SMOS BARCELONA EXPERT CENTRE

SMOS

CSIC   UPC

File: `BEC-SMOS-0006-QR.pdf` , version 1.0

Title: Quality Report: Validation of SMOS-BEC experimental products in the
Mediterranean Sea. Years 2011-2013.

Authors: SMOS-BEC Team.

Contact: smos-bec@icm.csic.es

Date: 20/11/2015

QUALITY REPORT: VALIDATION OF SMOS-BEC EXPERIMENTAL PRODUCTS IN THE MEDITERRANEAN SEA. YEARS 2011-2013

Abstract: This technical note focuses on the comparison of the Sea Surface Salinity (SSS) of the SMOS-BEC experimental products in the Mediterranean currently distributed by BEC at http://cp34-bec.cmima.csic.es with respect to the SSS provided by Argo floats

File: BEC-SMOS-0006-QR.pdf   Version: 1.0   Date: 20/11/2015   Page: 2 of 7

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.

Contents

| File: BEC-SMOS-0006-QR.pdf | Version: 1.0 | Date: 20/11/2015 | Page: 3 of 7 |

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.

1   INTRODUCTION

The aim of this technical note is to report the differences between the experimental SMOS Mediterranean SSS distributed by BEC and the Argo data. The BEC products have been generated from Level1B v620 processed by ESA. Two families of products are being considered here: the objective analyzed salinity maps, and fused maps. The spatial grid of these products is 0.25 degrees. The product accumulates SMOS salinities along 9 days and is distributed daily. These products are distributed by BEC from http://cp34-bec.cmima.csic.es. The structure of this technical note is the following. Section 2 describes how the SSS has been estimated from Argo profiles and the results are shown in section 3.

| File: BEC-SMOS-0006-QR.pdf | Version: 1.0 | Date: 20/11/2015 | Page: 4 of 7 |

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.

Table 1: Statistics of the comparison with Argo for the objective analyzed product

Year	<Mean>	<STD>	<RMS>
2011	-0.16	0.25	0.32
2012	-0.35	0.37	0.52
2013	-0.27	0.32	0.44

Table 2: Statistics of the comparison with Argo for the fused product

Year	<Mean>	<STD>	<RMS>
2011	-0.13	0.25	0.29
2012	-0.27	0.38	0.47
2013	-0.22	0.39	0.45

2   ARGO

The SMOS-BEC products are compared in this section with in situ data. The statistical comparison is carried out with close-to-surface values acquired by Argo floats (Argo data is freely distributed by the CORIOLIS data center, http://www.coriolis.eu.org).

In particular, SSS values are being estimated from Argo data by interpolating the salinity profiles at 7.5m below the surface. To avoid extrapolation, only profiles with valid values at (at least) 5.5m depth are considered. For SOLO and PROVOR profiles, only data below 5 m depth are taken into account as their CTD probes do stop pumping water at arround 5 m below the surface ([Boutin et al., 2012]). The whole valid profile is used in the interpolation, with the exception of values taken above 0.5 m depth. As in [Ballabrera-Poy et al., 2009], interpolation artifacts are reduced by using three different interpolations methods: Akima splines ([Lancaster and Salkauskas, 1981]), cubic splines, and third order polynomial fitting ([Press et al., 1992]). The interpolated profile is obtained here by averaging the three methods, but profiles are rejected if any of the three interpolation schemes differs by more than the 5% from the average.

3   RESULTS

The results rely upon the basic statistics of the difference between the SMOS an the ARGO value at each cell. The values listed in the table 1 correspond to the average value of the mean, the standard deviation and the root mean square statistics with respect to the SMOS objective analyzed SSS during the years 2011, 2012 and 2013 separately. The same information is provided in table 2 for the fused product.

The time evolution of these statistics is shown in Figure 1 for the objective analyzed product and in Figure 2 for the fused product.

File: BEC-SMOS-0006-QR.pdf   Version: 1.0   Date: 20/11/2015   Page: 5 of 7

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.

References

[Ballabrera-Poy et al., 2009] Ballabrera-Poy, J., Mourre, B., García-Ladona, E., Turiel, A., and Font, J. (2009). Linear and non-linear T-S models for the eastern North Atlantic from Argo data: Role of surface salinity observations. *Deep-Sea Res. I, 56, pp. 1605-1614.*

[Boutin et al., 2012] Boutin, J., Martin, N., Yin, Y., Font, J., Reul, N., and Spurgeon, P. (2012). First assessment of SMOS data over open ocean: Part II-sea surface salinity. *IEEE Trans. Geosci. Remote Sens., vol. 50, no. 5. pp. 1662-1675.*

[Lancaster and Salkauskas, 1981] Lancaster, P. and Salkauskas, K. (1981). Surfaces generated by moving least squared methods. *Mathematics and Computing*, 37:141–158.

[Press et al., 1992] Press, W. M., Teukolsky, S. A., T., V. W., and Flannery, B. P. (1992). Numerical recipies in c. *Cambridge. Cambridge University Press.*

File: BEC-SMOS-0006-QR.pdf   Version: 1.0   Date: 20/11/2015   Page: 6 of 7

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.
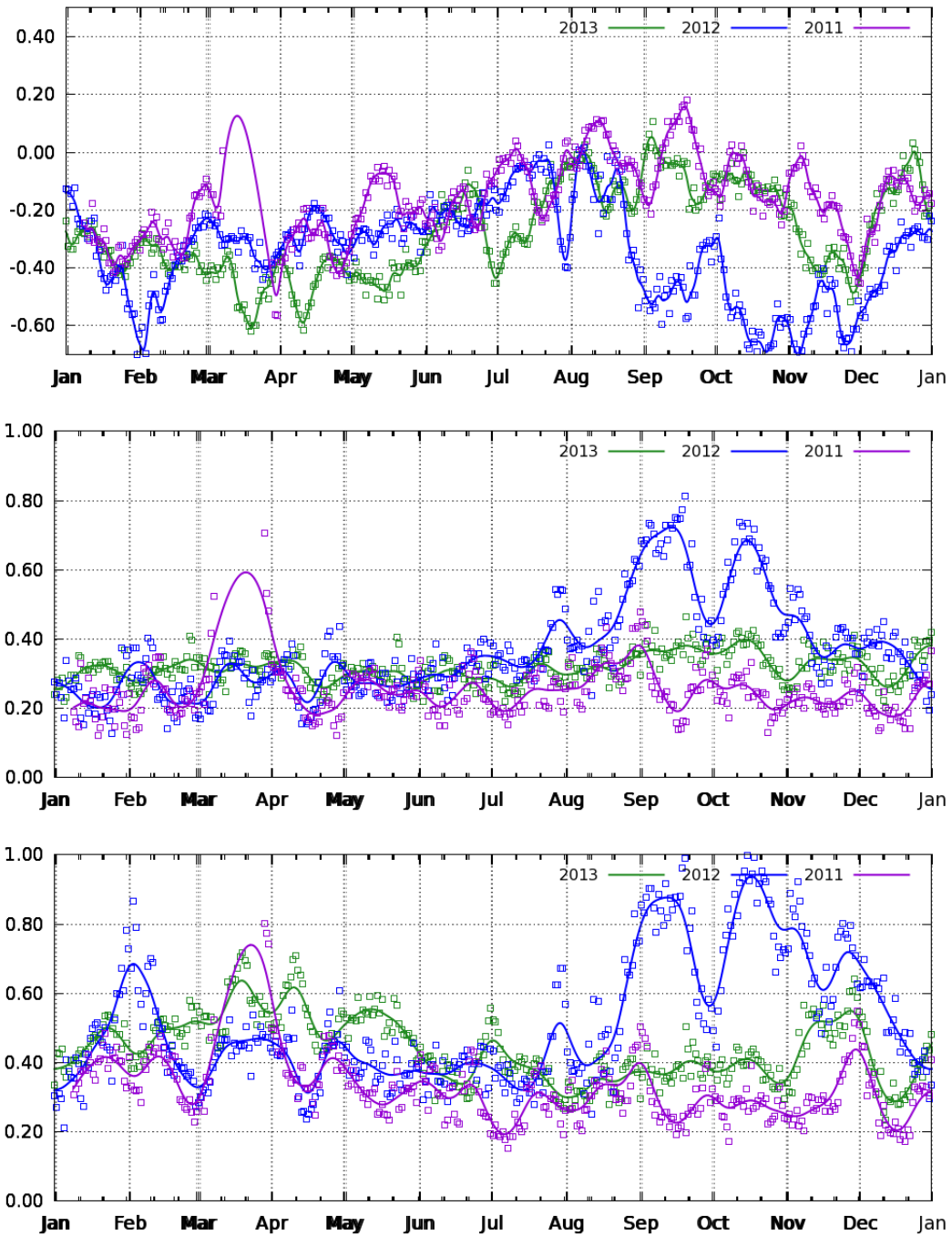
Figure 1: Differences of the SMOS objective analyzed SSS with respect to ARGO. From top to bottom: Mean of the differences; Standard Deviation of the differences; RMS of the differences

File: BEC-SMOS-0006-QR.pdf   Version: 1.0   Date: 20/11/2015   Page: 7 of 7

Title: Quality Report: Validation of SMOS-BEC experimental products in the Mediterranean Sea. Years 2011-2013.
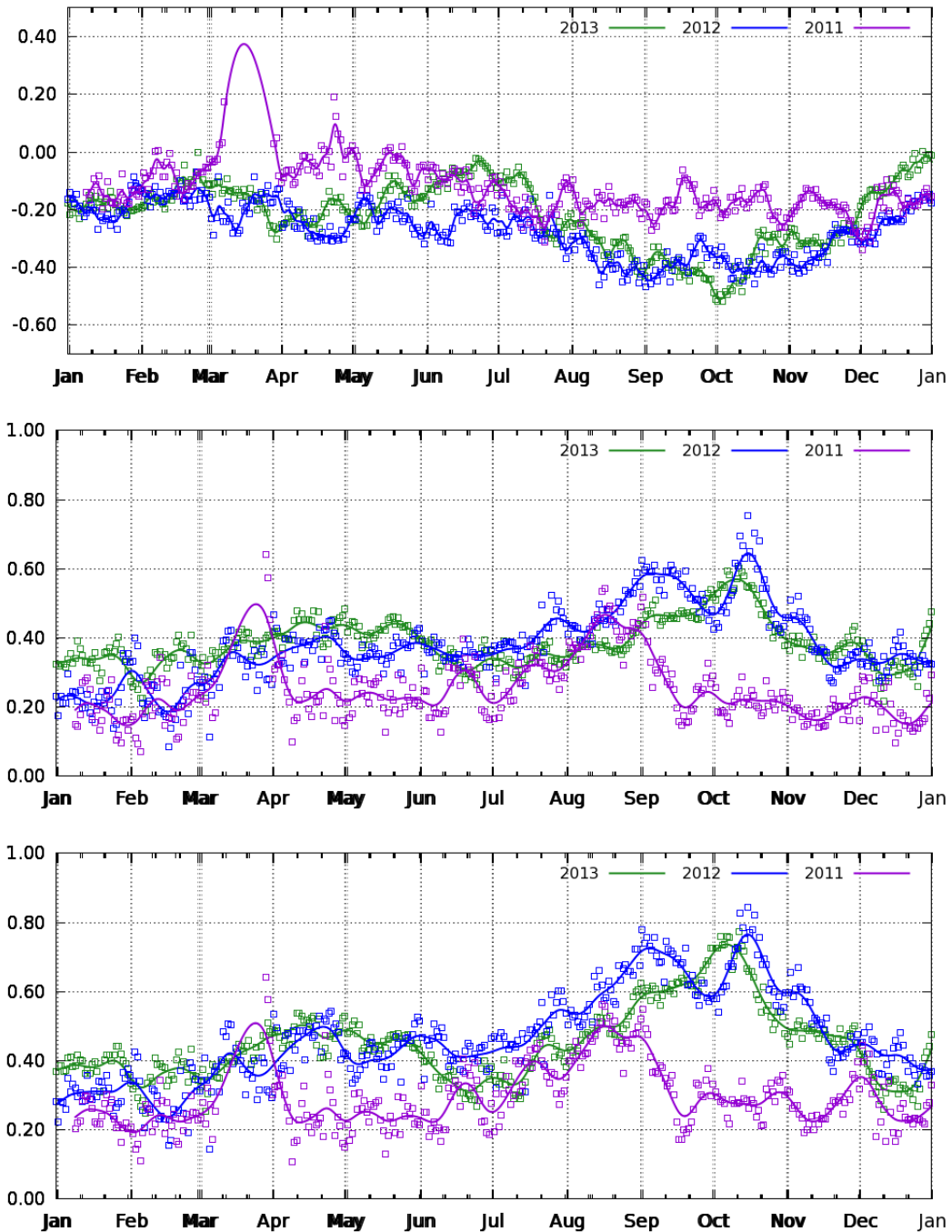
Figure 2: Differences of the SMOS fused SSS with respect to ARGO. From top to bottom: Mean of the differences; Standard Deviation of the differences; RMS of the differences