SMOS ECMWF processing campaign in EarthConsole (ID 292377)

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Project Objectives

The project objectives were:

1. to assess the impact of changing the ECMWF native grid in the SMOS level 2 processor (soil moisture and sea surface salinity)

2. to assess the impact of changing the ECMWF wind speed interpolation method in the SMOS level 2 processor for sea surface salinity
    - interpolation of wind speed modulus (proposed change) instead of interpolation of wind components (as performed in the operational ground segment)

3. To assess the impact of using high temporal resolution forecast (1hour forecast instead of 3 hours)

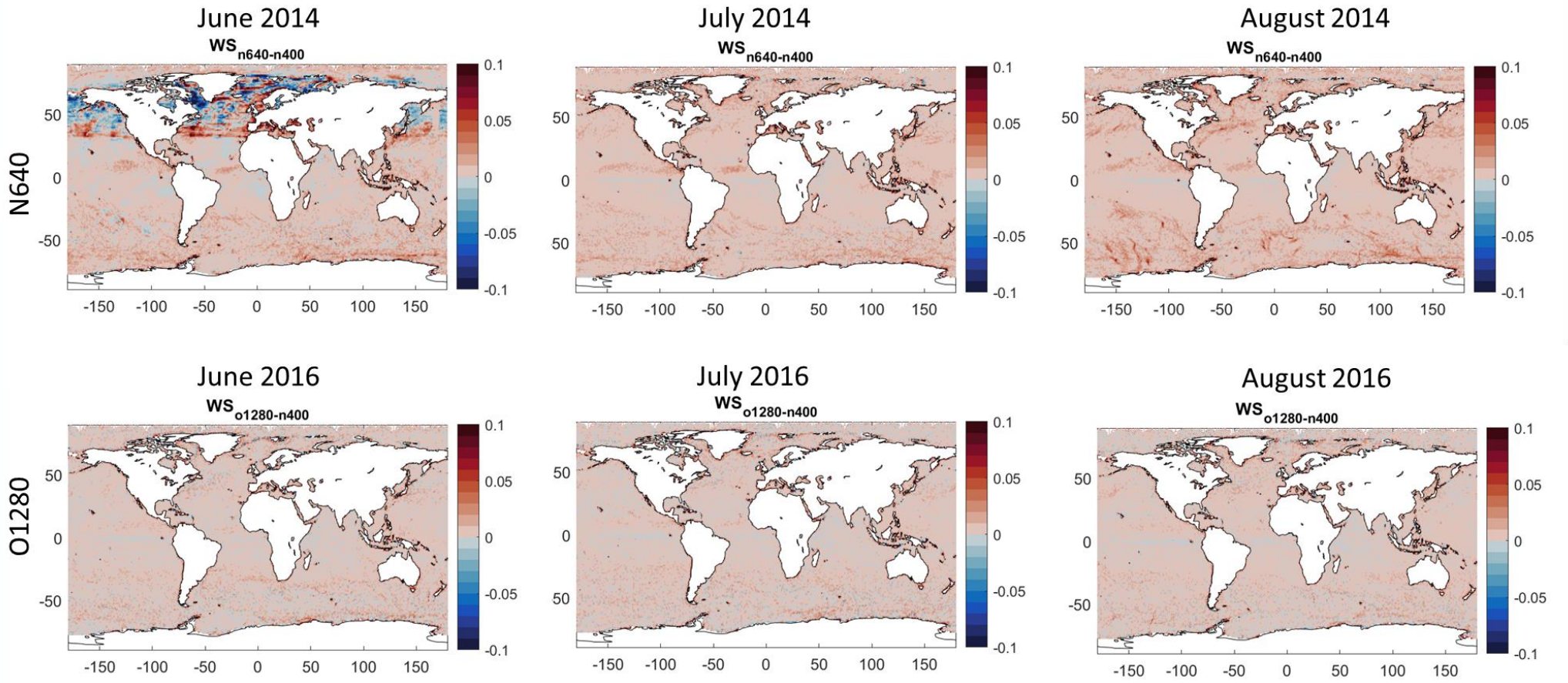
Methods

The NoR service has integrated an updated version of the “SMOS ECMWF pre-processor” and has generated several test dataset based on different ECMWF inputs and pre-processor configurations. Test dataset has been analysed by SMOS Expert Support Laboratories.

ID	ECMWF native grid	Temporal Interpolation	Spatial Interpolation	New Wind speed interpolation	TDS	user
#01	N640 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N640	as current baseline	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2014	OS
#02	O1280 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/O1280	as current baseline	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2016	OS
#05	N640 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N640	as current baseline	as current baseline	Yes	Full June, July, August 2014	OS
#06	O1280 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/O1280	as current baseline	as current baseline	Yes	Full June, July, August 2016	OS
#07	N400 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N400_2014 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N400_2016	as current baseline	as current baseline	Yes	Full June, July, August 2016 + Full June, July, August 2014	OS
#08	N640 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N640	as current baseline	as current baseline	No	Full December 2014	OS
#08a	N400 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/N400_2014	as current baseline	as current baseline	No	Full December 2014	OS
#12	O1280 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/O1280	as current baseline	Nearest neighbour in space	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2016	SM
#13	O1280 /ForRaffaele/ECMWF_raw_TDS_20220412/3H_forecast/O1280	Nearest neighbour in time	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2016	SM
#14	O1280 (1H) /ForRaffaele/ECMWF_raw_TDS_20220412/1H_forecast/O1280	Nearest neighbour in time	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2016	SM
#15	N640 (1H) /ForRaffaele/ECMWF_raw_TDS_20220412/1H_forecast/N640	Nearest neighbour in time	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2014	SM
#16	N640 (1H) /ForRaffaele/ECMWF_raw_TDS_20220412/1H_forecast/N640	as current baseline	as current baseline	No	4 AUX_ECMWF_ consecutive days e.g 01-04 June 2014	SM

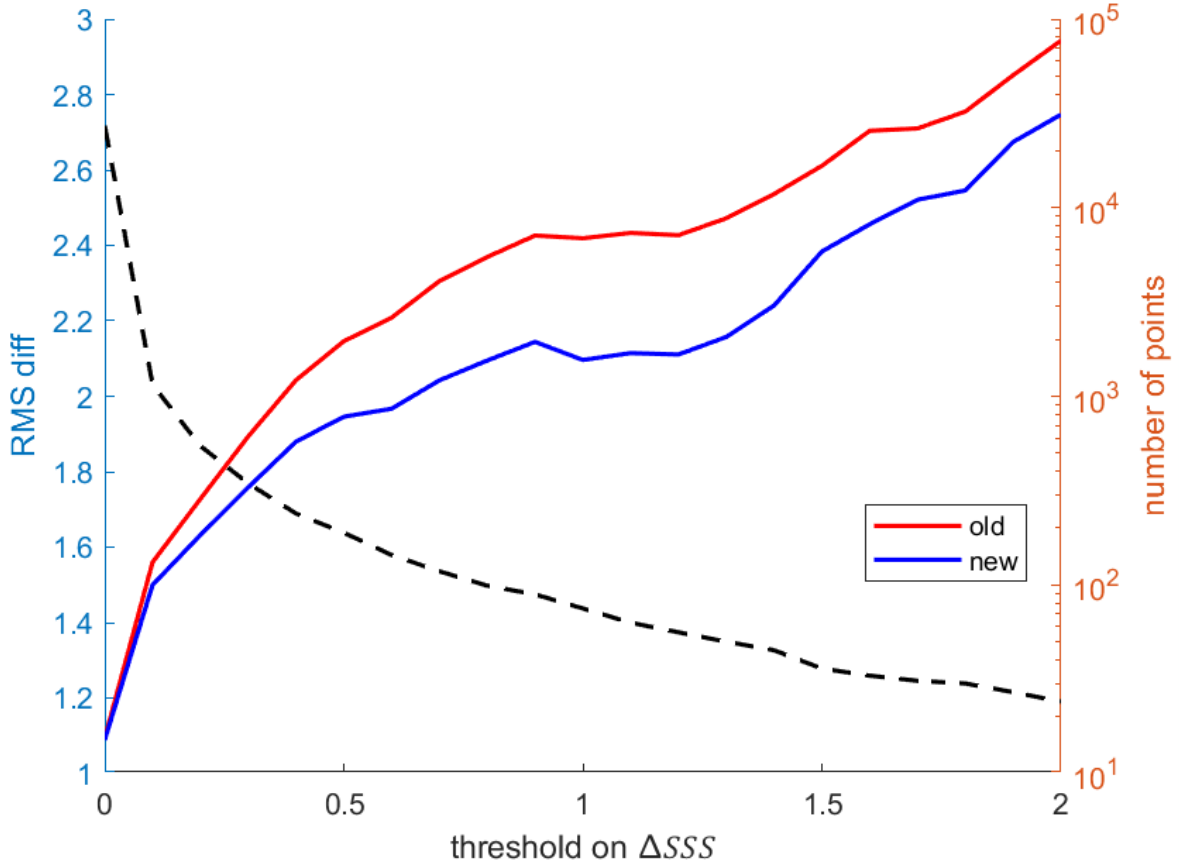
N640/O1280 vs N400 impact of native grid

The impact of native grid has been evaluated in term of differences in windspeed wrt the operation grid (N400).

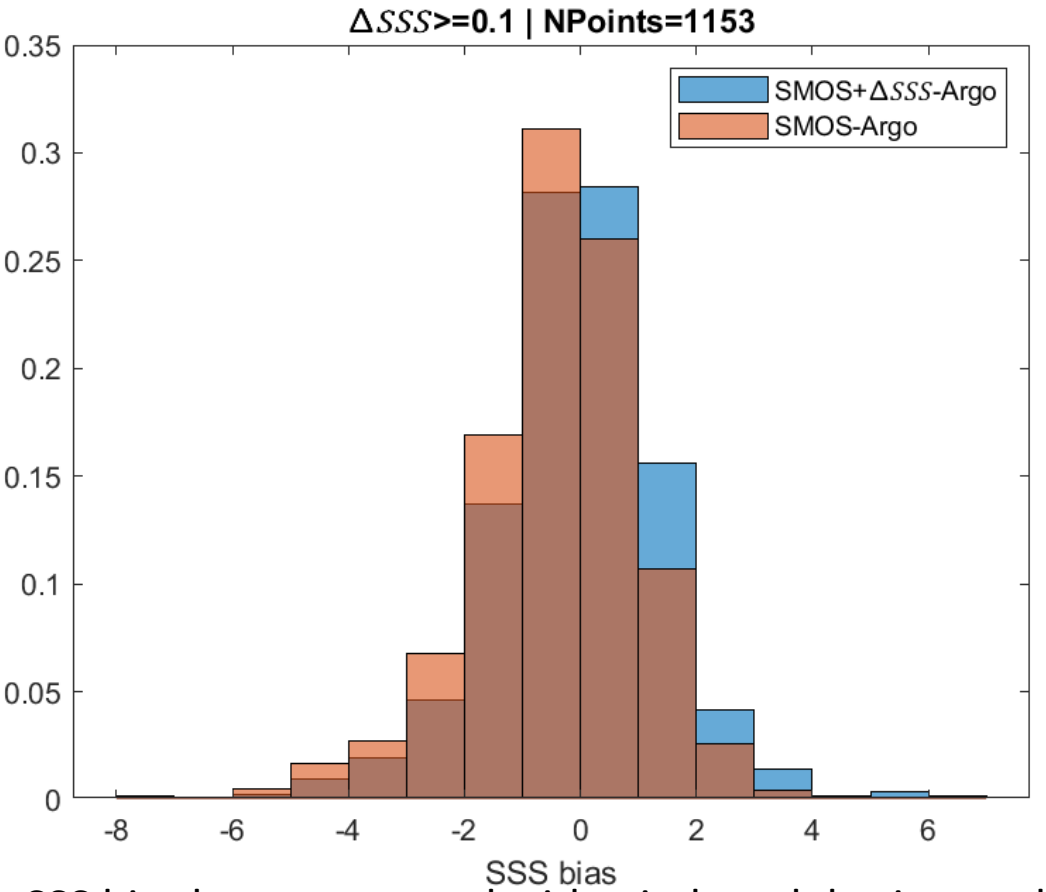


Impact of new wind speed interpolation

The impact of new wind speed interpolation has been evaluated considering the bias between retrieved SMOS salinity and ARGO buoys



RMS of the difference decreases with WS modulus interpolation



SSS bias better centered with wind modulus interpolation

Conclusions

NoR Service has enabled SMOS ESL to generate a large test dataset using an updated version of the SMOS-ECMWF preprocessor.

This test dataset has been compared with the operational dataset and has been used to assess the impact in the level 2 processors with the following conclusion:

- Impact of native grid is very small, not clear that it improves SSS (same conclusion for SM)
- Positive impact of the new wind speed interpolation on retrieved SSS
- Slightly reduced SSS bias at high windspeed (but is not enough to correct the whole negative bias at high wind speeds)
- Reduced rms difference SSSsmos-SSSargo
- Histogram of SSSsmos-SSSargo better centered and less skewed towards negative values

These results will be used to improve the data quality for the next SMOS mission reprocessing planned in 2024