Altimeter Ku-band sigma0 and wind speed calibration and corrections – updated May 2010

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This annexe gives details of the calibrations applied to the GDR sigma0 data, and of the corrections to get a new altimeter wind speed. The content is subject to change with time.

SIGMA0 calibration

A first calibration is obtained from informations published by the agencies or by people involved in the monitoring of this measurements – sources are indicated for each altimeter.
A second calibration (indicated in the following by : /ENVISAT) is obtained from comparison with the ENVISAT sigma0, which seems to be stable with time: for each altimeter a bias was estimated relative to ENVISAT, comparing mean values of sigma0, over the global oceans, between 66.15° S and 66.15° N, and over the common time period with ENVISAT, for TOPEX, ERS-2, Jason-1 & 2 and GFO. ERS-1 was calibrated indirectly by a first comparison with ERS-2, itself calibrated relatively to ENVISAT.
These two calibration values are applied to the GDR sigma0, resulting in the calibated sigma0 parameter given in the data set.

SIGMA0 correction

A correction to the above calibrated value of sigma0 is then estimated to get a best fit when comparing wind buoy data with altimeter wind speed inferred from a unique algorithm. Presently the Abdalla (2007) algorithm is used. The corrected sigma0 is not given in the data set. A corrected wind speed value is given.

The corrected wind speed is estimated using the calibrated and corrected sigma0 as input in the Abdalla algorithm.

ERS-1:
calibration : add + 0.0976 dB (=0.0465 +0.0511; /ENVISAT)
correction: add - 0.140 dB

Calibrated sigma0 Ku-band and corrected wind speed set to NaN before `01-Aug-1991 02:15:18`

ERS-2:

calibration:
add 0.15 dB from January 16 to February 7, 2000

add 0.35 dB from February 10 to March 2, 2000

add 0.25 dB from 3 Mar 2000 to 7 Oct 2000

add 0.35 dB from 8 Oct 2000 (anomaly occurs) to 5 Feb 2001

add 0.45 dB from 6 Feb 2001 (Extra backup mode starts) to 29 Apr 2001

add 0.25 dB since 30 Apr 2001 (Zero Gyro mode implemented)

Above calibrations were obtained from Dorandeu et al. 2000, and Scharroo, personal communication.

add + 0.0511 dB (/ENVISAT)

correction: add -0.140 dB

Extra Backup Mode (extended further...): do not use sigma0 ERS-2 from 17 Jan 2001 to 31 March 2001, included; calibrated sigma0 Ku-band and corrected wind speed set to NaN over this time period.

ENVISAT:
calibration : no
correction: add -0.138 dB (/buoy wind speed, as in Zieger et al. 2009)

TOPEX:

calibration:
- Add a correction as a function of cycle number:

    for side-A (i.e.before cycle 236): Table 2-b for cycle numbers lower than 133, and Table 2-a for cycle 133 and greater, from Hayne and Hancock, July 1999.

    for side-B(cycle 236 and greater): Table G-1 of Lockwood et al., July 2006.

- Add - 0.4739 dB (/ENVISAT)

correction: add - 0.15 dB (/buoy wind speed)

Do not use the 10 first TOPEX cycles, date lower than or equal to 31 Dec 1992.

Do not use TOPEX miss-pointing cycles 433-437 included, i.e. data between June 15, 2004 and August 2, 2004, included.
Calibrated sigma0 Ku-band and corrected wind speed set to NaN over this time periods.

Poseidon:
calibration: add – 0.4141 dB (still to be verified)
correction: add - 0.15 dB

Jason-1:
calibration: add - 2.8165 dB (/ENVISAT)
correction: add -0.30 dB (/buoy wind speed)

Jason-2:
calibration: add - 2.7668 dB (/ENVISAT)
correction: add - 0.225 dB (/buoy wind speed)

GFO:
calibration:
add +0.32 dB from 11 January 2000 to 6 December 2000 (included)
add - 0.4322 dB (/ENVISAT)
correction: add -0.140 dB to be verified/buoy wind speed

Do not use sigma0 GFO after 2 Aug 2006. Calibrated sigma0 Ku-band and corrected wind speed set to NaN over this time period.

REFERENCES

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Global Ocean monthly mean Ku-band Sigma0 (GDR & calibrated data)