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Global SMOS Soil Moisture Retrievals using the Land Parameter Retrieval Model

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The Land Parameter Retrieval Model (LPRM) is a methodology that retrieves soil moisture from low frequency dual polarized microwave measurements and has been extensively tested on C-, X- and Ku-band frequencies. Its performance on L-band is tested here by using observations from the Soil Moisture and Ocean Salinity (SMOS) satellite. These observations have potential advantages compared to higher frequencies: a low sensitivity to cloud and vegetation contamination, an increased thermal sampling depth and a greater sensitivity to soil moisture fluctuations. These features make it desirable to add SMOS-derived soil moisture retrievals to the existing European Space Agency (ESA) long-term climatological soil moisture data record, to be harmonized with other passive microwave soil moisture estimates from the LPRM. SMOS measures brightness temperature at a range of incidence angles, different incidence angles bins (42.5°, 47.5°, 52.5° and 57.5°) were combined and tested for both ascending and descending swaths. Two SMOS LPRM algorithm parameters, the single scattering albedo and roughness, were optimized against soil moisture from MERRA-Land, ERA-Interim/Land and AMSR-E LPRM over the period of July 2010 to December 2010. The SMOS LPRM soil moisture retrievals, using the optimized parameters, were then evaluated against the latest SMOS Level 3 (L3) soil moisture product and a set of in situ networks over the period of July 2010 to December 2013. The evaluation against SMOS L3 result in very high correlations over many parts of the world (>0.85), which is in line with earlier findings when SMOS LPRM was compared to SMOS L3 over the OzNet sites in southeast Australia. This study is part of an ESA project (de Jeu et al., this conference, session CL 5.7).