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Sea Surface Salinity variability: rain and other effects assessed from SMOS and in situ measurements

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SMOS mission monitors sea surface salinity (SSS) over the global ocean for more than four years. Rms difference between SMOS SSS averaged over 100km-1month and in situ (ship and ARGO) SSS is about 0.2 in subtropical regions and less than 0.5 between 45°N and 45°S. After reviewing large scale accuracy of SMOS SSS, we focus on variability at shorter scales than the ones sampled by the ARGO array. Individual SMOS SSS at 43km resolution are very noisy, as expected from the interferometry technique of the SMOS-MIRAS instrument. The observed variability within 100km-1month is very consistent with instrumental noise except in regions affected by land contamination, by radio frequency interferences or caracterized by large natural SSS variability, like strong precipitation areas. Remarkable spatial correlation are observed between SMOS SSS and SSM/I rain rates, the influence of a rain event onto the SSS spatial variability measured at less than one hour from the rain event being on the order of 0.2psu/(mm/hr); this order of magnitude is the same as the one derived from comparisons with ARGO (Boutin et al., ocean science, 2013). This order of magnitude derived from satellite SSS is validated considering the spatial variability of SSS measured by in situ drifters in case of rain event.