SMAP SSS provided by REMSS: v1.0 vs v2.0

Since last September, Remote Sensing Systems (REMSS) is producing version 2.0 of the Level 2 and Level 3 Sea Surface Salinity products from SMAP. One year ago, we published in this blog a brief study on the validation of version 1.0 of the 8-day L3 SSS maps provided by REMSS (see Preliminary validation of 8-day SMAP L3 Salinity product V1.0 for more information). Now, in order to assess the improvements of this new version, we present a small comparison between these two versions of the 8-day SSS L3 maps. Part of this study was included in the V2.0 Release Notes document. The validation has been made using as reference field the 7-day global ocean 0.25-degree SSS FOAM product generated by Met Office and distributed by Copernicus.

Fig. 1: Outliers distribution (red dots) is homogeneous in both versions. The nearest points to the coast are also excluded from statistics.

Fig. 2: SMAP SSS v1.0 (top) and v2.0 (bottom) minus FOAM reference field. Latitudinal mean

Spatial outliers have been eliminated by analyzing the statistics in the neighborhood of each grid point. For a given grid point, its neighborhood consists of itself and its closest 8 neighbors. The associated 9 SSS values are used to compute the first and the third quartiles (Q1 and Q3) of the neighborhood. If the value of SSS for the central point lies outside the range [Q1-1.5 x IQR : Q3+1.5 x IQR] (IQR = Q3-Q1), the point is assumed to be an outlier and discarded. Points with less than 6 neighbors are also discarded.

Both versions of the 8-day L3 maps are compared with the FOAM reference field, and the **latitudinal mean** of the difference is computed for each map (figure 2). Version 2 shows a clear improvement at high latitudes. The discrepancies with respect to the reference field found around 10°N are probably due to the high variability induced by the North Equatorial Current.

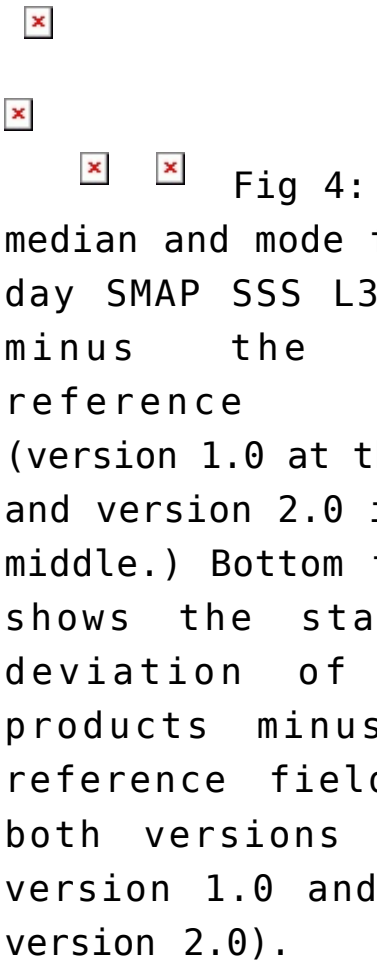

Fig 4: Mean, median and mode for 8-day SMAP SSS L3 maps minus the FOAM reference field (version 1.0 at the top and version 2.0 in the middle.) Bottom figure shows the standard deviation of SMAP products minus the reference field for both versions (red, version 1.0 and blue version 2.0).

The improvement of version 2.0 with respect to v1.0 is also clear when SSS is compared as a function of the **distance to the coast** (figure 3).

Global statistics (between 60°S and 60°N) have also been computed. In figure 4, we show the evolution of the mean, median, mode and standard deviation of the difference to the reference for each 8-day global map. The mode has been computed, using the Freedman Diaconis estimator to compute the width of the bins ($h = /\sqrt[3]{}N$, where N is the number of values in the dataset) and convolving the resulting distribution with a Gaussian kernel. The comparison of both versions shows a clear

improvement of the distributions of SMAP minus reference differences for version 2.0: the mode remains close to 0 in v2.0. Moreover, the mean, median and mode show smaller temporal variations. Despite having symmetric distributions until mid july 2015, the skewness becomes negative from that date on. The global standard deviation (bottom of figure 4) also shows smaller values for the v2.0 SSS product.

Acknowledgement

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References

Meissner, T. and Wentz, F.J. (2016). Remote sensing systems SMAP Ocean Surface Salinities [Level 2C. Level 3 Running 8-day, Level 3 Monthly], Version 2.0 validated release. Remote Sensing Systems, Santa Rosa, CA. Available at http://www-remss.com/missions/smap, doi:0.5067/SMP20-3SPCS.