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Uncertainty assessment on SAR retrieved soil moisture based on a regression model for roughness

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Soil moisture retrieval from SAR images using semi-empirical or physically-based backscatter models requires surface roughness parameters, generally obtained by means of in situ measurements. However, measured roughness parameters often result in inaccurate soil moisture contents. Furthermore, when these retrieved soil moisture contents need to be used in data assimilation schemes, it is important to also assess the retrieval uncertainty. In this study, a regression-based method is developed which allows for the parameterization of roughness by means of a probability distribution. This distribution is further propagated through an inverse backscatter model in order to obtain soil moisture distributions. Skewed, non-normal distributions of soil moisture content are obtained, which are best represented by means of the median value and the interquartile range when used in data assimilation studies that assume normality. Furthermore, it is shown that the interquartile range differs with respect to soil moisture conditions. Comparison of soil moisture measurements with the retrieved median values resulted in a root mean square error of approximately 6 vol%.