

Global Verification of Wind, Wave, and MWR Water Content NRT Products from SARAL/AltiKa

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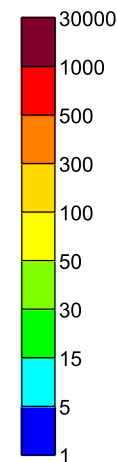
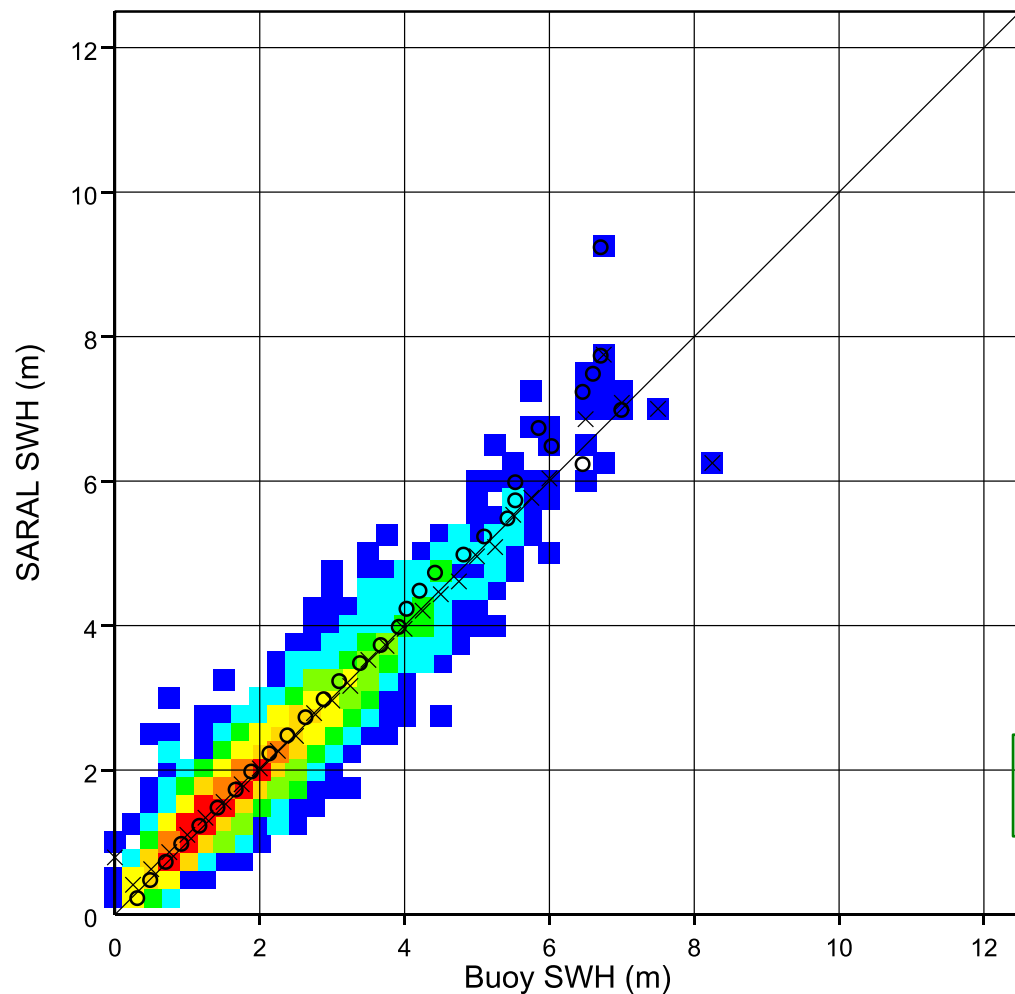
OUTLINE

- Significant Wave Height (SWH).
- ~~Wind Speed.~~ *(see presentation of J. Lillibridge)*
- Wet Tropospheric Correction (WTC).
- Total Column Water Vapour (TCWV) = Water Vapour Content.
- Concluding Remarks.

Significant Wave Height (SWH)

- Verification against ECMWF First Guess (FG) SWH.
- Period covered: 18 March – 20 August 2013.
- Quality is slightly better than Jason-2.
- Assimilation of SARAL SWH has positive impact on model forecasts (preliminary result as tests are still ongoing).

SWH comparison against buoy data, Global, 18 March – 20 August 2013



SARAL

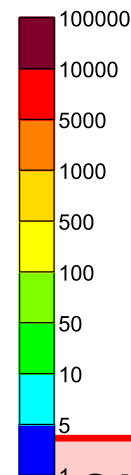
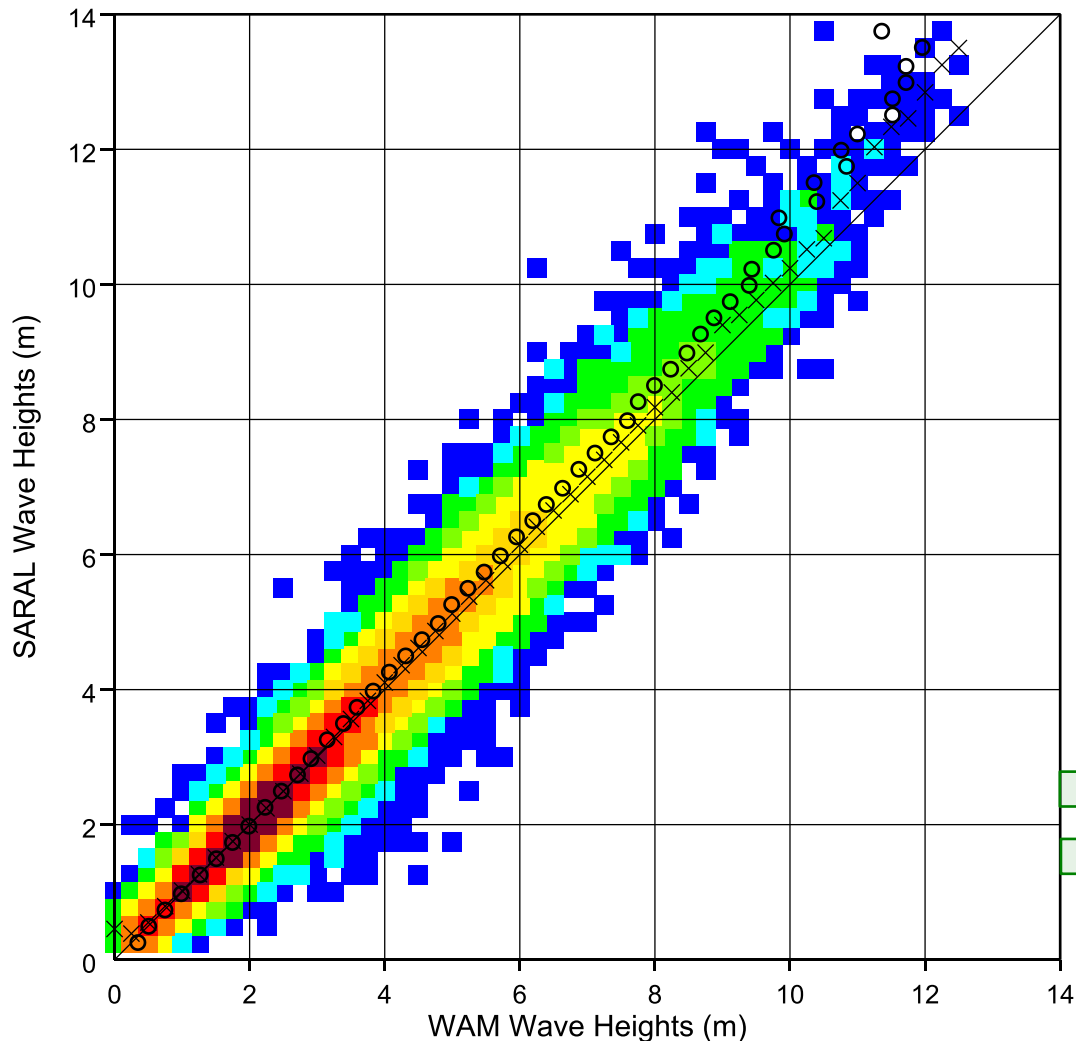
Jason-2

STATISTICS

ENTRIES	12840	12447
MEAN BUOY	1.6801	1.7492
MEAN SARAL	1.7412	1.7852
BIAS (SARAL - BUOY)	0.0611	0.0360
STANDARD DEVIATION	0.2489	0.2713
SCATTER INDEX	0.1481	0.1551
CORRELATION	0.9601	0.9597
SYMMETRIC SLOPE	1.0281	1.0082
REGR. COEFFICIENT	0.9579	0.9273
REGR. CONSTANT	0.1318	0.1632

SARAL slightly better

SWH comparison against ECMWF model FG, Global, 18 March – 20 August 2013



SARAL

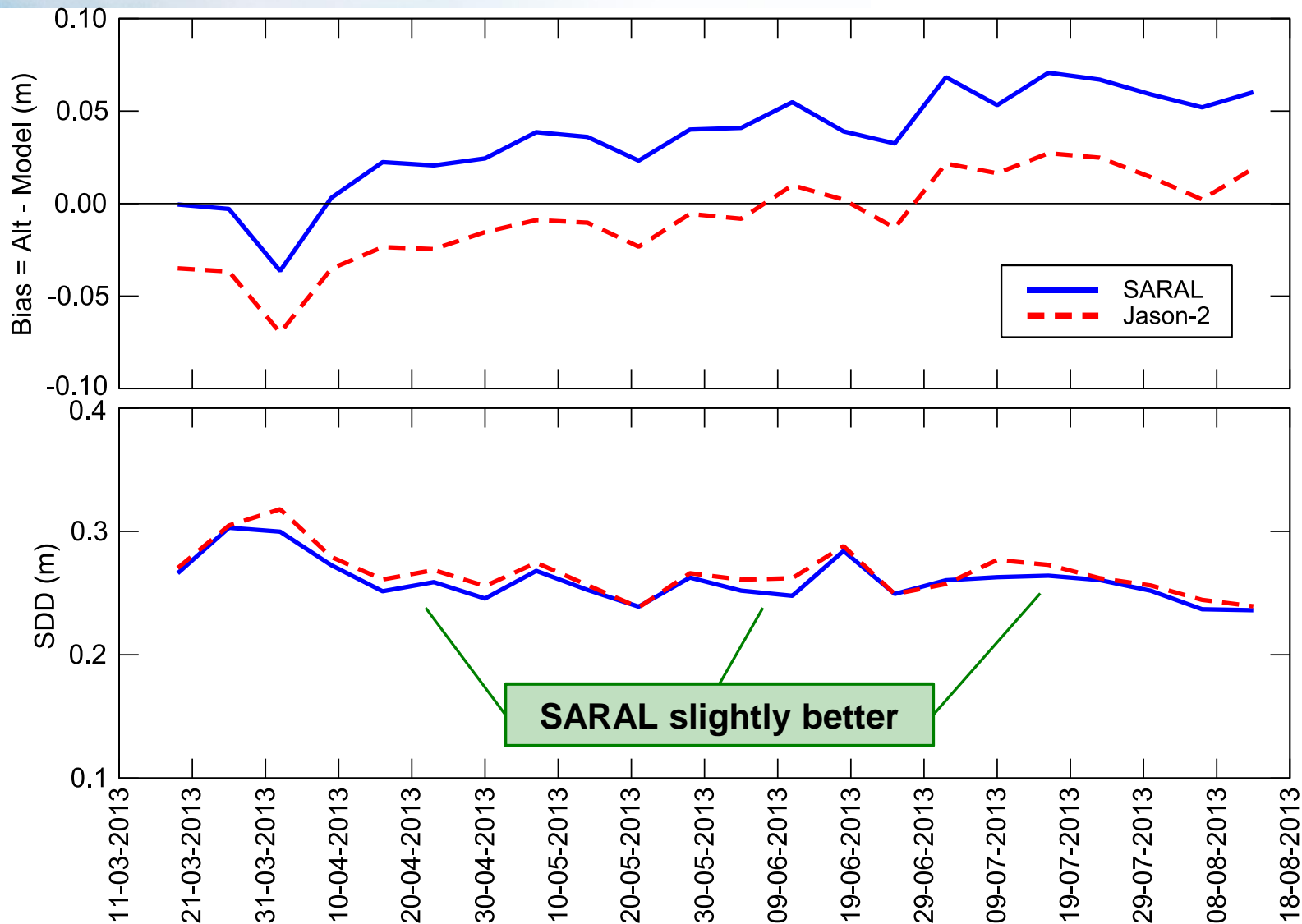
Jason-2

STATISTICS

ENTRIES	556776	581064
MEAN WAM	2.5985	2.7132
MEAN SARAL	2.6330	2.7079
BIAS (SARAL - WAM)	0.0344	-0.0054
STANDARD DEVIATION	0.2620	0.2650
SCATTER INDEX	0.1008	0.0977
CORRELATION	0.9837	0.9828
SYMMETRIC SLOPE	1.0206	1.0041
REGR. COEFFICIENT	1.0295	1.0089
REGR. CONSTANT	-0.0423	-0.0294

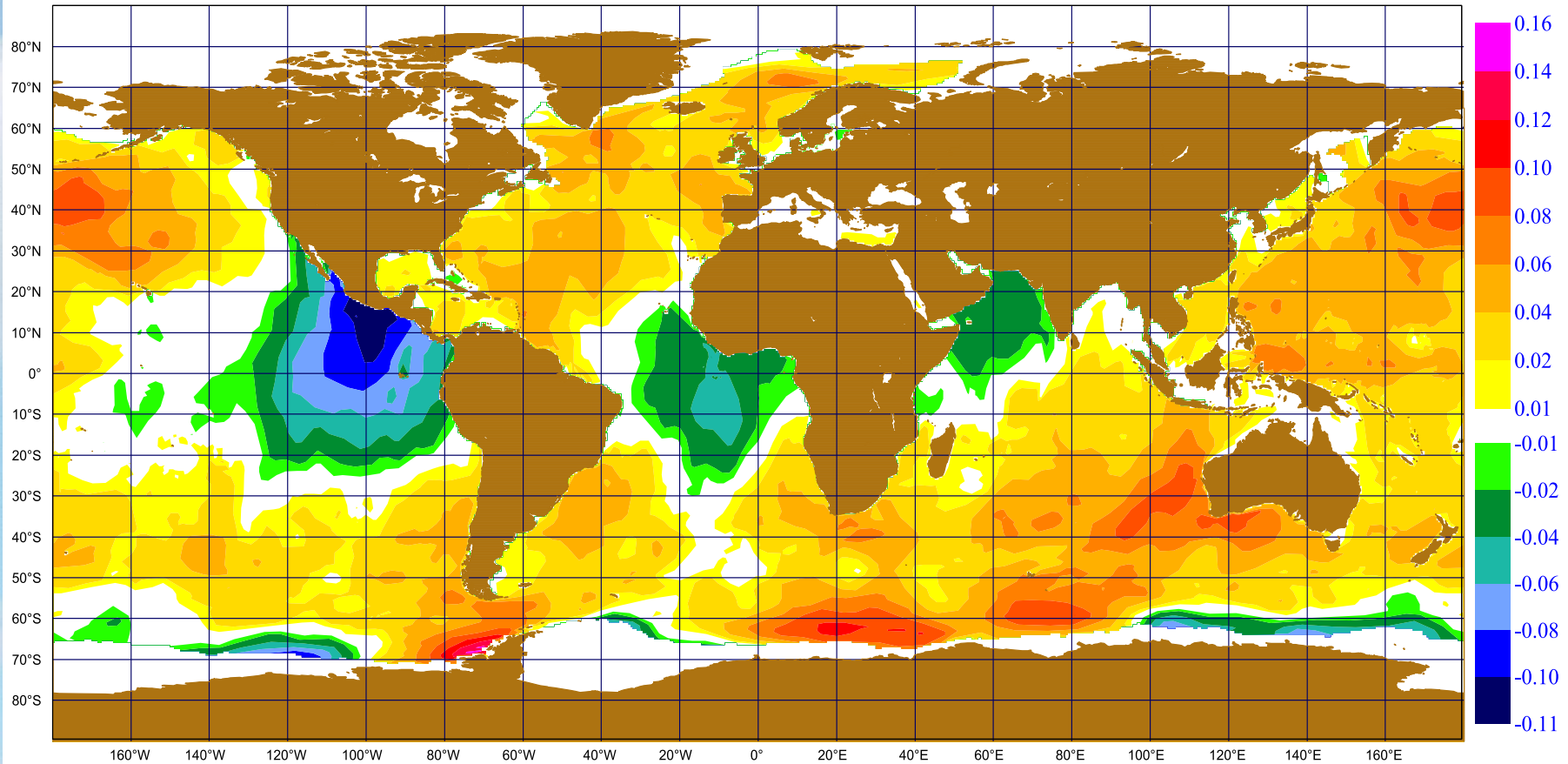
SARAL slightly better

Global bias and st. dev. of difference between SARAL (& Jason-2) and ECMWF model first-guess SWH



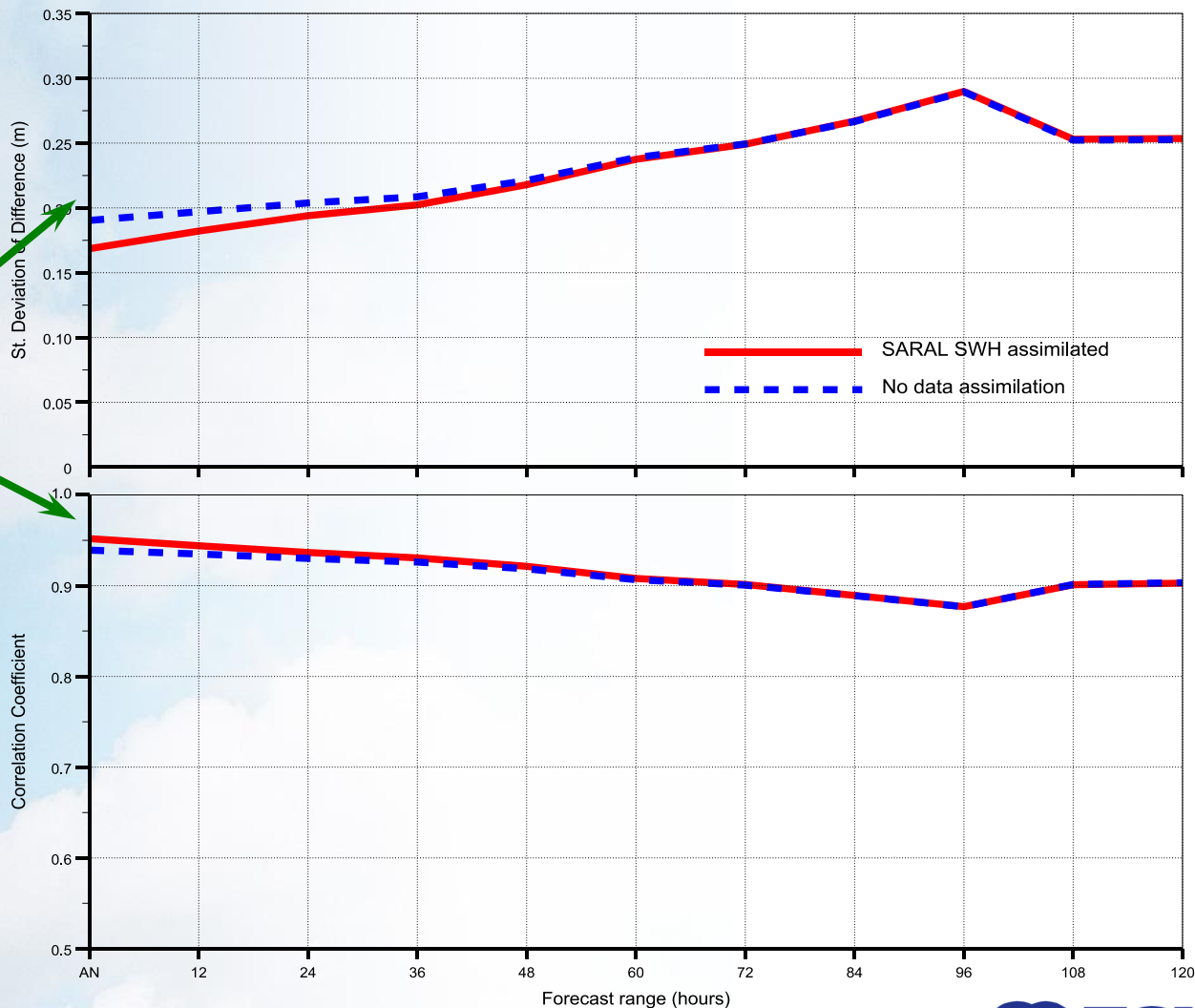
Impact of assimilating SARAL SWH on ECMWF model analysis – Monthly mean SWH difference – April 2013

SWH Monthly Mean Correction due SARAL SWH Data Assimilation - April 2013



Impact of assimilating SARAL SWH on ECMWF model analysis as verified against Jason-2: Tropics forecast statistics – April 2013.

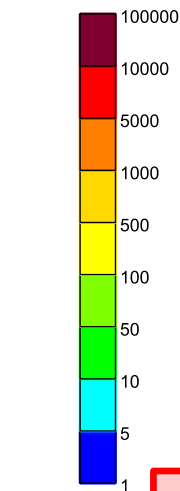
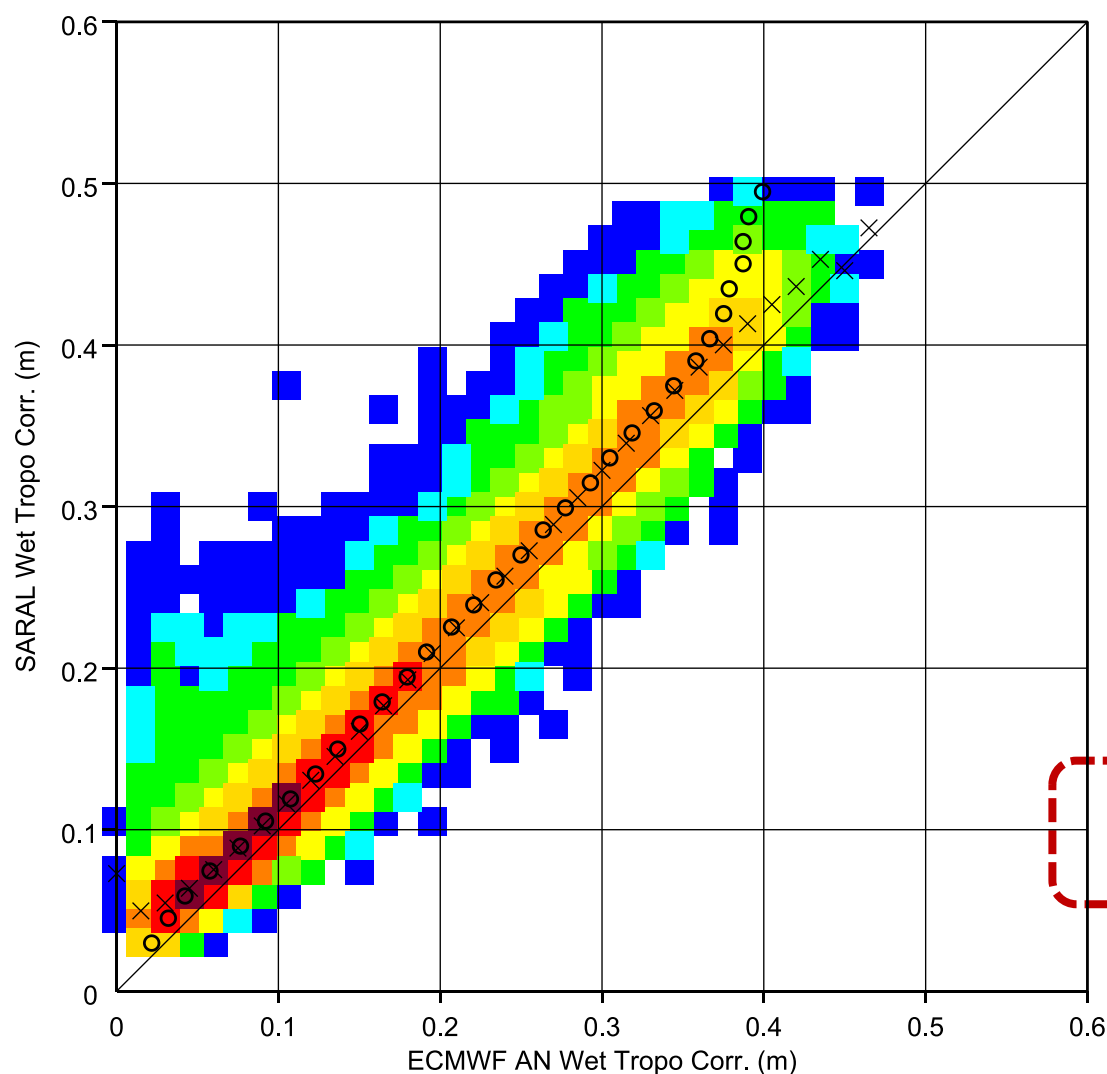
Positive impact



Wet Tropospheric Correction (WTC)

- Verification against WTC computed from ECMWF AN fields.
- Period covered: 18 March – 30 June 2013 (BUFR format change on 1 July).
- Although not bad, the **quality of SARAL WTC is clearly lower** than that from other satellites (e.g. Jason-2).

WTC comparison against computations from ECMWF, Global, 18 March – 30 June 2013

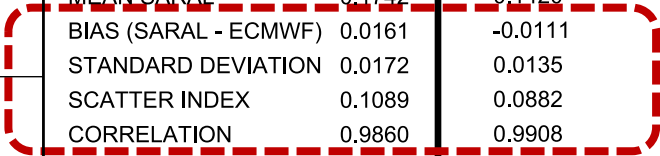


SARAL

Jason-2

STATISTICS

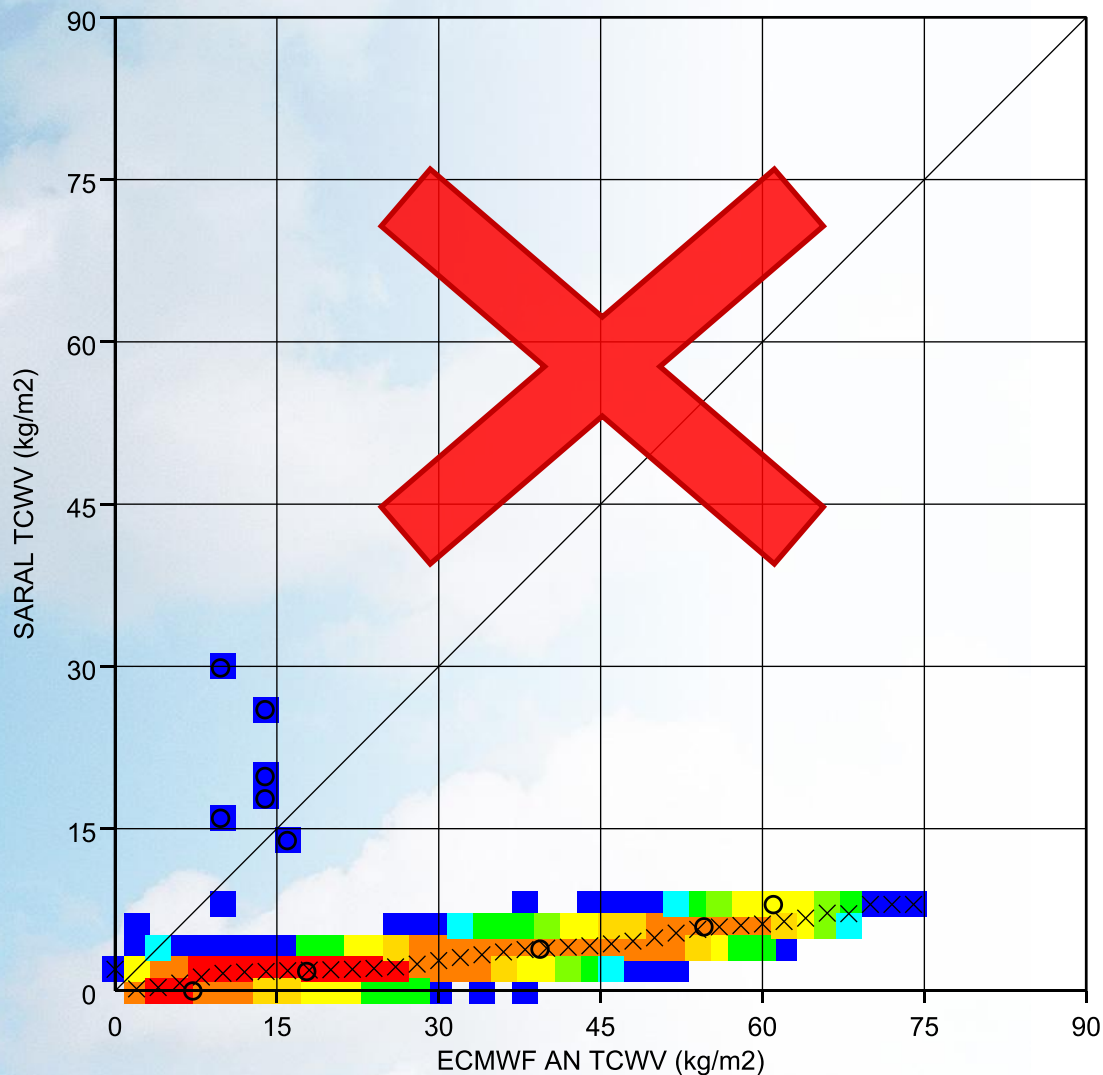
ENTRIES	373342	383818
MEAN ECMWF	0.1581	0.1531
MEAN SARAL	0.1742	0.1420
BIAS (SARAL - ECMWF)	0.0161	-0.0111
STANDARD DEVIATION	0.0172	0.0135
SCATTER INDEX	0.1089	0.0882
CORRELATION	0.9860	0.9908
SYMMETRIC SLOPE	1.0845	0.9424
REGR. COEFFICIENT	1.0236	0.9683
REGR. CONSTANT	0.0124	-0.0063



Total Column Water Vapour (TCWV) (= Water Vapour Content)

- Verification against ECMWF AN TCWV.
- **Apparently the TCWV needs to be calibrated or at least needs multiplication by 10.**
- Validation period: 18 March – 30 June 2013 (BUFR format change on 1 July).
- Irrespective of the multiplication by 10, **the quality of SARAL TCWV is lower than that from other satellites** (e.g. Jason-2).

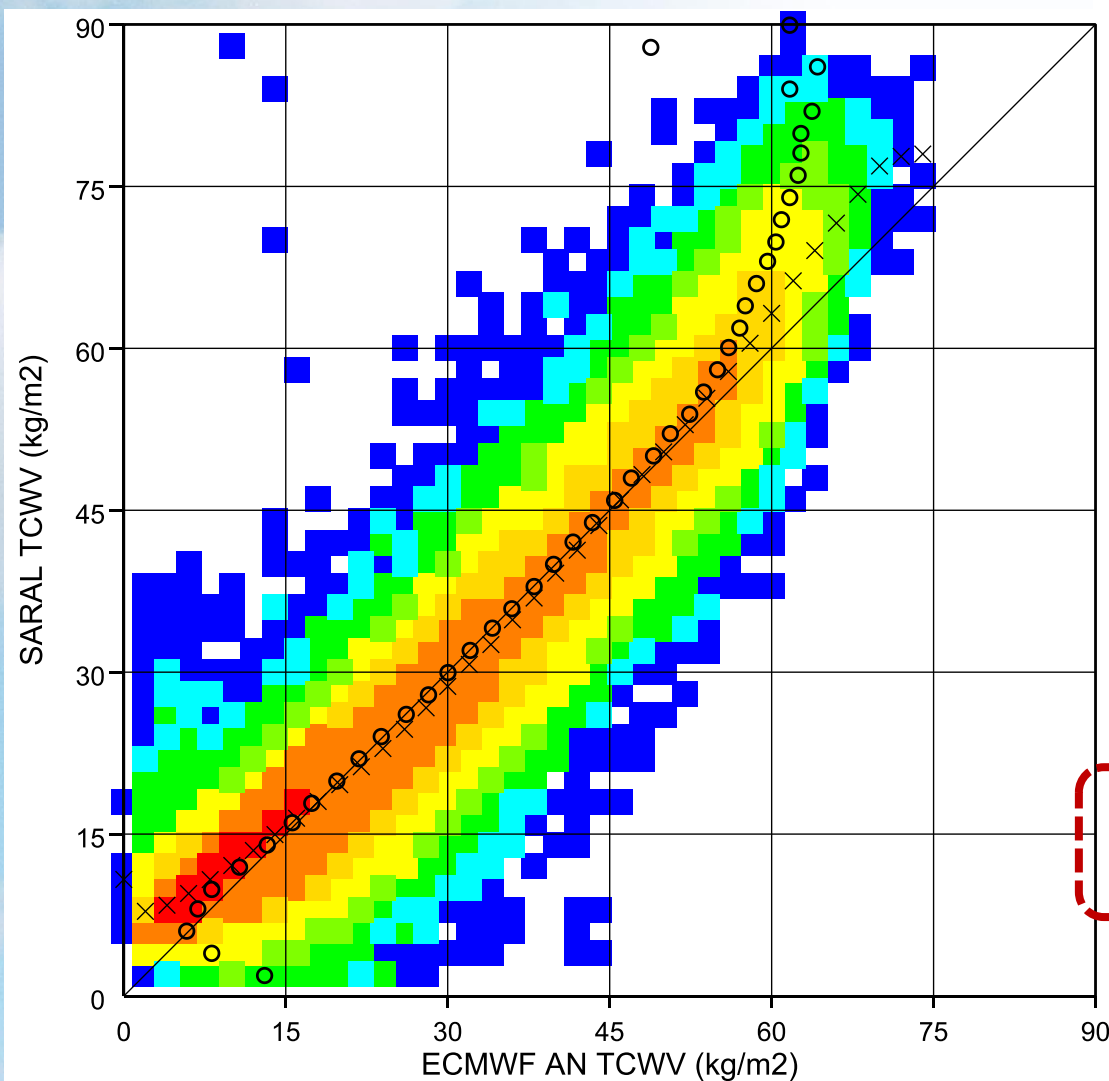
Original TCWV comparison against ECMWF AN, Global, 18 March – 1 May 2013



STATISTICS

ENTRIES	162464
MEAN ECMWF	24.9762
MEAN SARAL	2.5355
BIAS (SARAL - ECMWF)	-22.4407
STANDARD DEVIATION	14.6039
SCATTER INDEX	0.5847
CORRELATION	0.9563
SYMMETRIC SLOPE	0.1011 (0.0001)
REGR. COEFFICIENT	0.0956 (0.0001)
REGR. CONSTANT	0.1488 (0.0022)

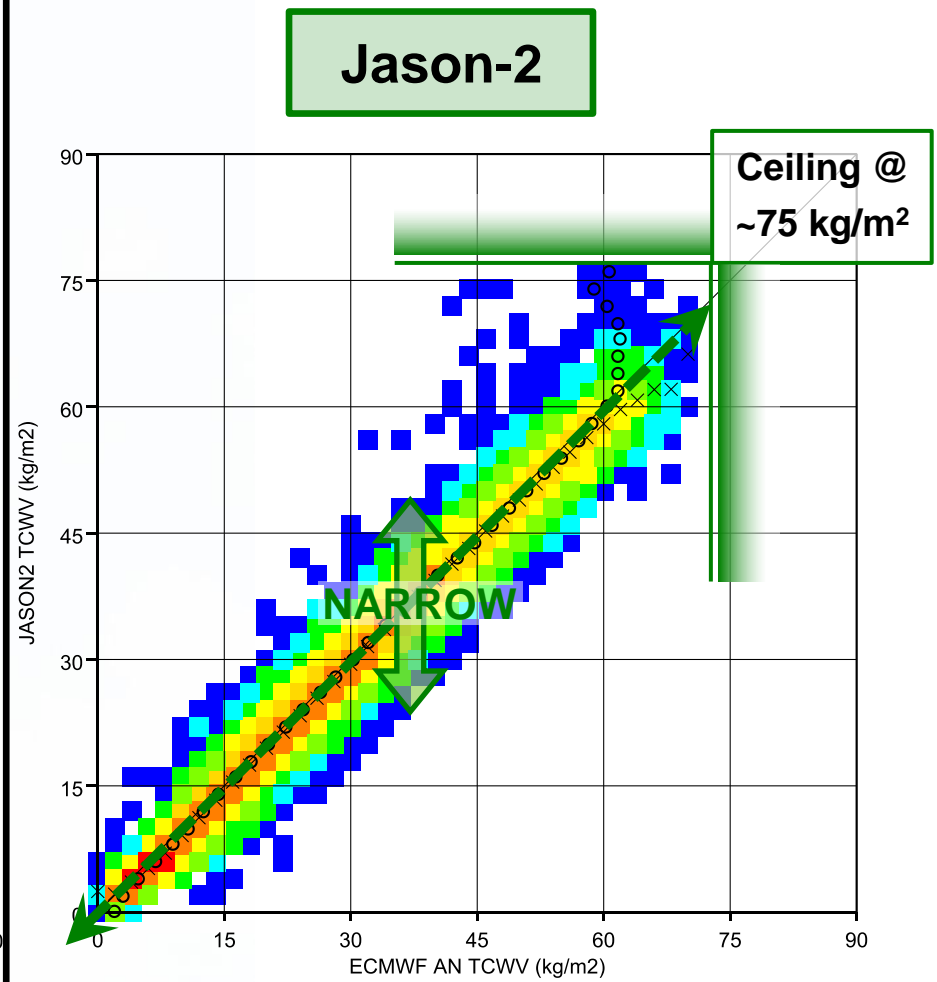
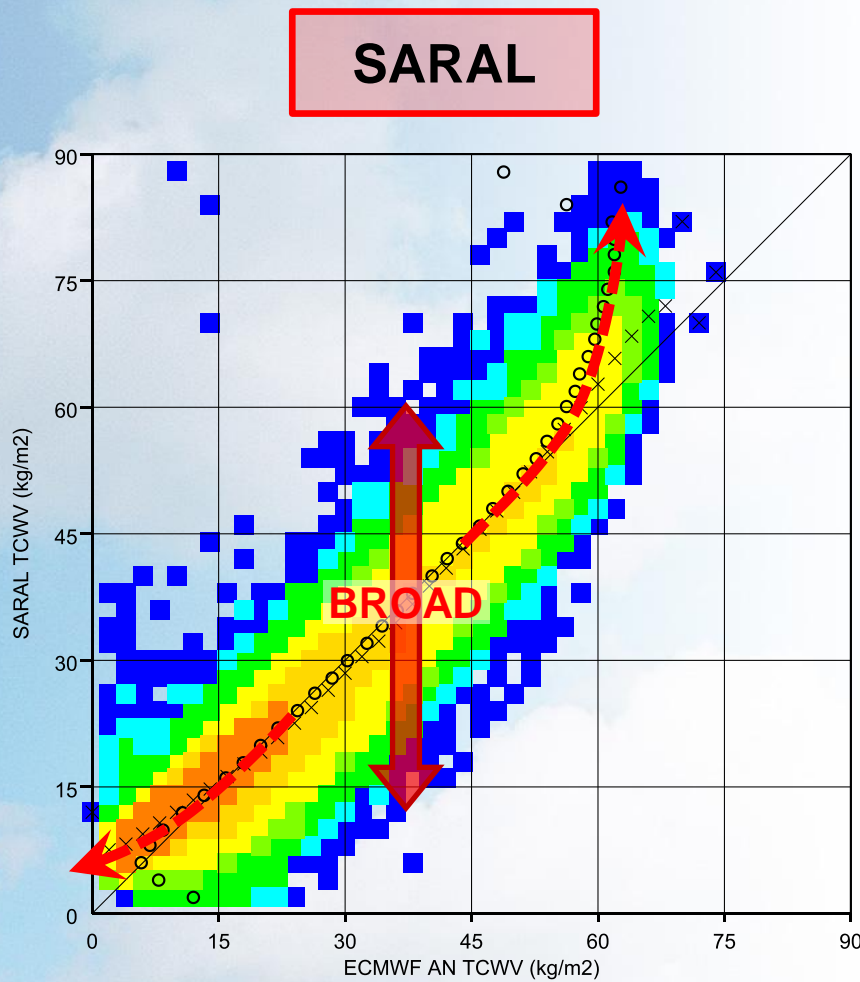
SARAL TCWV x 10 comparison against ECMWF TCWV, Global, 18 March – 30 June 2013



Differences w.r.t. Jason-2 on next slide

STATISTICS	SARAL	Jason-2
ENTRIES	373341	383818
MEAN ECMWF	25.0382	23.6346
MEAN SARAL	25.6663	22.8500
BIAS (SARAL - ECMWF)	0.6281	-0.7846
STANDARD DEVIATION	4.5220	1.7277
SCATTER INDEX	0.1806	0.0731
CORRELATION	0.9605	0.9941
SYMMETRIC SLOPE	1.0194	0.9770
REGR. COEFFICIENT	0.9658	0.9933
REGR. CONSTANT	1.4839	-0.6262

SARAL TCWV x 10 comparison against ECMWF TCWV, Global, 18 March – 1 May 2013, It needs calibration



Concluding Remarks / Notes - 1

- SARAL near real time (NRT) products were downloaded in BUFR format from <ftp.saral.oceanobs.com>
- SARAL SWH is slightly better than Jason-2.
- Preliminary results from SARAL SWH data assimilation experiments show positive impact on wave model results.
- There was a BUFR format change on 1 July 2013. It impacted our processing of the microwave radiometer data. So MWR verification results stop at the end of June 2013.

Concluding Remarks / Notes - 2

- The quality of SARAL NRT wet tropospheric correction (WTC) is not as good as that of Jason-2.
- SARAL NRT water vapour content (=Total Column Water Vapour, TCWV) is not correct. Apparently, a calibration is needed with at least factor of 10 is needed to boost TCWV to correct levels. *(as of 30 June)*
- After multiplying by 10, the SARAL TCWV is not as good as that of Jason-2 → Calibration is still needed. *(as of 30 June)*