale hydrologic models (or by simplified estimators), as a priori information for the SAR retrieval algorithm that provides soil moisture maps at high spatial resolution (e.g. 0.01 km²). In the present form, the retrieval algorithm applies to cereal fields and has been assessed on simulated and experimental data. The latter were acquired by the airborne E-SAR system during the AgriSAR campaign carried out over the Demmin site (Northern Germany) in 2006. Results indicate that the retrieval algorithm always improves the a priori information on soil moisture content though the improvement may be marginal when the accuracy of prior m_v estimates is better than 5%.

- Final Revised Paper (PDF, 2592 KB)
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