

Interactive comment on “Sea surface freshening inferred from SMOS and ARGO salinity: impact of rain” by J. Boutin et al.

Anonymous Referee #2

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General Comments

The ESA SMOS satellite has been flying for several years and this paper is opportune for assessing the impact of rain on sea surface salinity. The data from SMOS is compared to data from the Argo float programme with a difference ranging from 0.3-0.5 depending on the location. SMOS is found to freshen by 0.14 g/kg per mm/hr, with rain rates detected by the SSM/I satellite. The residual differences between SMOS and Argo salinities are 0.1 g/kg, and this is attributed to vertical salinity stratification (as the Argo instruments cease measurements at about 5m depth).

Specific Comments

C1366

There are no units of salinity used throughout the article e.g. line 19 page 3333 - "in situ salinity measured at various depths between 1m and 10m differ by 0.1 to 0.5 in 20% of the cases ". Salinity is a parameter that has a unit associated with it, and I suggest that the authors insert units where appropriate in this paper.

P3334 L6: can you provide a reference for the comment regarding the ocean haline skin?

P3337 L15: Argo has no data above 5m, so how can there be inaccuracies i.e. when there is no data? Do the authors interpolate to the surface?

P3341 L20: Do you have a reference to back up the statement that the ECMWF rain rate is a poor indicator of local rain?

Technical Corrections

The use of the word "rainy" is not appropriate in this article e.g. abstract L9 should read "when rain events".

Abstract L7: the sentence beginning "The mean SSS..." should be improved, as it's very unclear.

Abstract L9: as detected from

P3333 L1: omit particularly

P3335 L15: sentence beginning "Although very..." is awkward and should be re-written

P3335 L22: no brackets around Reul et al.

P3337 L21: what is pression?

P3338 L22: on Fig. 1 -> in Fig. 1

C1367

P3339 L20: on Fig. 3 -> in Fig. 3

P3342 L25: in the presence of rain

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C1368