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ENVISAT CYCLIC ALTIMETRIC REPORT

CYCLE 27 from 17-05-2004 to 21-06-2004

Quality Assessment Report

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1 INTRODUCTION

This documents aims at reporting on the performances of the EnviSat Radar Altimeter, Microwave Radiometer and DORIS sensors, on the data quality of the corresponding Fast Delivery products (RA2_FGD_2P) as well as on the main events occurred during cycle 27.

This reports covers the period from the 17th of May and the 21st of June 2004.

2 DISTRIBUTION LIST

This report is available in PDF format at the internet address http://earth.esa.int/pcs/envisat

3 ACRONYMS

AGC	Automatic Gain Control
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DSR	Data Set Record
EPC	Electronic Power Converter
ERS	European Remote Sensing satellite
ESRIN	European Space Research Institute
ESOC	European Space Operations Centre
FD	Fast Delivery products
GS	Ground Segment
GTS	Global Telecommunication System
HTL	Height Tracking Loop
ICU	Instrument Control Unit
IECF	Instrument Engineering Calibration Facility
IF	Intermediate Frequency
IE	Individual Echoes
IPF	Instrument Processing Facility
LUT	Look Up Table
MCMD	MacroCommand
MPH	Main Product Header
MSS	Mean Sea Surface
MWR	MicroWave Radiometer
MPS	Mission Planning System
OBT	On-Board Time
OCM	Orbit Control Mode/Manoeuvres
PCS	ERS Products Control Service
PCF	EnviSat Product Control Facility
PDHS-E	ESRIN Processing and Data Handling Station
PDHS-K	Kiruna Processing and Data Handling Station
PLSOL	Payload Switch-Off Line

PMC	Payload Main Computer
PTR	Point Target Response
RA-2	EnviSat Radar Altimeter bi-frequency
RSL	Resolution Selection Logic
SAD	Static Auxiliary Files
SBT	Satellite Binary Time
SEU	Single Event
SFCM	Stellar Fine Control Mode
SPH	Specific Product header
SPSA	Signal Processing Sub-Assembly
S/W	Software
TM	Telemetry
TRP	Transponder
TWT	Traveling Wave Tube
UTC	Coordinated Universal Time

4 REFERENCE DOCUMENTS

[R – 1] F-PAC MONTHLY REPORT, SALP-RP-M-OP-15299-CN, June 2004
[R – 2] ENVISAT Microwave Radiometer Assessment Report Cycle 027, CLS.DOS/04.119, http://earth.esa.int/pcs/envisat/mwr/reports/
[R – 3] Envisat RA-2 IF Mask weird behavior: Investigation Report
[R – 4] Instrument Performance Evaluation and Analysis Summary, PO-TR-ALS-RA-0042
[R – 5] Instrument Corrections Applied on RA-2 Level 1b products, Paper presented at the ENVISAT Calibration Review in September 2002
[R – 6] ENVISAT Phase E Cal/Val Acquisition Plan, ENVI-SPPA-EOPG-TN-03-0008
[R – 7] RA-2 S-Band Anomaly Investigation, PO-TN-ESA-RA-1331, http://earth.esa.int/pcs/envisat/ra2/articles/
[R – 8] RA-2 Performance Results, Paper presented at the ENVISAT Calibration Review in September 2002
[R – 9] ECMWF Report on ENVISAT RA- 2 for May and June 2004, Report on ENVISAT Radar Altimeter - 2 (RA- 2), Wind/ Wave Product with Height Information (RA2_ WWV_ 2P), http://earth.esa.int/pcs/envisat/ra2/reports/ecmwf/
[R – 10] Envisat GDR Quality Assessment Report, SALP-RP-P2-EX-21121-CLS015
[R – 11] Envisat RA-2 Range Instrumental correction: USO clock period variations and associated auxiliary file, ENVI-GSEG-EOPG-TN-03-0009
[R – 12] Defining a Rain flag for the Envisat altimeter, G. Quartly, study presented to the final CCVT plenary meeting, http://earth.esa.int/pcs/envisat/ra2/articles/
[R – 13] ENVISAT Weekly Mission Operations Reports # 102-106, ENVI-ESOC-OPS-RP-1011-TOS-OF
[R – 14] Envisat validation and cross calibration activities during the verification phase. Synthesis Report ESTEC contract No. 16243/02/NL/FF WP6, http://earth.esa.int/pcs/envisat/ra2/articles/
[R – 15] ENVISAT-1 Products Specifications SPECIFICATIONS - Vol. 14: RA-2 Products Specifications, PO-RS-MDA-GS-2009, Iss 3, Rev. K, 24/05/2004

[R – 16] Algorithm for Flag identification and waveforms reconstruction of RA-2 data affected by "S-Band anomaly", ENVI-GSEG-TN-04-0004, Issue 1.2

5 GENERAL QUALITY ASSESSMENT

5.1 Instruments status

The RA-2 instrument, during this cycle underwent two instrument anomalies as given in par. 6.1.

The two known causes of random on-board anomalies are still present. In particular we refer to the so-called S-Band anomaly and the IF mask weird behavior described respectively in [R – 7] and [R – 3]. Only the S-Band anomaly partially affects a low number of Envisat data products as given in par. 7.1.7.

MWR sensor assessment report: refer to [R – 2].

DORIS sensor assessment report: refer to [R – 1].

5.2 Cycle quality

The summary of the RA-2 data products availability for this cycle is given in Table 1.

Start orbit	Stop orbit	Time instrum. unavailability	Time L0 gaps	Time L1b gaps	Time L2 (FGD) gaps	% instrum. avail.	% L0 avail.	% L1b avail.	% L2 (FGD) avail.
11578	11678,2	1012,03	2337,102	14273,414	14285,07	99,83267	99,44624	97,47265	97,47072
11678,2	11778,4	34460,69	546,026	542,044	548,148	94,30214	94,21186	94,21252	94,21151
11778,4	11878,6	1070,934	7964,513	13779,131	13790,659	99,82293	98,50605	97,54463	97,54273
11878,6	11978,8	1047,38	545,516	543,469	552,12	99,82682	99,73662	99,73696	99,73553
11978,8	12079	17519,81	37973	73737,659	73766,796	97,1032	90,82459	84,91112	84,9063

Table 1: RA-2 L0, L1b and L2 FGD Data products availability summary for cycle 27

5.3 Orbit quality

During cycle 27 the orbit was maintained within the +/- 1km to the reference ground track.

5.4 Ground Segment Processing Chain Status

5.4.1 IPF PROCESSING CHAIN

The current IPF version is V4.57, operational at the Envisat PDHS-K and PDHS-E since April 29th and 28thth 2004 respectively.

5.4.2 F-PAC PROCESSING CHAIN

Apr. 29, 2004: Version installed CMA V6.3. This version includes a tuning of the ice verification chainas well as the inclusion of a new pass number field (available from the SPH) and an orbit quality flag (ref. [R – 15])

Before that date the F-PAC CMA version was V6.2.1; installed on December the 3rd 2003. For what regards the Envisat products this version is equivalent to V6.1 installed on August the 4th 2003.

F-PAC CMA anomalies: anomalies are detailed in the F-PAC Monthly Report [R - 1].

5.4.3 AUXILIARY DATA FILE

Hereafter all the Auxiliary files used actually used by the IPF ground processing are listed:

```
RA2_CHD_AXVIEC20030402_094243_20030407_000000_20200101_000000
RA2_CON_AXVIEC20020606_164228_20020101_000000_20200101_000000
RA2_CST_AXVIEC20020621_135858_20020101_000000_20200101_000000
RA2_DIP_AXVIEC20020122_134206_20020101_000000_20200101_000000
RA2_GEO_AXVIEC20020314_093428_20020101_000000_20200101_000000
RA2_ICT_AXVIEC20020709_131546_20020101_000000_20200101_000000
RA2_IFA_AXVIEC20020313_174755_20020101_000000_20200101_000000
RA2_IFB_AXVIEC20020313_174959_20020101_000000_20200101_000000
RA2_IFF_AXVIEC20021023_085202_20020101_000000_20100101_000000
RA2_IOC_AXVIEC20020122_141121_20020101_000000_20200101_000000
RA2_MET_AXVIEC20020204_073357_20020101_000000_20200101_000000
RA2_MSS_AXVIEC20021023_141823_20020101_000000_20200101_000000
RA2_OT1_AXVIEC20020313_173134_20020101_000000_20200101_000000
RA2_OT2_AXVIEC20020313_173944_20020101_000000_20200101_000000
RA2_SET_AXVIEC20020122_150917_20020101_000000_20200101_000000
RA2_SL1_AXVIEC20030131_100228_20020101_000000_20200101_000000
RA2_SL2_AXVIEC20030131_101757_20020101_000000_20200101_000000
RA2_SOI_AXVIEC20021023_140434_20020621_000000_20200101_000000
RA2_SSB_AXVIEC20020122_160151_20020101_000000_20200101_000000
RA2_TLD_AXVIEC20020313_175443_20020101_000000_20200101_000000
RA2_USO_AXVIEC20020122_162920_20020101_000000_20200101_000000
```

The RA2_POL_AX, the RA2_SOL_AX and the RA2_PLA_AX have been regularly updated every week without problems.

The RA-2 Auxiliary Data Files (ADF) are accessible from the Envisat Web pages under http://envisat.esa.int/services/tools_table.html.

5.4.4 PLANNED UPGRADES

Evolution of the IPF Level 1B and Level 2 processing chain is currently planned. The next IPF version release shall nominally contain the following:

1. USO instrumental correction within the RA-2 L1b processor.
2. New MWR Side Lobes correction algorithm within MWR L1b processor
3. Correction of the mispointing evaluation algorithm within the RA-2 L2 processor
4. Inclusion of the loading tide for the GOT2000.2 model.
5. Addition of the peakiness fields in Ku and S band to the RA-2 and MWR FD/I/MAR meteorological products
6. Inclusion of the square of the significant wave height in Ku and S band
7. Inclusion of an S-band anomaly flag, see [R – 16]
8. Upgrade of the Level 1B and Level 2 processing for DORIS NRT orbital information computation.

Evolutions 3, 5 and 6 shall be reflected too in the F-PAC CMA processing chain.

6 ENVISAT PAYLOAD STATUS

6.1 Altimeter Events

The Radar Altimeter 2, during cycle 27, was unavailable twice, in the following time periods:
Start: 31 May 2004 02:45:27 Orbit = 11766 RA2 went to Suspend/Reset-Wait owing to repeated
Stop: 31 May 2004 12:01:50 Orbit = 11772 type 10 entries in report format.

Start: 21 Jun 2004 14:47:51 Orbit = 12074 RA-2 in Suspend/Reset-Wait due to due to reporting of
Stop: 21 Jun 2004 19:24:30 Orbit = 12077 too many SEUs.

The HSU1 fuse problem (Ref anomaly occurrence during cycle 22) is still present. This problem does not affect nominal operations since the RA-2 instrument is heated by the nearby hardware.

The cause of the problem is still unknown. The heater fuses as well as the hardware used to report on the status of the fuses are presently under examination.

6.1.1 RA-2 INSTRUMENT PLANNING

The RA-2 instrument planning was performed as follows:

- IF Calibration Mode according the nominal operational acquisition scheme: 100 seconds of data per day over Himalayan region.
- Preset Loop Output mode for GAVDOS Range transponders, located in Creta.
- Preset Loop Output acquisition over ESA transponders, located near Rome; for both ascending and descending passes.

- Individual Echoes background planning: buffering of 20 Data block of individual Echoes and transmission of the in the following 160 Data Blocks. This repeated continuously.

Hereafter the map is reported showing the acquisition sites for both the Range and Sigma_0 transponders.

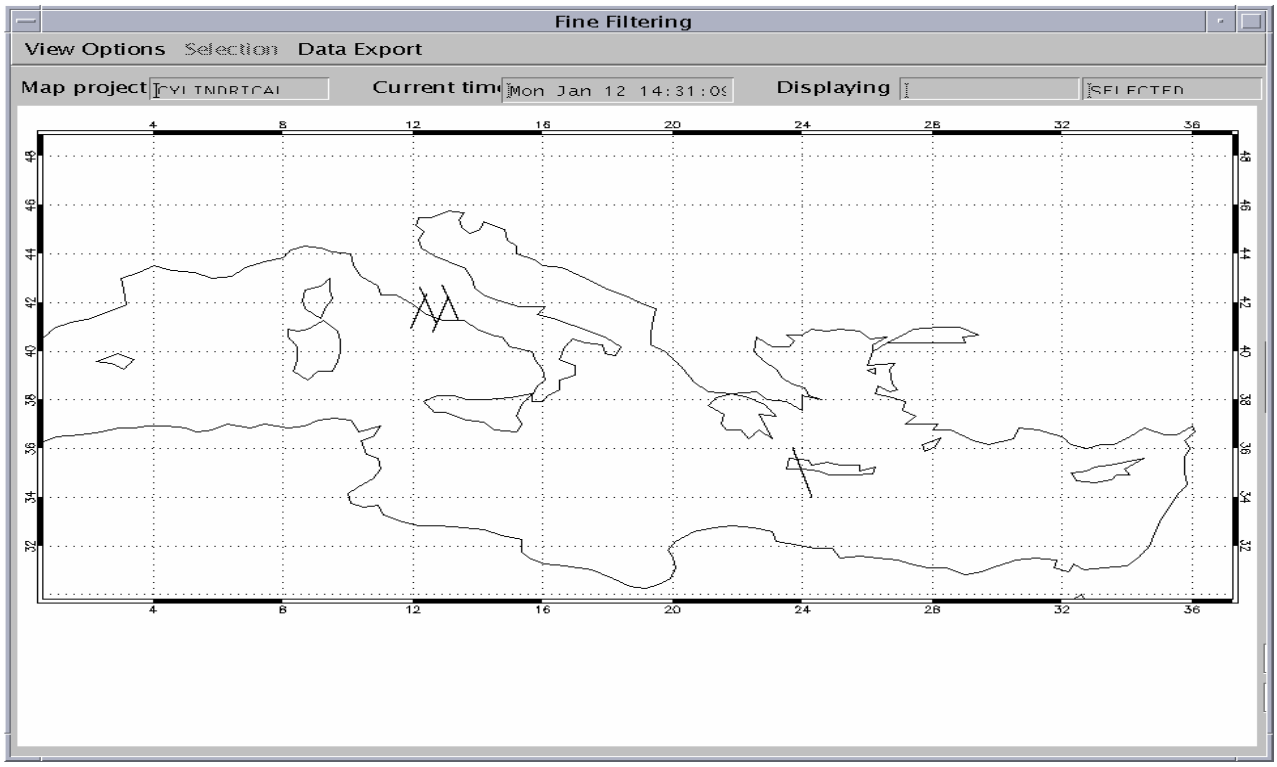

Figure 1: Transponder Acquisition sites for cycle 27

6.2 MWR Events

The MWR, during cycle 27 was never unavailable.

6.3 DORIS Events

The DORIS during cycle 27 was unavailable once in the following time period:
Start: 6 Jun 2004 13:00:00 Orbit = 11858 DORIS data no more usable due to interruption of the
Stop: 14 Jun 2004 14:52:00 Orbit = 11974 USO 10 MHz frequency

After this anomaly the DORIS USO was switched to the redundancy component and it is now working correctly.

7 INSTRUMENT PERFORMANCES

7.1 RA-2 Performances

7.1.1 IF FILTER MASK

In Figure 2 all valid IF masks retrieved by averaging the 100 seconds of data acquired daily during cycle 27 are plotted in the left panel. The on-ground measured IF mask (ref [R – 4]) is also plotted in that panel with a red solid line. In the right panel the difference of each of the calculated IF masks with respect to the on-ground measured one is reported. During cycle 27 the number of valid IF masks has been of 10, representing about the 28% of the total available IF masks. Only valid IF masks are used to generate the final IF mask used in the Level 1B ground processing; the method used for editing the data is based on the comparison between each of the single IF masks and the reference one (on-ground).

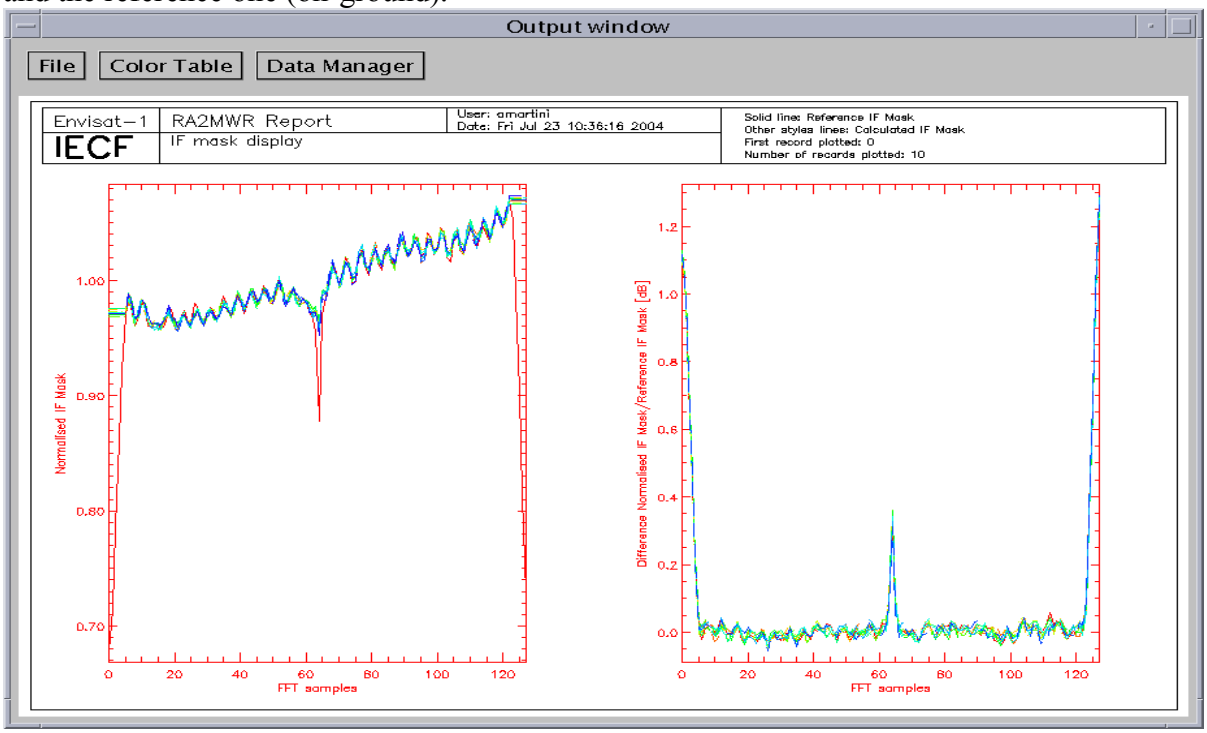

Figure 2: Valid IF masks retrieved daily during cycle 27 plotted together with the on-ground reference.

7.1.2 USO

In Figure 3 the USO clock period trend retrieved for cycle 27 is reported. In order to make the variability visible, the difference of the actual USO clock period with respect to the nominal one has been plotted, in the upper panel. In the lower panel the Range error due to the USO clock variability has been reported taking a satellite altitude of 800 Km as a nominal value.

Currently the nominal USO clock period (12500 ps) is used within the processing, this means that the data are not corrected for the bias and the drift correlated to the actual USO clock period.

A particular investigation has been performed regarding the USO clock trend and the associated auxiliary file; this is described in [R – 11]. The conclusion can be summarized as follows: the precision of 1ps available in the current USO auxiliary file is not enough to appreciate its trend and it is too rough for any altimetric application. A suitable resolution is considered to be of 10^{-6} ps. This problem will be corrected with the following upgrade of the IPF as described in par. 5.4.4.

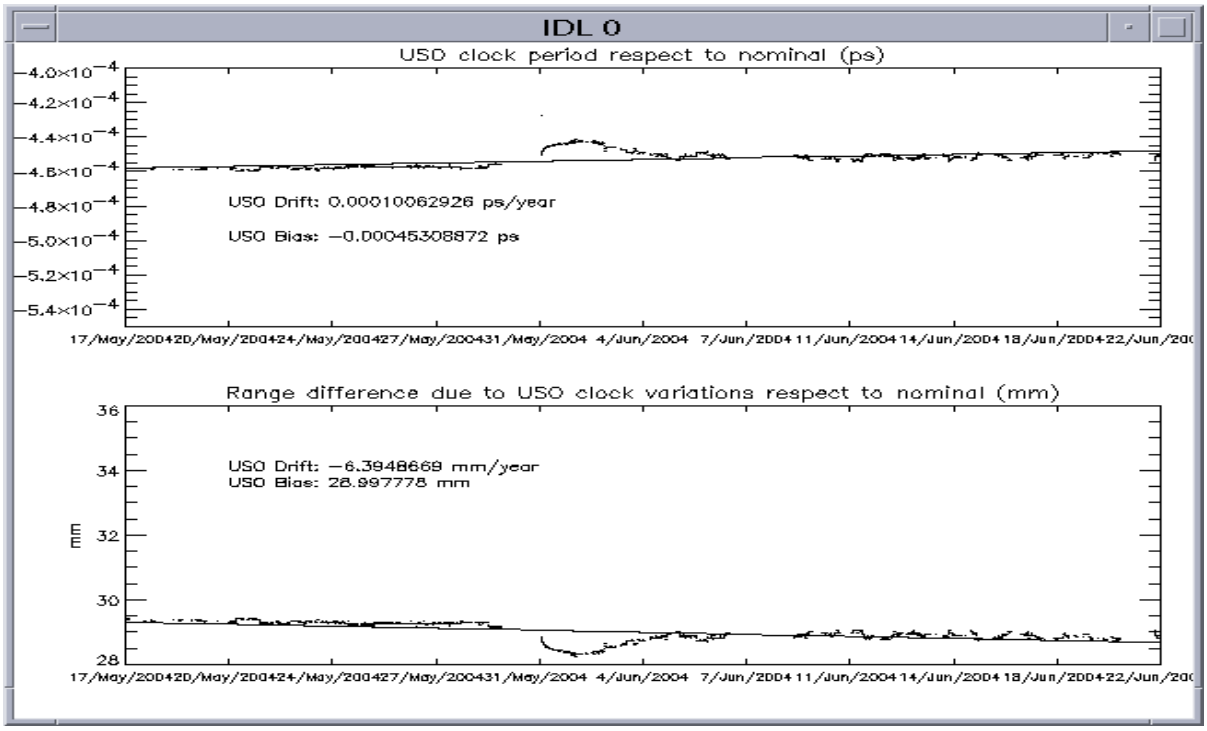

Figure 3: USO clock period for cycle 27

In particular, for this cycle, the USO recovery periods after the anomaly occurred on the 31st of May is visible in the plot; for the second anomaly nothing is visible since no RA-2 L0 data were available just after it (ref. par. 6.1)

7.1.3 TRACKING CAPABILITY

In Figure 4 and Figure 5, the Chirp ID is plotted respectively for ascending and descending passes of cycle 27. The MDSRs acquired with 320MHz bandwidth are plotted in light gray (Chirp ID equal to 0), the ones acquired with 80MHz bandwidth are plotted in violet (Chirp ID equal to 1) and the ones acquired with the 20MH bandwidth are plotted in dark green (Chirp ID equal to 2).

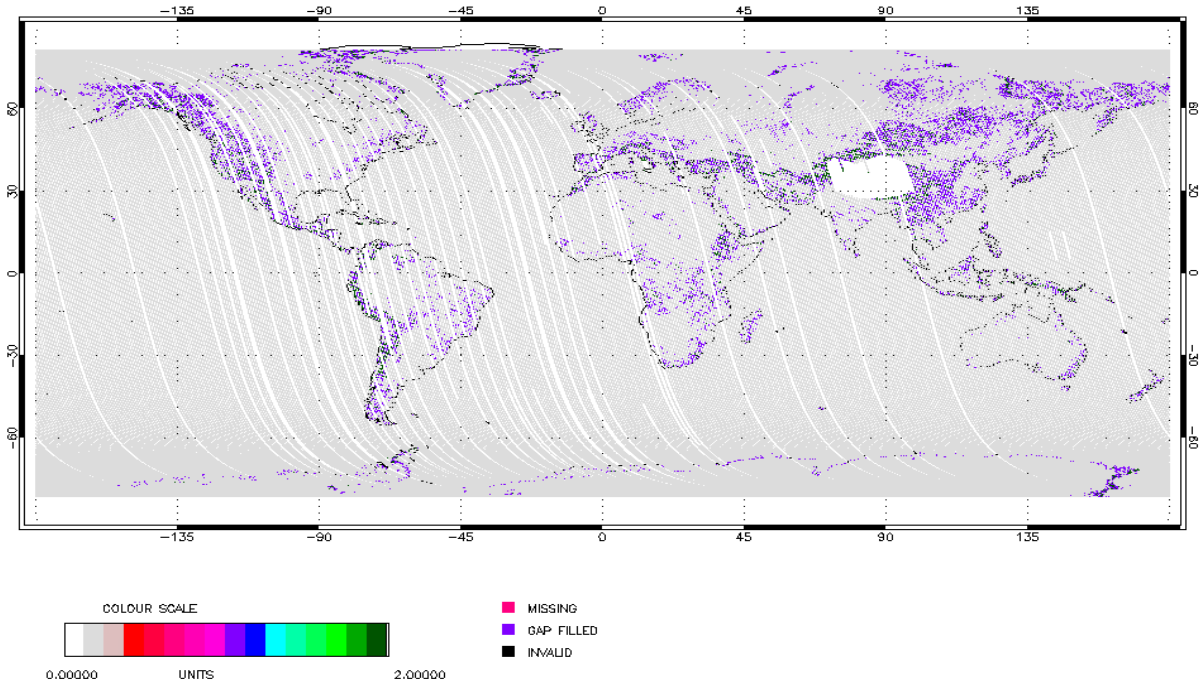

Figure 4: RA-2 Chirp ID for ascending passes during cycle 27

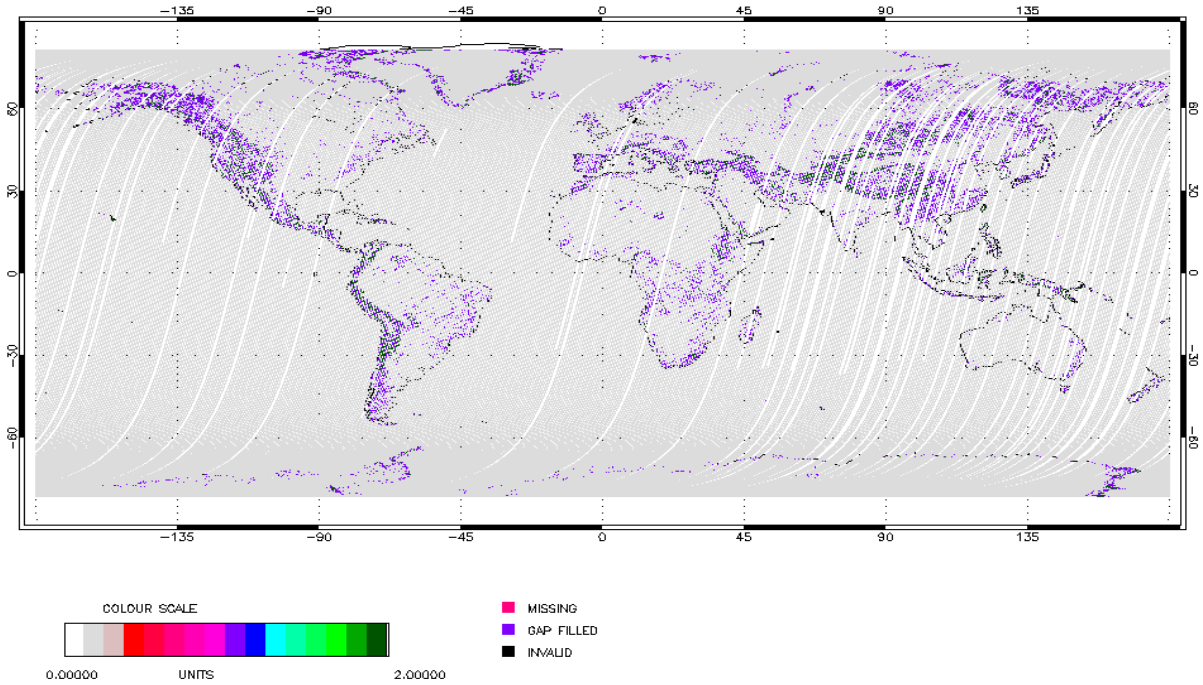

Figure 5: RA-2 Chirp ID for descending passes during cycle 27

The corresponding percentages of acquisition in the different resolutions subdivided by surface type are given in Table 2:

Surface type	320 MHz	80 MHz	20MHz
Open Ocean	99.99%	0.007%	0.001%
Costal Water (ocean depth < 200 m)	98.36%	1.43%	0.21%
Sea Ice	99.12%	0.77%	0.11%
Ice Sheet	95.99%	3.15%	0.86%
Land	81.17%	13.79%	4.05%
All world	95.13%	3.83%	1.04%

Table 2: RA-2 Tracking capability: Chirp ID percentages discriminated by surface type

The figures given for the RA-2 tracking performances during this cycle are very much in line with the ones recorded at the end of the Commissioning Phase and presented in [R – 8]. The slight differences are in part due to the different algorithms used to discriminate the surface types.

The objectives of the Commissioning Phase "RSL and Tracking optimization" are hereafter reported:

320MHz over Ocean > 99%
320 MHz within 15km of Land/Ocean boundary (Costal Water)
320 MHz over Sea Ice > 95%
320/80 MHz Fixed resolution at Ice Sheet Crossovers > 95%
320MHz over Ice Shelves > 95%

7.1.4 SIGMA0 TRANSPONDER

During cycle 27 four Sigma_0 Transponder measurement where performed on the following dates:

20-MAY-2004 20:36:27
01-JUN-2004 09:41:55
08-JUN-2004 20:39:22
17-JUN-2004 09:39:05

The first, third and fourth acquisition have been successfully performed at low resolution. For the second acquisition, the instrument didn't go in preset Loop Output Mode, so the Transponder measurement is lost.
Around June the 2nd en error in the Mission Planning System has been corrected which caused the MCMD parameters sent to the instrument being wrongly calculated. This was expected to correct the problem for which the Transponder signal was not centered in the RA-2 receiving window as expected. Unfortunately the problem is not yet solved indeed the signal acquired with measurement performed on the 8th of June is still not as expected.

7.1.5 DATATION

A significant part of an eventual error in the RA-2 products datation could be given by the not perfect synchronism between the Satellite Binary Time and the UTC Time due to a drift of the ICU clock period. A correlation between those two times is performed at every Kiruna orbit dump and then extrapolated for the four non-Kiruna orbits. In Figure 6 (upper panel) the differences between the extrapolated UTC values and the corresponding real UTC values measured at the next Kiruna dump, are reported. For the whole cycle they are well under the 20 microseconds warning threshold. In the lower panel the ICU clock step for the same period is shown.

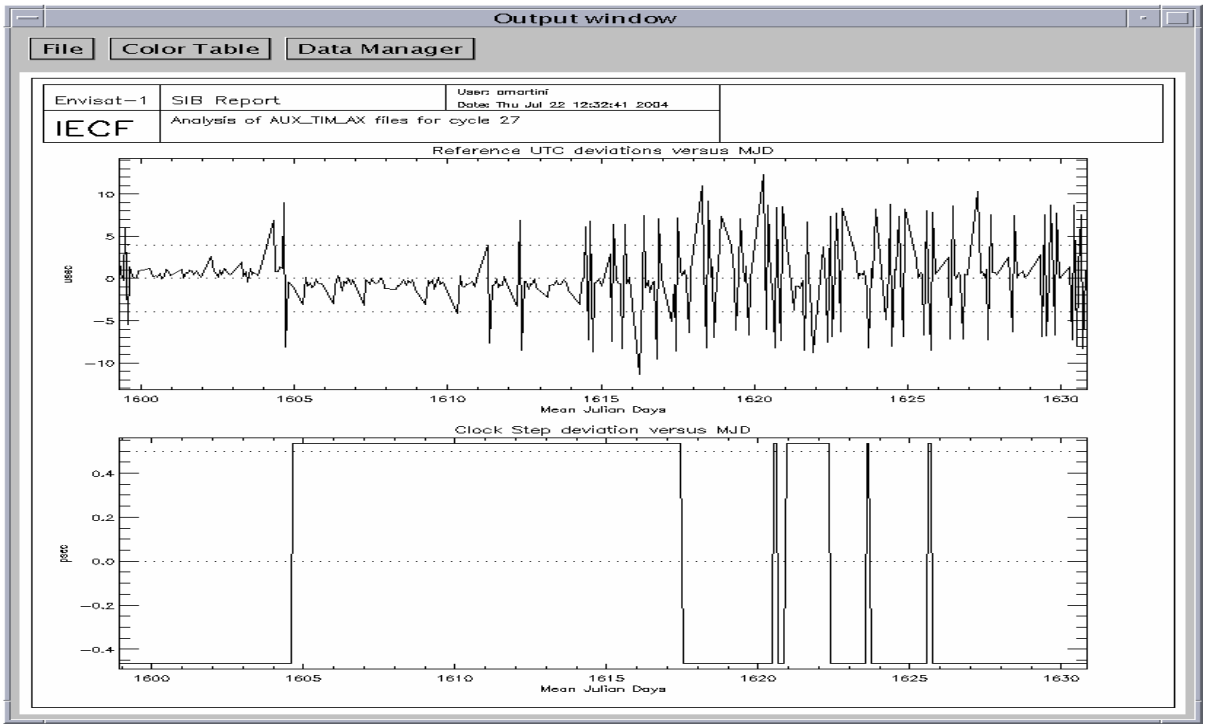

Figure 6: UTC deviations and ICU clock period for cycle 27

7.1.6 MISPOINTING

In Figure 7 the trend of the mispointing squared (averaged every orbit) is reported in deg^2*10e-4
The average mispointing value, as extracted from the RA2_FGD_2P data products, is around 0.027 deg^2, is known to be higher than the one reported at platform level [R – 13]. This is due to a not perfect tuning of the algorithm currently used to retrieve the mispointing value from the RA-2 waveform data. An optimization of this algorithm shall be part of the next Level 2 processors upgrade, planned for end-2004 (ref. 5.4.4).
In particular for this cycle two events of low mispointing values are visible in the plot, in correlation with the occurrence of the two instrument anomalies, the rational after this is given in 7.1.6.

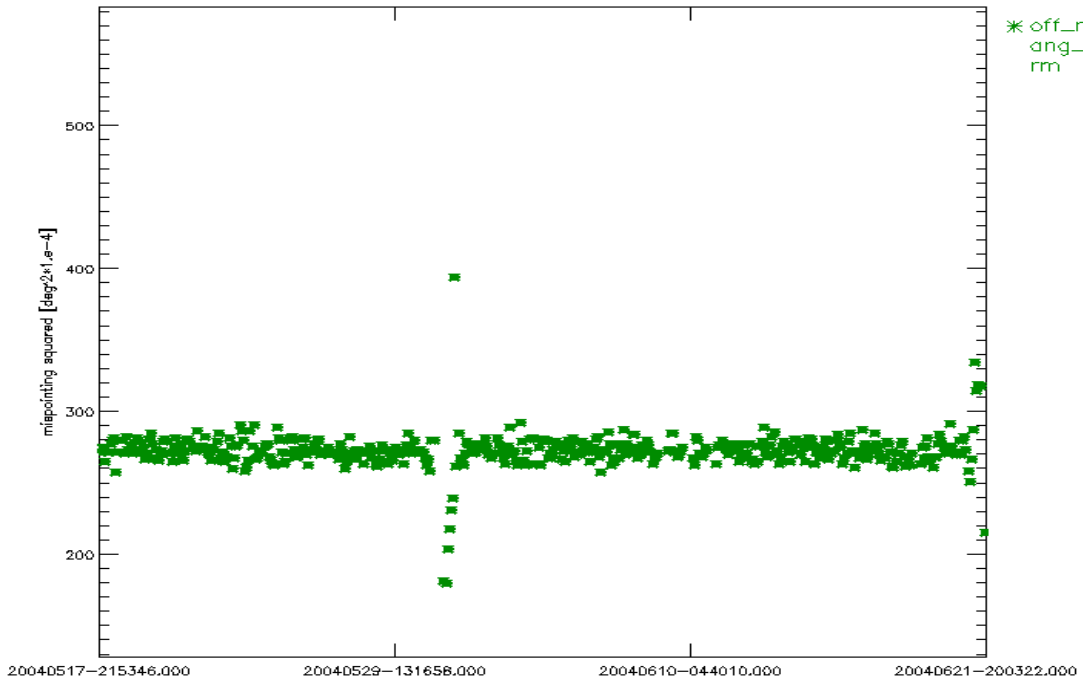

Figure 7: Smoothed mispointing squared trend for cycle 27 (deg^2*10^4)

7.1.7 S-BAND ANOMALY

The so-called "S-Band anomaly" affects the RA-2 data products quality. Hereafter, the table lists the products files affected by the S-band anomaly problem during cycle 27. This corresponds to a total percentage of about 8 % of the acquired data.
Being the method used a statistical one working on ocean data; files containing less than 1000 seconds of data over ocean have not been considered. This choice is supported by the fact that the "S-Band anomaly" is associated to a particular instrumental behavior that cannot appear and disappear within a short time frame. (ref. [R – 7])

File name	Start date	Start time	Stop date	Stop time
RA2_FGD_2PNPDE20040521_233534_000061752027_00059_11636_0259.N1	21-May-04	23:35:34.315296	22-May-04	01:18:29.161380
RA2_FGD_2PNPDE20040522_011754_000062132027_00060_11637_0261.N1	22-May-04	01:17:54.683079	22-May-04	03:01:27.405153
RA2_FGD_2PNPDE20040522_030048_000060862027_00061_11638_0262.N1	22-May-04	03:00:48.470854	22-May-04	04:42:14.196931
RA2_FGD_2PNPDE20040522_044137_000061402027_00062_11639_0263.N1	22-May-04	04:41:37.490632	22-May-04	06:23:57.802702
RA2_FGD_2PNPDK20040522_062324_000062072027_00063_11640_0992.N1	22-May-04	06:23:24.438406	22-May-04	08:06:51.590477
RA2_FGD_2PNPDK20040522_080613_000060132027_00064_11641_0993.N1	22-May-04	08:06:13.770181	22-May-04	09:46:27.086260
RA2_FGD_2PNPDK20040522_094552_000060062027_00065_11642_0994.N1	22-May-04	09:45:52.607963	22-May-04	11:25:58.126042
RA2_FGD_2PNPDK20040522_112524_000060332027_00066_11643_0995.N1	22-May-04	11:25:24.761743	22-May-04	13:05:58.129823
RA2_FGD_2PNPDK20040522_130515_000059382027_00067_11644_0996.N1	22-May-04	13:05:15.853523	22-May-04	14:44:13.417605
RA2_FGD_2PNPDK20040522_144337_000050682027_00068_11645_0997.N1	22-May-04	14:43:37.825307	22-May-04	16:08:05.355391
RA2_FGD_2PNPDK20040601_142937_000050522027_00211_11788_1120.N1	01-Jun-04	14:29:37.054451	01-Jun-04	15:53:48.988528
RA2_FGD_2PNPDK20040601_155620_000006812027_00212_11789_1121.N1	01-Jun-04	15:56:20.548207	01-Jun-04	16:07:41.146541

RA2_FGD_2PNPDK20040601_160706_000058482027_00212_11789_1122.N1	01-Jun-04	16:07:06.668242	01-Jun-04	17:44:35.112328
RA2_FGD_2PNPDK20040601_174330_000060372027_00213_11790_1123.N1	01-Jun-04	17:43:30.556027	01-Jun-04	19:24:07.266114
RA2_FGD_2PNPDK20040601_192304_000059722027_00214_11791_1124.N1	01-Jun-04	19:23:04.937813	01-Jun-04	21:02:37.035898
RA2_FGD_2PNPDK20040601_210034_000065062027_00215_11792_1125.N1	01-Jun-04	21:00:34.551582	01-Jun-04	22:49:00.255665
RA2_FGD_2PNPDE20040601_224747_000062672027_00216_11793_0361.N1	01-Jun-04	22:47:47.901385	02-Jun-04	00:32:15.209447
RA2_FGD_2PNPDE20040602_003140_000061562027_00217_11794_0362.N1	02-Jun-04	00:31:40.731160	02-Jun-04	02:14:16.639252
RA2_FGD_2PNPDE20040602_021341_000062082027_00218_11795_0363.N1	02-Jun-04	02:13:41.046953	02-Jun-04	03:57:09.313032
RA2_FGD_2PNPDE20040602_035634_000060782027_00219_11796_0364.N1	02-Jun-04	03:56:34.834734	02-Jun-04	05:37:52.762820
RA2_FGD_2PNPDK20040602_053712_000062472027_00220_11797_1127.N1	02-Jun-04	05:37:12.714520	02-Jun-04	07:21:19.970596
RA2_FGD_2PNPDK20040602_072032_000060572027_00221_11798_1128.N1	02-Jun-04	07:20:32.124299	02-Jun-04	09:01:28.886384
RA2_FGD_2PNPDK20040602_090042_000059802027_00222_11799_1129.N1	02-Jun-04	09:00:42.154084	02-Jun-04	10:40:22.050173
RA2_FGD_2PNPDK20040602_103947_000060622027_00223_11800_1130.N1	02-Jun-04	10:39:47.571874	02-Jun-04	12:20:49.903960
RA2_FGD_2PNPDK20040602_122015_000059502027_00224_11801_1131.N1	02-Jun-04	12:20:15.425654	02-Jun-04	13:59:25.243752
RA2_FGD_2PNPDK20040602_135850_000050172027_00225_11802_1132.N1	02-Jun-04	13:58:50.765460	02-Jun-04	15:22:28.165548
RA2_FGD_2PNPDK20040606_133354_000059182027_00282_11859_1182.N1	06-Jun-04	13:33:54.542296	06-Jun-04	15:12:32.054383
RA2_FGD_2PNPDK20040606_151157_000051242027_00283_11860_1183.N1	06-Jun-04	15:11:57.576084	06-Jun-04	16:37:21.920166
RA2_FGD_2PNPDK20040606_195956_000000362027_00286_11863_1188.N1	06-Jun-04	19:59:56.501350	06-Jun-04	20:00:32.093651
RA2_FGD_2PNPDE20040619_225101_000008892027_00473_12050_0520.N1	19-Jun-04	22:51:01.530618	19-Jun-04	23:05:50.446837
RA2_FGD_2PNPDE20040620_003138_000058942027_00474_12051_0521.N1	20-Jun-04	00:31:38.296401	20-Jun-04	02:09:52.414499
RA2_FGD_2PNPDE20040620_020845_000004972027_00475_12052_0522.N1	20-Jun-04	02:08:45.630206	20-Jun-04	02:17:02.418448
RA2_FGD_2PNPDE20040620_032322_000060902027_00476_12053_0523.N1	20-Jun-04	03:23:22.796013	20-Jun-04	05:04:52.978098
RA2_FGD_2PNPDE20040620_050417_000006952027_00477_12054_0524.N1	20-Jun-04	05:04:17.385797	20-Jun-04	05:15:52.466101
RA2_FGD_2PNPDK20040620_064519_000041322027_00478_12055_1349.N1	20-Jun-04	06:45:19.773583	20-Jun-04	07:54:11.543729
RA2_FGD_2PNPDK20040620_075335_000061112027_00479_12056_1350.N1	20-Jun-04	07:53:35.951431	20-Jun-04	09:35:27.299509
RA2_FGD_2PNPDK20040620_093439_000060402027_00480_12057_1351.N1	20-Jun-04	09:34:39.453202	20-Jun-04	11:15:19.505286
RA2_FGD_2PNPDK20040620_111443_000060212027_00481_12058_1352.N1	20-Jun-04	11:14:43.912988	20-Jun-04	12:55:05.027070
RA2_FGD_2PNPDK20040620_125430_000059302027_00482_12059_1353.N1	20-Jun-04	12:54:30.548780	20-Jun-04	14:33:20.314867
RA2_FGD_2PNPDK20040620_143221_000050532027_00483_12060_1354.N1	20-Jun-04	14:32:21.328570	20-Jun-04	15:56:34.376649

Table 3: List of L2 FGD Files affected by S-Band anomaly during cycle 27

A valuable algorithm to detect the RA-2 DSRs affected by the S-Band anomaly within the L2 products can be found in [R- 12]. Note that the algorithm is only valid for data acquired over open-ocean.

7.2 MWR Performances

For MWR performances please refer to the Reference CLS Cyclic Report of the type of [R – 2].

7.3 DORIS Performances

For DORIS performances refer to the Reference F-PAC Monthly Report of the type of [R - 1].

8 PRODUCT PERFORMANCES

8.1 Availability of data

In Figure 8 and Table 4 the summary of unavailable RA-2 L0 products is given.
It is easy to notice that close to the Himalayan region a small gap in the data is present. This is due to the daily instrument switch-off (Heater 2 mode) performed to prevent the S-Band anomaly to last more than one day when it occurs

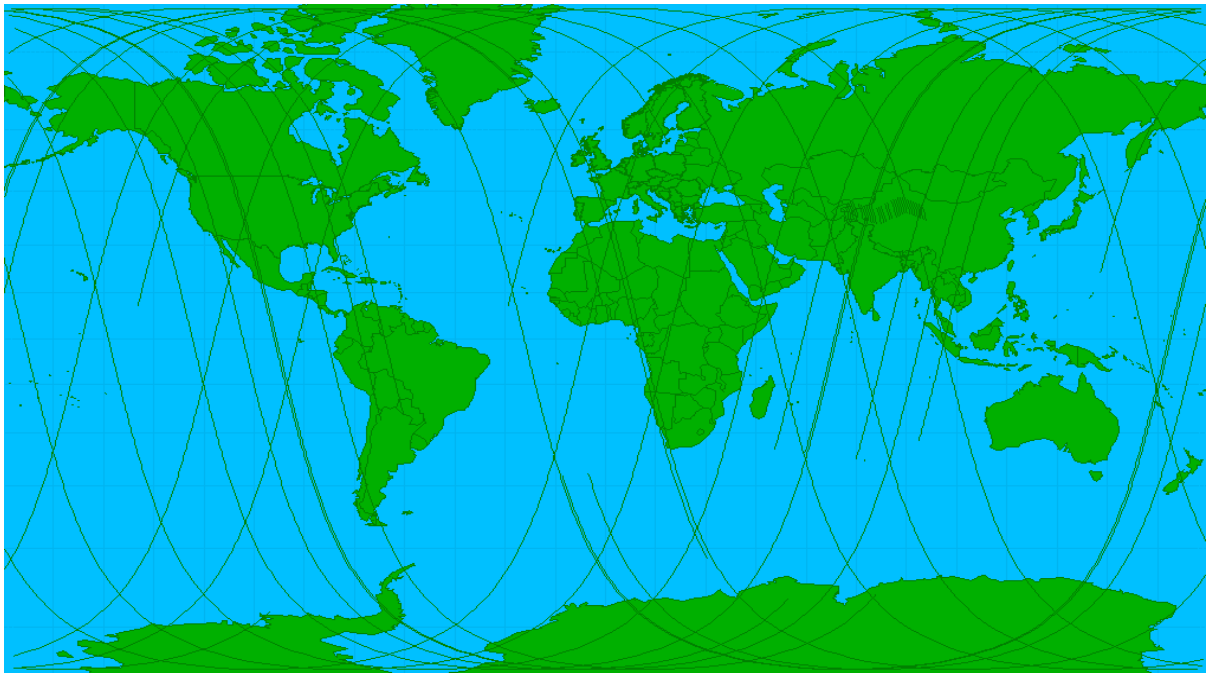

Figure 8: RA-2 L0 unavailable products for first part of cycle 27

Start date	Start time	Stop date	Stop time	Duration (s)	Start orbit	Stop orbit	Reason
18-May-04	16:36:44	18-May-04	16:38:01	77	11589	11589	PDS_UNKNOWN_FAILURE
19-May-04	16:04:41	19-May-04	16:05:59	78	11603	11603	PDS_UNKNOWN_FAILURE
20-May-04	15:30:52	20-May-04	15:30:55	3	11617	11617	PDS_UNKNOWN_FAILURE
20-May-04	15:33:56	20-May-04	15:35:14	78	11617	11617	PDS_UNKNOWN_FAILURE
21-May-04	16:42:09	21-May-04	16:43:26	77	11632	11632	PDS_UNKNOWN_FAILURE
22-May-04	16:10:24	22-May-04	16:11:42	78	11646	11646	PDS_UNKNOWN_FAILURE
23-May-04	15:39:32	23-May-04	15:40:50	78	11660	11660	PDS_UNKNOWN_FAILURE
25-May-04	16:16:19	25-May-04	16:17:37	78	11689	11689	PDS_UNKNOWN_FAILURE
26-May-04	15:42:10	26-May-04	15:42:13	3	11703	11703	PDS_UNKNOWN_FAILURE
26-May-04	15:45:08	26-May-04	15:46:26	78	11703	11703	PDS_UNKNOWN_FAILURE
27-May-04	15:13:19	27-May-04	15:14:37	78	11717	11717	PDS_UNKNOWN_FAILURE
28-May-04	16:22:14	28-May-04	16:23:32	78	11732	11732	PDS_UNKNOWN_FAILURE
29-May-04	15:50:44	29-May-04	15:52:02	78	11746	11746	PDS_UNKNOWN_FAILURE

30-May-04	15:19:14	30-May-04	15:20:32	78	11760	11760	PDS_UNKNOWN_FAILURE
31-May-04	02:45:17	31-May-04	02:45:27	10	11766	11766	PDS_UNKNOWN_FAILURE
31-May-04	02:45:27	31-May-04	12:01:50	33383	11766	11772	UNAV_RA2
31-May-04	12:01:50	31-May-04	12:02:56	66	11772	11772	PDS_UNKNOWN_FAILURE
02-Jun-04	15:25:09	02-Jun-04	15:26:27	78	11803	11803	PDS_UNKNOWN_FAILURE
02-Jun-04	22:16:33	03-Jun-04	00:21:28	7495	11807	11808	PDS_UNKNOWN_FAILURE
03-Jun-04	16:34:04	03-Jun-04	16:35:22	78	11818	11818	PDS_UNKNOWN_FAILURE
04-Jun-04	16:01:55	04-Jun-04	16:03:13	78	11832	11832	PDS_UNKNOWN_FAILURE
05-Jun-04	15:28:05	05-Jun-04	15:28:07	2	11846	11846	PDS_UNKNOWN_FAILURE
05-Jun-04	15:31:04	05-Jun-04	15:32:22	78	11846	11846	PDS_UNKNOWN_FAILURE
06-Jun-04	16:39:28	06-Jun-04	16:40:46	78	11861	11861	PDS_UNKNOWN_FAILURE
08-Jun-04	15:33:44	08-Jun-04	15:33:46	2	11889	11889	PDS_UNKNOWN_FAILURE
08-Jun-04	15:36:46	08-Jun-04	15:38:04	78	11889	11889	PDS_UNKNOWN_FAILURE
09-Jun-04	16:44:53	09-Jun-04	16:46:10	77	11904	11904	PDS_UNKNOWN_FAILURE
10-Jun-04	16:13:23	10-Jun-04	16:14:41	78	11918	11918	PDS_UNKNOWN_FAILURE
11-Jun-04	15:42:21	11-Jun-04	15:43:39	78	11932	11932	PDS_UNKNOWN_FAILURE
12-Jun-04	15:10:22	12-Jun-04	15:11:40	78	11946	11946	PDS_UNKNOWN_FAILURE
13-Jun-04	16:19:18	13-Jun-04	16:20:35	77	11961	11961	PDS_UNKNOWN_FAILURE
15-Jun-04	15:16:17	15-Jun-04	15:17:35	78	11989	11989	PDS_UNKNOWN_FAILURE
16-Jun-04	16:25:12	16-Jun-04	16:26:30	78	12004	12004	PDS_UNKNOWN_FAILURE
16-Jun-04	19:52:16	16-Jun-04	21:31:16	5940	12006	12007	PDS_UNKNOWN_FAILURE
17-Jun-04	15:50:48	17-Jun-04	15:50:51	3	12018	12018	PDS_UNKNOWN_FAILURE
17-Jun-04	15:53:32	17-Jun-04	15:54:50	78	12018	12018	PDS_UNKNOWN_FAILURE
18-Jun-04	15:19:36	18-Jun-04	15:19:39	3	12032	12032	PDS_UNKNOWN_FAILURE
18-Jun-04	15:22:11	18-Jun-04	15:23:29	78	12032	12032	PDS_UNKNOWN_FAILURE
18-Jun-04	21:56:50	18-Jun-04	23:22:25	5135	12036	12036	PDS_UNKNOWN_FAILURE
19-Jun-04	04:12:10	19-Jun-04	05:36:36	5066	12039	12040	PDS_UNKNOWN_FAILURE
19-Jun-04	16:31:07	19-Jun-04	16:32:24	77	12047	12047	PDS_UNKNOWN_FAILURE
19-Jun-04	21:04:24	19-Jun-04	22:51:01	6397	12049	12050	PDS_UNKNOWN_FAILURE
20-Jun-04	02:17:01	20-Jun-04	03:23:22	3981	12052	12053	PDS_UNKNOWN_FAILURE
20-Jun-04	15:56:33	20-Jun-04	15:56:35	2	12061	12061	PDS_UNKNOWN_FAILURE
20-Jun-04	15:59:07	20-Jun-04	16:00:25	78	12061	12061	PDS_UNKNOWN_FAILURE
21-Jun-04	03:02:31	21-Jun-04	04:33:51	5480	12067	12068	PDS_UNKNOWN_FAILURE
21-Jun-04	04:43:19	21-Jun-04	06:13:41	5422	12068	12069	PDS_UNKNOWN_FAILURE
21-Jun-04	14:47:40	21-Jun-04	14:47:51	11	12074	12074	PDS_UNKNOWN_FAILURE
21-Jun-04	14:47:51	21-Jun-04	15:25:17	2246	12074	12075	UNAV_RA2
21-Jun-04	15:28:06	21-Jun-04	19:24:30	14184	12075	12077	UNAV_RA2
21-Jun-04	19:24:30	21-Jun-04	19:25:36	66	12077	12077	PDS_UNKNOWN_FAILURE

Table 4: List of gaps for RA-2 L0 products during cycle 27

In Figure 9 and Table 5 the summary of unavailable MWR L0 products is given.

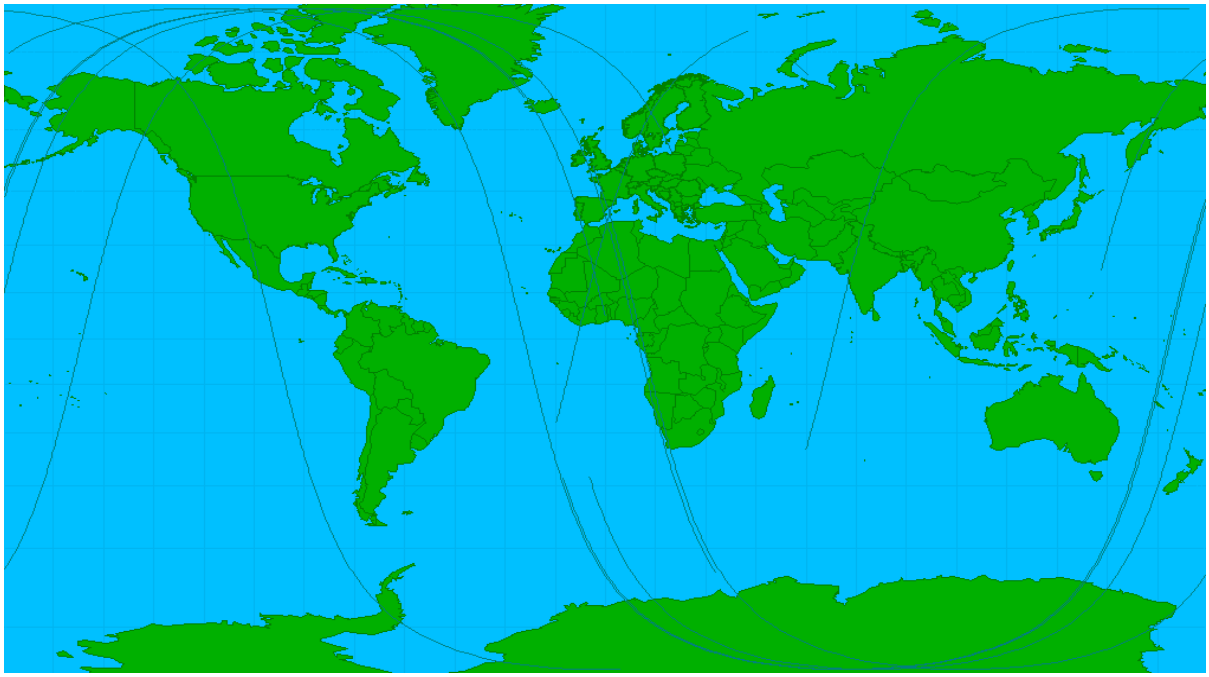

Figure 9: MWR L0 unavailable products for cycle 27

Start date	Start time	Stop date	Stop time	Duration (s)	Start orbit	Stop orbit	Reason
18-May-04	10:11:10	18-May-04	10:41:34	1824	11585	11585	PDS_UNKNOWN_FAILURE
19-May-04	16:14:49	19-May-04	16:15:37	48	11603	11603	PDS_UNKNOWN_FAILURE
02-Jun-04	22:15:43	03-Jun-04	00:21:19	7536	11807	11808	PDS_UNKNOWN_FAILURE
16-Jun-04	19:51:25	16-Jun-04	21:31:01	5976	12006	12007	PDS_UNKNOWN_FAILURE
18-Jun-04	21:55:53	18-Jun-04	23:22:18	5185	12036	12036	PDS_UNKNOWN_FAILURE
19-Jun-04	04:10:42	19-Jun-04	05:36:18	5136	12039	12040	PDS_UNKNOWN_FAILURE
19-Jun-04	21:03:32	19-Jun-04	22:50:44	6432	12049	12050	PDS_UNKNOWN_FAILURE

Table 5: List of gaps for MWR L0 products during cycle 27

In Figure 10 and Table 6 the summary of unavailable RA-2 L1b products is given. Please note that in this case, only the gaps due to problems with the PDS are reported.

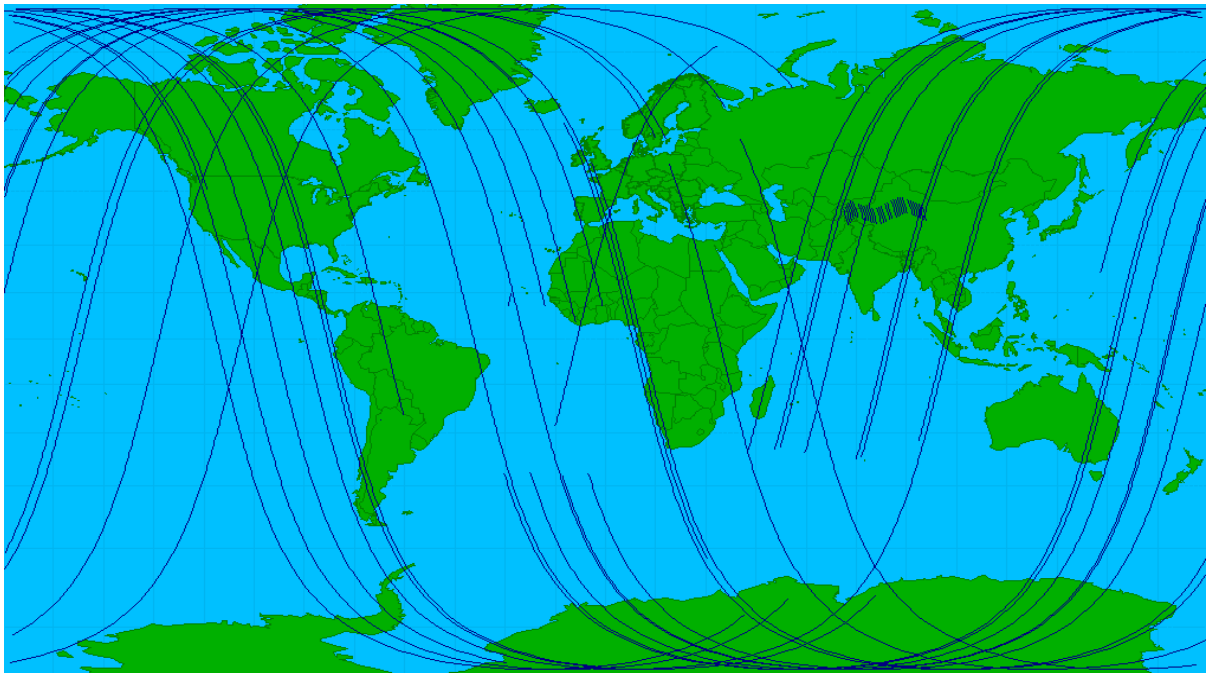

Figure 10: RA-2 L1b unavailable products for cycle 27

Start date	Start time	Stop date	Stop time	Duration (s)	Start orbit	Stop orbit	Reason
18-May-04	10:12:03	18-May-04	10:41:52	1789	11585	11585	PDS_UNKNOWN_FAILURE
18-May-04	16:36:44	18-May-04	16:38:01	77	11589	11589	PDS_UNKNOWN_FAILURE
18-May-04	16:45:44	18-May-04	18:23:10	5846	11589	11590	PDS_UNKNOWN_FAILURE
18-May-04	20:03:52	18-May-04	21:45:26	6094	11591	11592	PDS_UNKNOWN_FAILURE
19-May-04	16:04:41	19-May-04	16:05:59	78	11603	11603	PDS_UNKNOWN_FAILURE
20-May-04	15:33:56	20-May-04	15:35:14	78	11617	11617	PDS_UNKNOWN_FAILURE
21-May-04	16:42:09	21-May-04	16:43:26	77	11632	11632	PDS_UNKNOWN_FAILURE
22-May-04	16:10:24	22-May-04	16:11:42	78	11646	11646	PDS_UNKNOWN_FAILURE
23-May-04	15:39:32	23-May-04	15:40:50	78	11660	11660	PDS_UNKNOWN_FAILURE
25-May-04	16:16:19	25-May-04	16:17:37	78	11689	11689	PDS_UNKNOWN_FAILURE
26-May-04	15:45:08	26-May-04	15:46:26	78	11703	11703	PDS_UNKNOWN_FAILURE
27-May-04	15:13:19	27-May-04	15:14:37	78	11717	11717	PDS_UNKNOWN_FAILURE
28-May-04	16:22:14	28-May-04	16:23:32	78	11732	11732	PDS_UNKNOWN_FAILURE
29-May-04	15:50:44	29-May-04	15:52:02	78	11746	11746	PDS_UNKNOWN_FAILURE
30-May-04	15:19:14	30-May-04	15:20:32	78	11760	11760	PDS_UNKNOWN_FAILURE
31-May-04	02:45:18	31-May-04	02:45:27	9	11766	11766	PDS_UNKNOWN_FAILURE
31-May-04	12:01:50	31-May-04	12:02:56	66	11772	11772	PDS_UNKNOWN_FAILURE
02-Jun-04	15:25:09	02-Jun-04	15:26:27	78	11803	11803	PDS_UNKNOWN_FAILURE
02-Jun-04	22:16:34	03-Jun-04	00:21:28	7494	11807	11808	PDS_UNKNOWN_FAILURE
03-Jun-04	16:34:04	03-Jun-04	16:35:22	78	11818	11818	PDS_UNKNOWN_FAILURE
03-Jun-04	18:22:16	03-Jun-04	19:59:14	5818	11819	11820	PDS_UNKNOWN_FAILURE
04-Jun-04	16:01:55	04-Jun-04	16:03:13	78	11832	11832	PDS_UNKNOWN_FAILURE
05-Jun-04	15:31:04	05-Jun-04	15:32:22	78	11846	11846	PDS_UNKNOWN_FAILURE

06-Jun-04	16:39:28	06-Jun-04	16:40:46	78	11861	11861	PDS_UNKNOWN_FAILURE
08-Jun-04	15:36:46	08-Jun-04	15:38:04	78	11889	11889	PDS_UNKNOWN_FAILURE
09-Jun-04	16:44:53	09-Jun-04	16:46:10	77	11904	11904	PDS_UNKNOWN_FAILURE
10-Jun-04	16:13:23	10-Jun-04	16:14:41	78	11918	11918	PDS_UNKNOWN_FAILURE
11-Jun-04	15:42:21	11-Jun-04	15:43:39	78	11932	11932	PDS_UNKNOWN_FAILURE
12-Jun-04	15:10:22	12-Jun-04	15:11:40	78	11946	11946	PDS_UNKNOWN_FAILURE
13-Jun-04	16:19:18	13-Jun-04	16:20:35	77	11961	11961	PDS_UNKNOWN_FAILURE
15-Jun-04	15:16:17	15-Jun-04	15:17:35	78	11989	11989	PDS_UNKNOWN_FAILURE
16-Jun-04	16:25:12	16-Jun-04	16:26:30	78	12004	12004	PDS_UNKNOWN_FAILURE
18-Jun-04	21:56:51	18-Jun-04	23:22:25	5134	12036	12036	PDS_UNKNOWN_FAILURE
19-Jun-04	04:12:11	19-Jun-04	05:36:36	5065	12039	12040	PDS_UNKNOWN_FAILURE
19-Jun-04	16:31:07	19-Jun-04	16:32:24	77	12047	12047	PDS_UNKNOWN_FAILURE
19-Jun-04	21:04:26	19-Jun-04	22:51:01	6395	12049	12050	PDS_UNKNOWN_FAILURE
19-Jun-04	23:05:50	20-Jun-04	00:31:38	5148	12051	12051	PDS_UNKNOWN_FAILURE
20-Jun-04	02:17:02	20-Jun-04	03:23:22	3980	12052	12053	PDS_UNKNOWN_FAILURE
20-Jun-04	05:15:52	20-Jun-04	06:45:19	5367	12054	12055	PDS_UNKNOWN_FAILURE
20-Jun-04	15:59:07	20-Jun-04	16:00:25	78	12061	12061	PDS_UNKNOWN_FAILURE
16-Jun-04	19:52:17	16-Jun-04	21:31:16	5939	12006	12007	PDS_UNKNOWN_FAILURE
16-Jun-04	23:20:02	17-Jun-04	01:00:59	6057	12008	12009	PDS_UNKNOWN_FAILURE
17-Jun-04	02:44:32	17-Jun-04	04:24:56	6024	12010	12011	PDS_UNKNOWN_FAILURE
17-Jun-04	15:53:32	17-Jun-04	15:54:50	78	12018	12018	PDS_UNKNOWN_FAILURE
18-Jun-04	03:02:41	18-Jun-04	04:27:58	5117	12024	12025	PDS_UNKNOWN_FAILURE
18-Jun-04	05:20:42	18-Jun-04	06:07:44	2822	12026	12026	PDS_UNKNOWN_FAILURE
18-Jun-04	15:19:37	18-Jun-04	15:19:39	2	12032	12032	PDS_UNKNOWN_FAILURE
18-Jun-04	15:22:11	18-Jun-04	15:23:29	78	12032	12032	PDS_UNKNOWN_FAILURE
20-Jun-04	22:32:39	21-Jun-04	00:00:04	5245	12065	12065	PDS_UNKNOWN_FAILURE
21-Jun-04	03:02:32	21-Jun-04	04:33:51	5479	12067	12068	PDS_UNKNOWN_FAILURE
21-Jun-04	04:43:20	21-Jun-04	06:13:41	5421	12068	12069	PDS_UNKNOWN_FAILURE
21-Jun-04	14:47:41	21-Jun-04	14:47:51	10	12074	12074	PDS_UNKNOWN_FAILURE
21-Jun-04	19:24:30	21-Jun-04	19:25:36	66	12077	12077	PDS_UNKNOWN_FAILURE

Table 6: List of gaps for RA-2 L1b products during cycle 27

8.2 RA-2 Altimeter Parameters

Hereafter a summary of the main Altimetric parameters performances is reported; these results have been obtained with the editing criteria mentioned in par. 8.3.

8.2.1 ALTIMETER RANGE

No current results for the time being. The monitoring of the RA-2 FD altimetric range shall be done once the NRT products shall be upgraded with the DORIS navigator NRT orbital information.

8.2.2 SIGNIFICANT WAVE HEIGHT

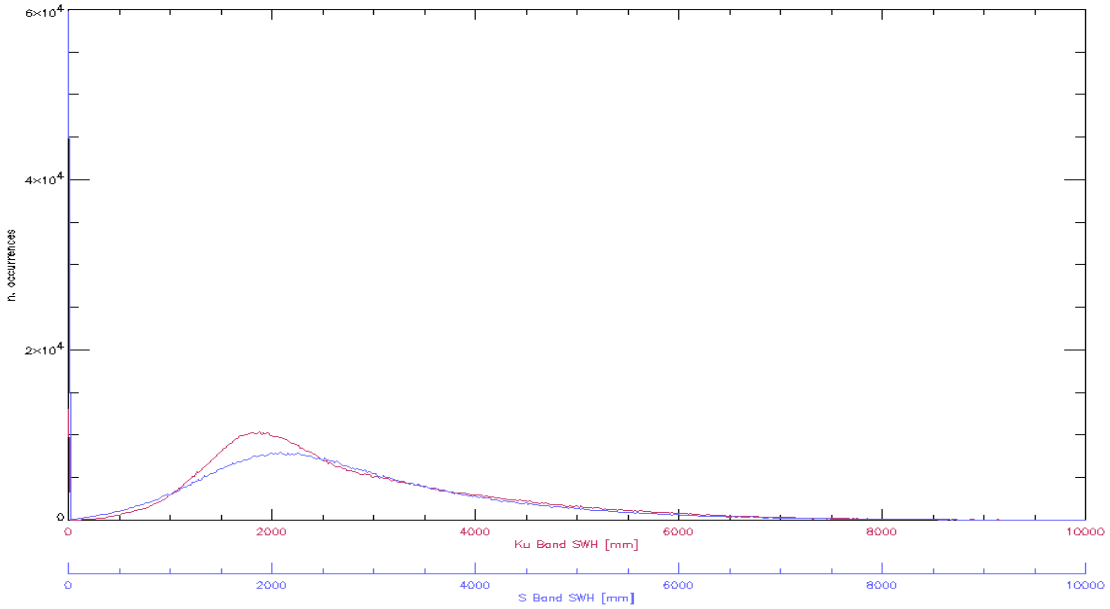

Figure 11: Histogram of Ku and S Band SWH for cycle 27 (mm)

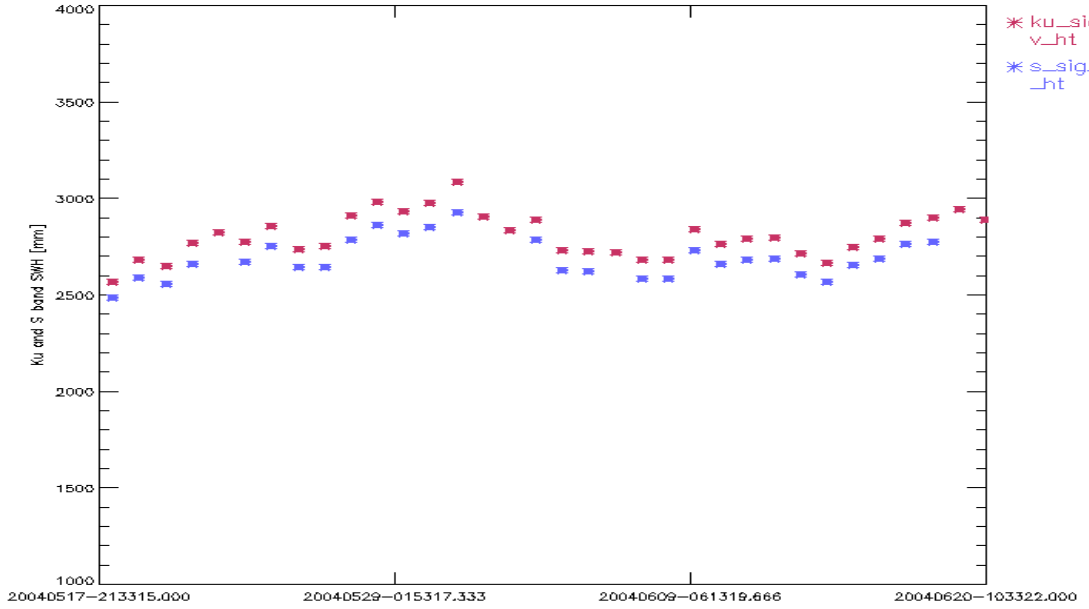

Figure 12: Ku and S SWH daily average for cycle 27 (mm)

The trend and the histogram of the SWH show a nominal behavior for this cycle; the high daily means (sometimes plotted outside the figure range) reported for the S-Band values are due to the so-called S-Band anomaly (ref. par.7.1.7).

8.2.3 BACKSCATTER COEFFICIENT – WIND SPEED

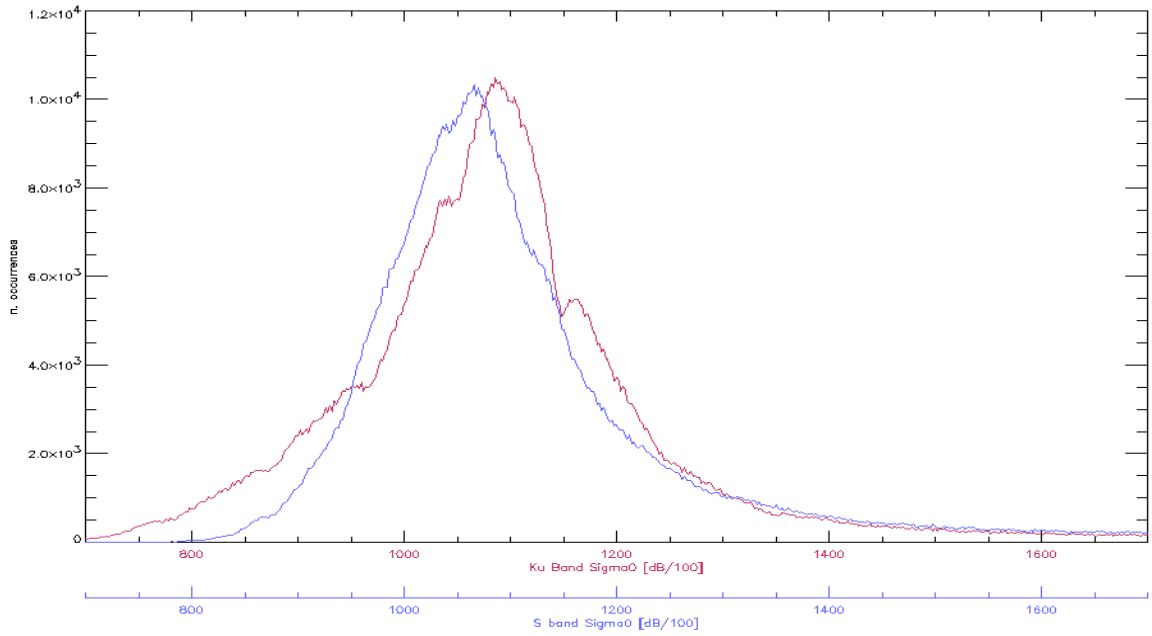

Figure 13: Histogram of Ku and S Band Backscattering Coefficient for cycle 27 (dB/100)

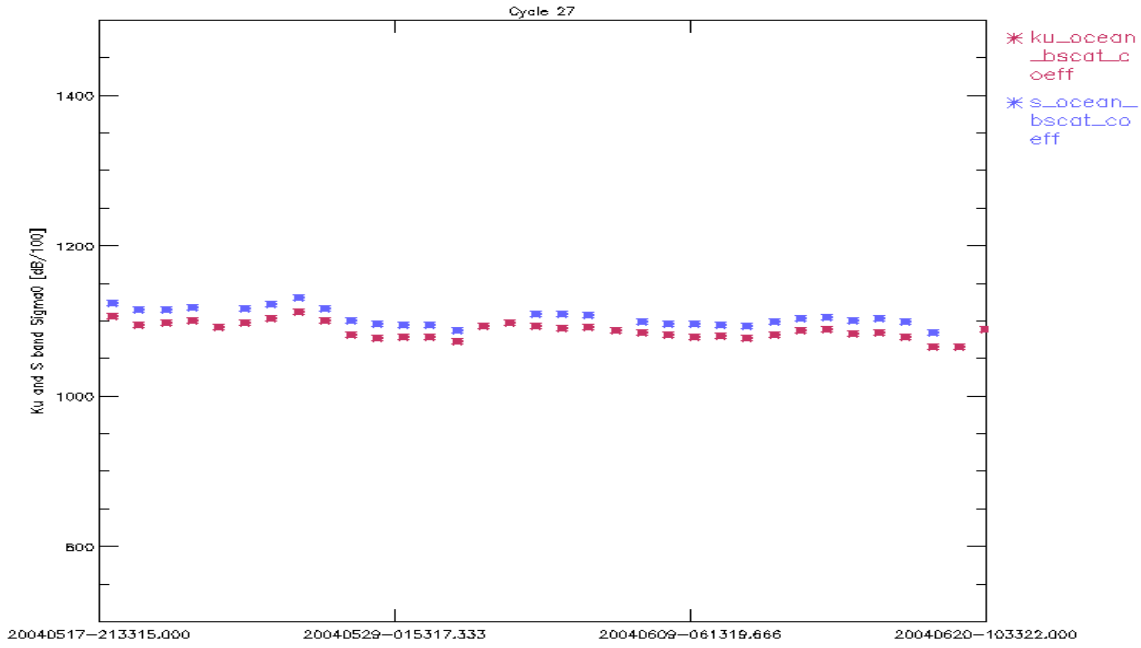

Figure 14: Ku and S Sigma_0 daily average for cycle 27 (dB/100)

The trend and the histogram of the Ku-Band Sigma_0 show a nominal behavior for this cycle. The S-Band Sigma_0 histogram double peak, noticed for cycles 24 and 25, is not present anymore; for this reason we are keen on thinking that it was due to a seasonal effect. The high daily means

(sometimes plotted outside the figure range) reported for the S-Band Sigma_0 trend are due to the so-called S-Band anomaly (ref. par. 7.1.7).

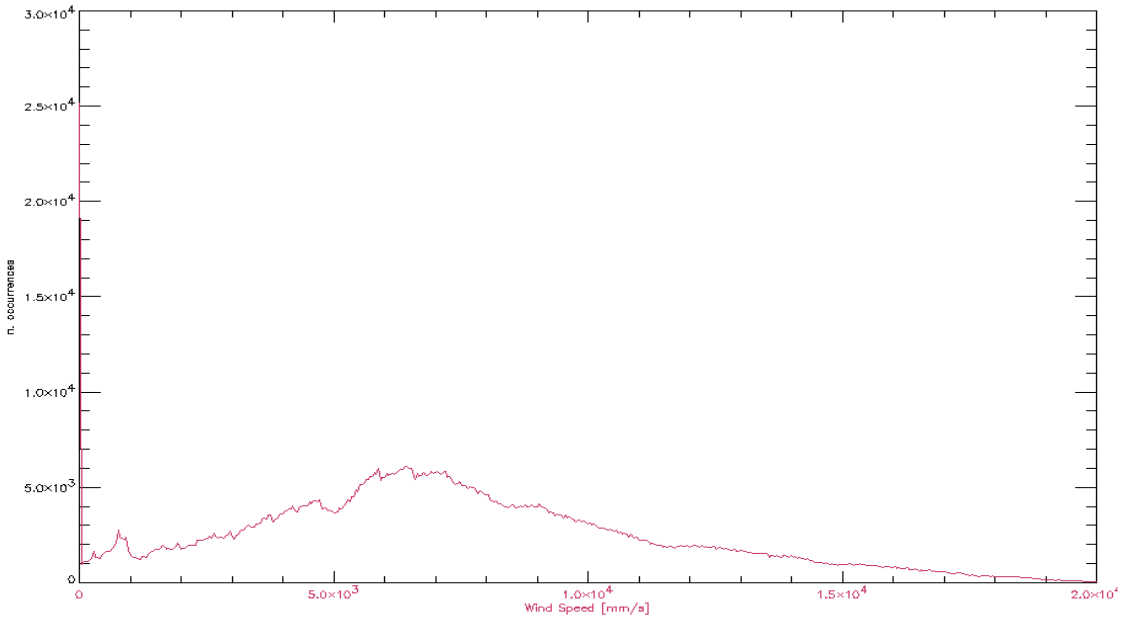

Figure 15: Histogram of Ku Wind Speed for cycle 27 (mm/s)

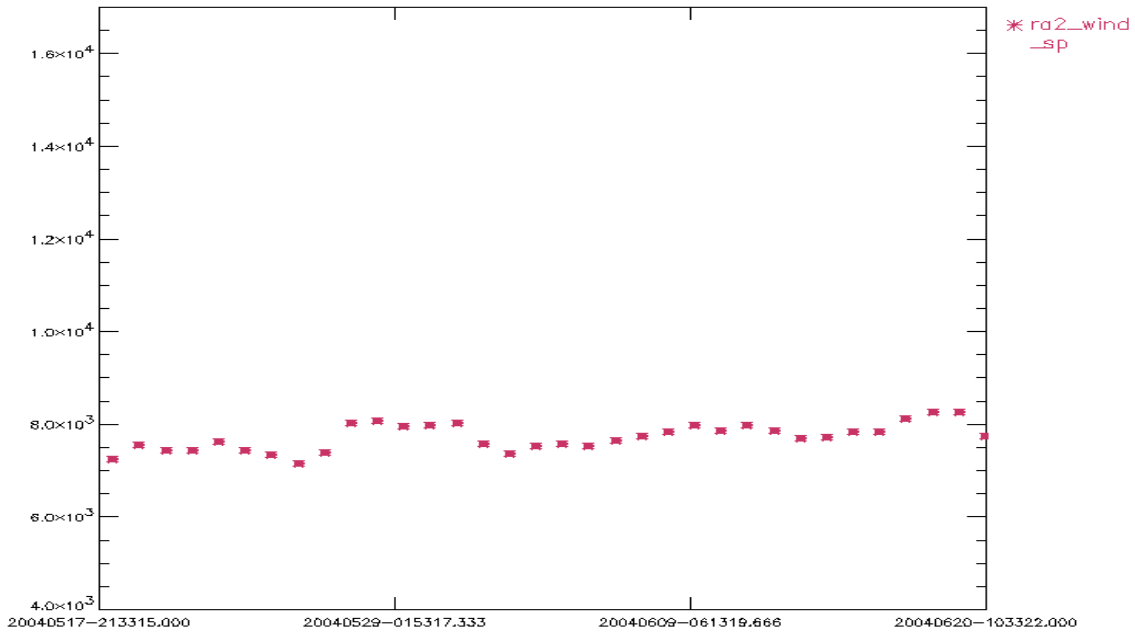

Figure 16: Wind Speed daily average for cycle 27 (mm/s)

8.3 Edited measurements

In order to produce the statistics reported in 8.2 the following editing criteria have been used before using RA2_FGD products:

Parameter	Surface type	Zone	Range
Ku SWH	Open Ocean	All world	[0, 10] (m)
Ku Backscattering Coeff.	Open ocean	All world	[7, 17] (dBs)
Ku Wind Speed	Open ocean	All world	[0, 20] (m/s)

Table 7: Editing criteria for RA-2 parameters statistics

8.4 Product disclaimer

For the product disclaimers please refer to the following web link:
http://envisat.esa.int/dataproducts/availability/

8.5 Data handling recommendations

8.5.1 SEA-ICE FLAG

The following algorithm is proposed for the determination of a sea-ice flag, presently missing in the Level 2 Ra-2 and MWR data products. (See [R – 14]):

|Latitude *(lat: field#4 of L2 data)*| >50 deg
AND
The number of 20Hz valid data *(num_18hz_ku_ocean: field#23 of L2 data)* < 17
OR
|MWR Wet Tropospheric Correction *(mwr_wet_tropo_corr: field#42 of L2 data)*–ECMWF Wet Tropospheric Correction *(mod_wet_tropo_corr: field#41 of L2 data)*| > 10 cm
OR
Peakiness *(Ku_peak: field#139 of L2 data)* >2

8.5.2 OCEAN S-BAND ANOMALIES DETECTION

A valuable algorithm to detect the Level 2 DSR affected by the RA-2 S-Band anomaly is proposed in [R- 12]. Note that its validity is limited to the data acquired over open-ocean.

8.5.3 WARNING ON IPF 4.56 VERSION IDENTIFICATION FIELD

All RA-2 and MWR level 1B and NRT Level 2 products generated after November 26, 2003 report a software version as being 4.54 (available in MPH field 8).

Nevertheless those products have been generated with the IPF V4.56 operational since November 26, 2003. The first nominal generated product, using the new SW version, will be the one relevant to the absolute orbit number 9094.

The software version ID is correct since December 4, 2003.

8.5.4 S-BAND BACKSCATTERING COEFFICIENT

For the data processed with IPF version 4.56 on, the S-Band Backscattering coefficient has been demonstrated to be in average about 0.65 dBs higher than for the previous versions of the processor. This is due to the algorithm used for the retrieval of the AGC in S-Band, corrected in IPF version 4.56 to be more coherent with the real functioning of the instrument.

An average value of 0.65 dBs is suggested to be added to the old software versions S-Band Sigma0 in order to be in line with the new IPF V4.56 version.

As a consequence of the IPF V4.56 s/w version installation, the rain flag validity is currently affected. This shall be corrected with the loading of a new ADF table.

8.5.5 USO RANGE CORRECTION

The actual data of cycle 27 have to be corrected to compensate for the Ultra Stable Oscillator drift shown in Figure 3. The measured Range shall be corrected considering a drift of –6.39 mm per year. Eventually it could also be corrected for the cyclic average given bias (28.99 mm) that has to be added from the measured value.

8.6 Wind & Wave quality assessment

Refer to the ECMWF report given in [R – 9].

9 LONG TERM MONITORING

9.1 RA-2 Instrument monitoring

9.1.1 IF FILTER MASK

In Figure 17 the evolution of the IF mask quality parameters evaluated as in [R – 4] is reported only for valid data. It can be observed that the difference with respect to the on-ground reference stays quite constant around 0.07 dBs. Three peaks are visible on the plot that correspond to the data

acquired on September the 27th at 15:48, on October the 29th at 15:42 and on May the 10th at 15:45. The reason of this could be found in the instrument warming up considering that the IF Cal acquisition has been made, in all the cases, only a couple of hours after an anomaly recovery. The residual noise and the accuracy show a very constant behavior over the whole period.

Despite the quite constant IF mask trend, a weird behavior has been observed during the validation of several newly created IF mask correction auxiliary files. This phenomenon is currently under investigation but in the meantime the decision has been taken to avoid updating the auxiliary file in question.

During cycle 27 the IF Calibration Mode still shows the weird behavior described in [R – 3]. This problem, present since the beginning of the mission, is under investigation. The anomaly directly affects the number of valid RA-2 IF masks obtained per cycle, but does not refrain from the generation of the IF mask correction file, used in input to the Level 1 B ground processing.

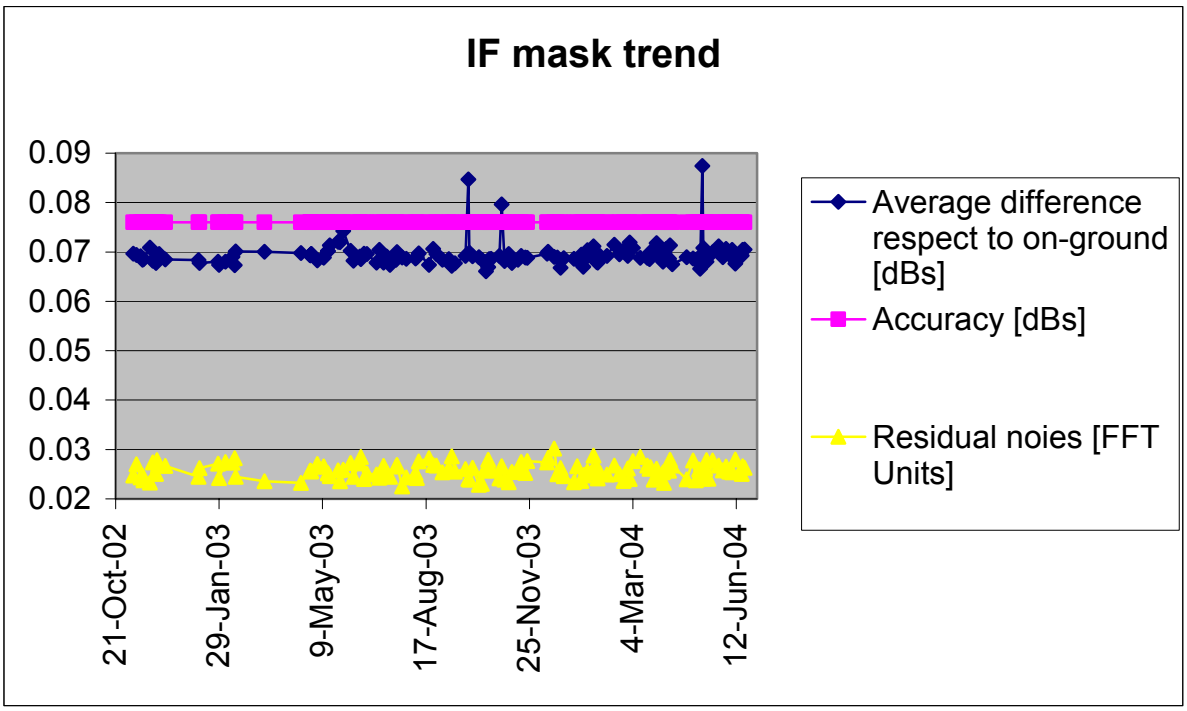

Figure 17: Evolution of the IF mask related parameters for valid IF masks retrieved up to cycle 27

9.1.2 USO

In Figure 18 the USO clock period trend retrieved until the end of cycle 27 is reported. In order to make the variability visible, the difference of the actual USO clock period with respect to the nominal one has been plotted, in the upper panel. In the lower panel the Range error due to the USO clock variability has been reported taking a satellite altitude of 800 Km as a nominal value.

Currently the nominal USO clock period (12500 ps) is used within the processing, this means that the data are not corrected for the bias and the drift correlated to the actual USO clock period. Those values, translated into altimetric range figures, are respectively of 32.41 mm and –3.60 mm/year as calculated with data covering the period 13 June 2003 to 22 June 2004. The given bias and drift have to added from the original altimetric range.

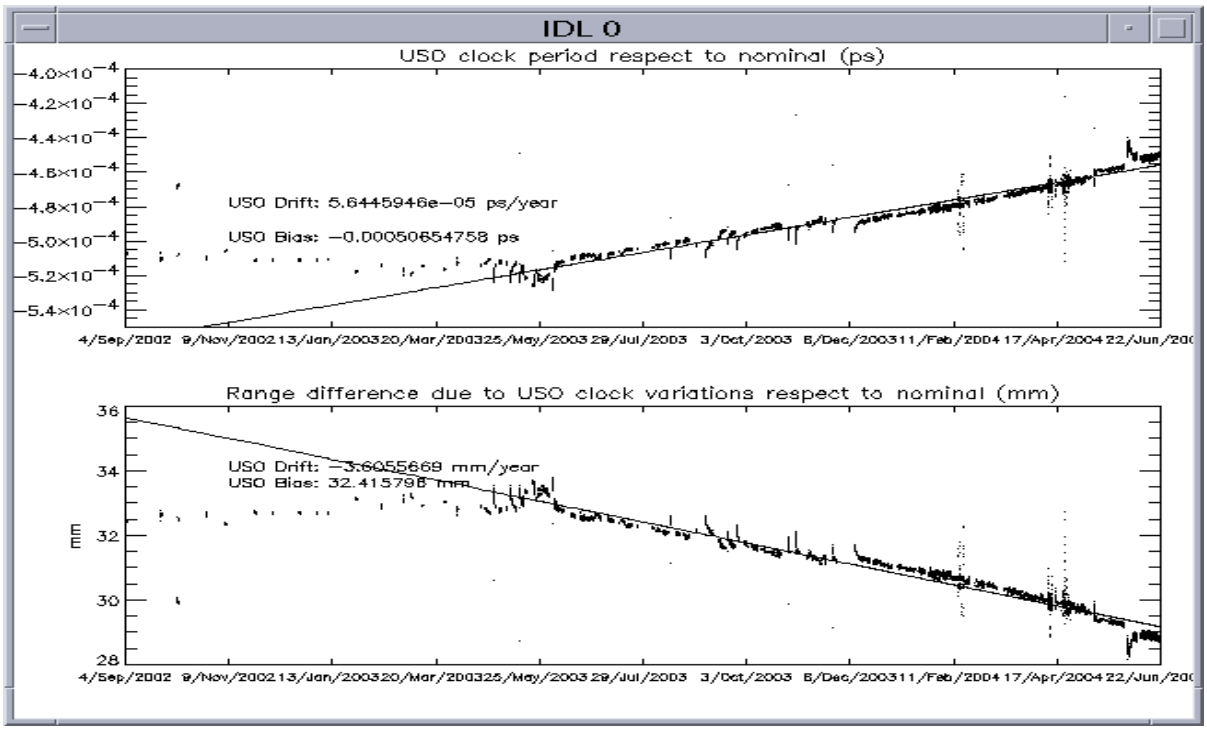

Figure 18: USO clock period until end of cycle 27

9.1.3 TRACKING CAPABILITY

In Figure 19, Figure 20 and Figure 21, the cyclic tracking percentages for the three RA-2 bandwidths are reported.
The worsening in performances noticeable for cycle 20 was due to the up-load of wrong on-board software parameters for the lasted for about three days.

In general, even if a tiny evolution can be observed, the tracking performances are well in line with the output figures and objectives of the Commissioning Phase as given in par. 7.1.3.

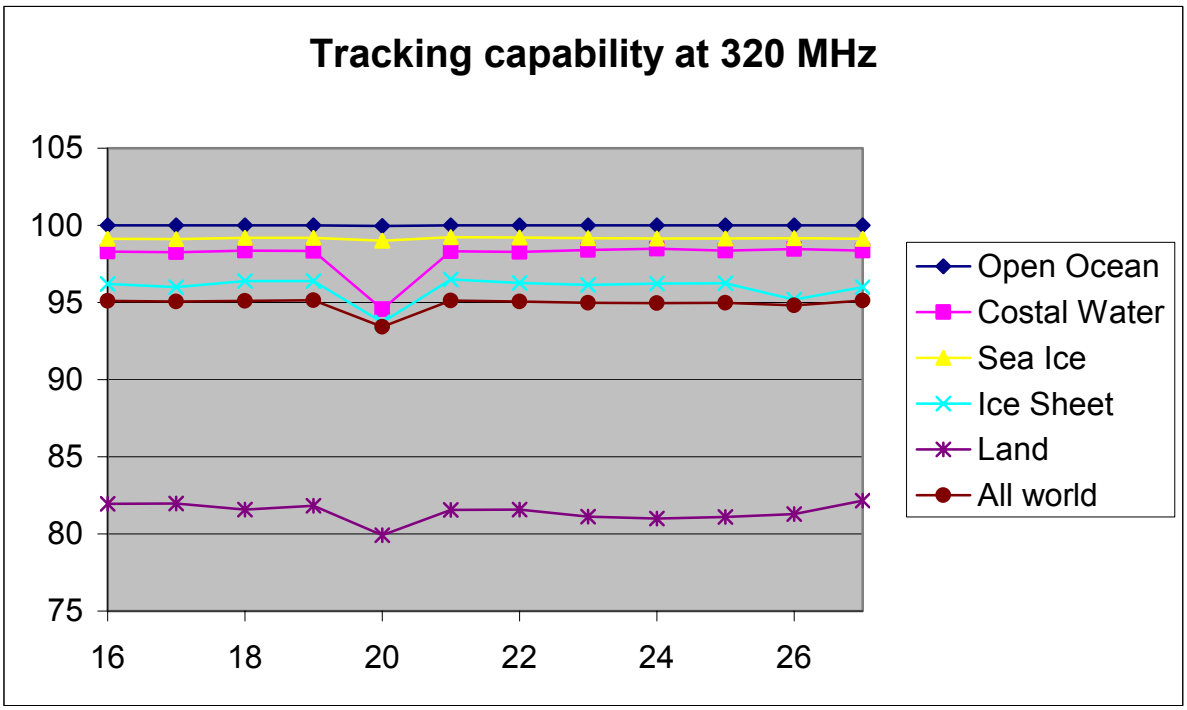

Figure 19: RA-2 Tracking percentage at 320MHz for different surfaces

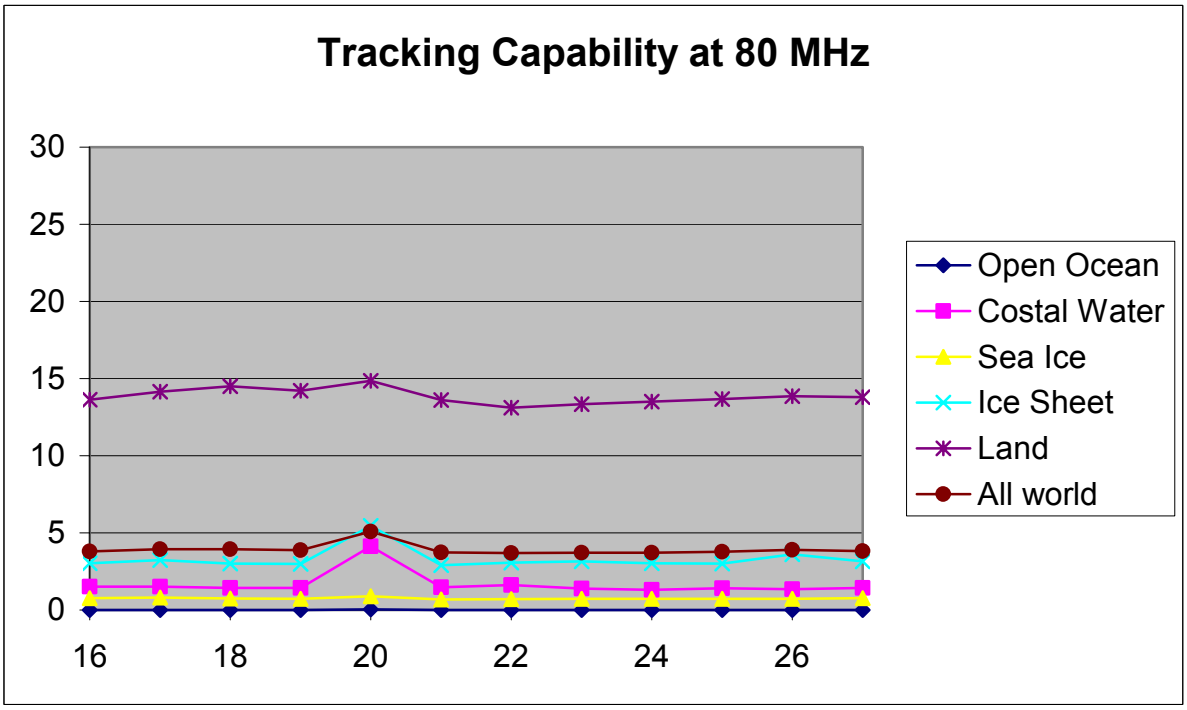

Figure 20: RA-2 Tracking percentage at 80MHz for different surfaces

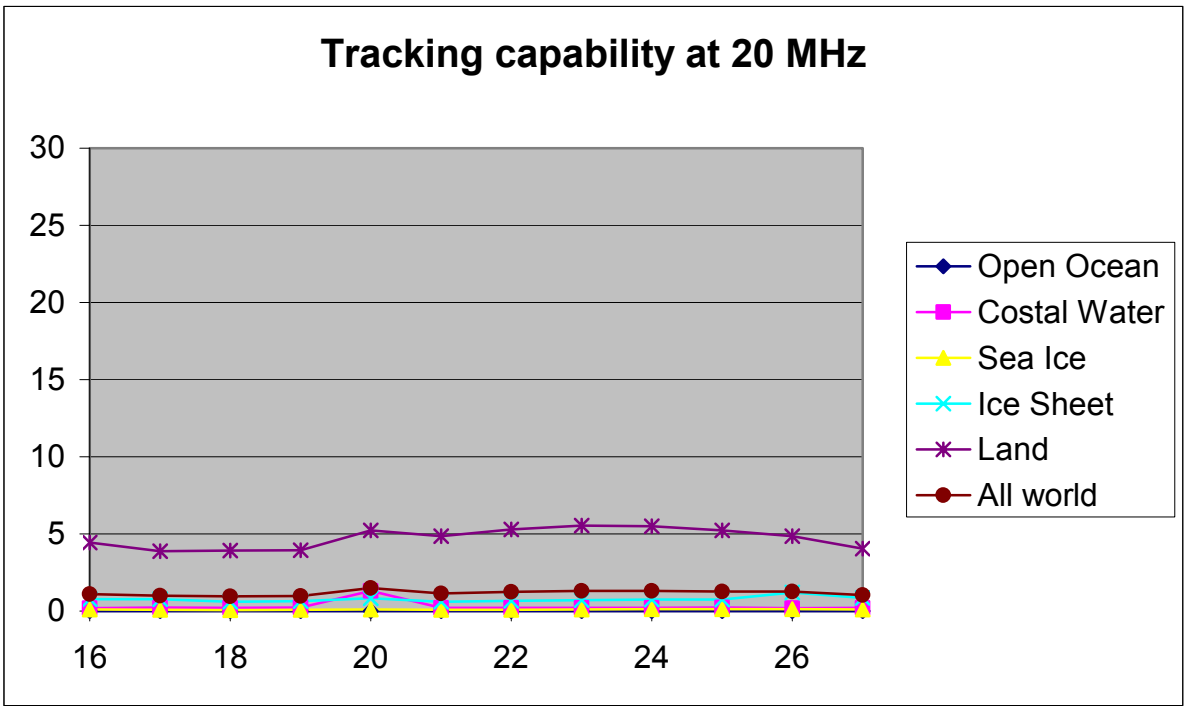

Figure 21: RA-2 Tracking percentage at 20MHz for different surfaces

9.1.4 DATATION

In Figure 22 (upper panel) the differences between the extrapolated UTC values and the corresponding real UTC values measured at the next Kiruna dump, are reported. Only few anomalous events can be observed at the beginning of the period (cycles 16/17) for which the difference rises above the 20 microseconds warning threshold. However, starting from cycles 22/23, the number of small differences (10 microseconds plus or minus) has increased a lot; this problem is currently under investigation.

In the lower panel the ICU clock step for the same period is shown where big variations are reported. This is however not a problem because the ICU clock period variations are included in the algorithm for the SBT/UTC correlation evaluation.

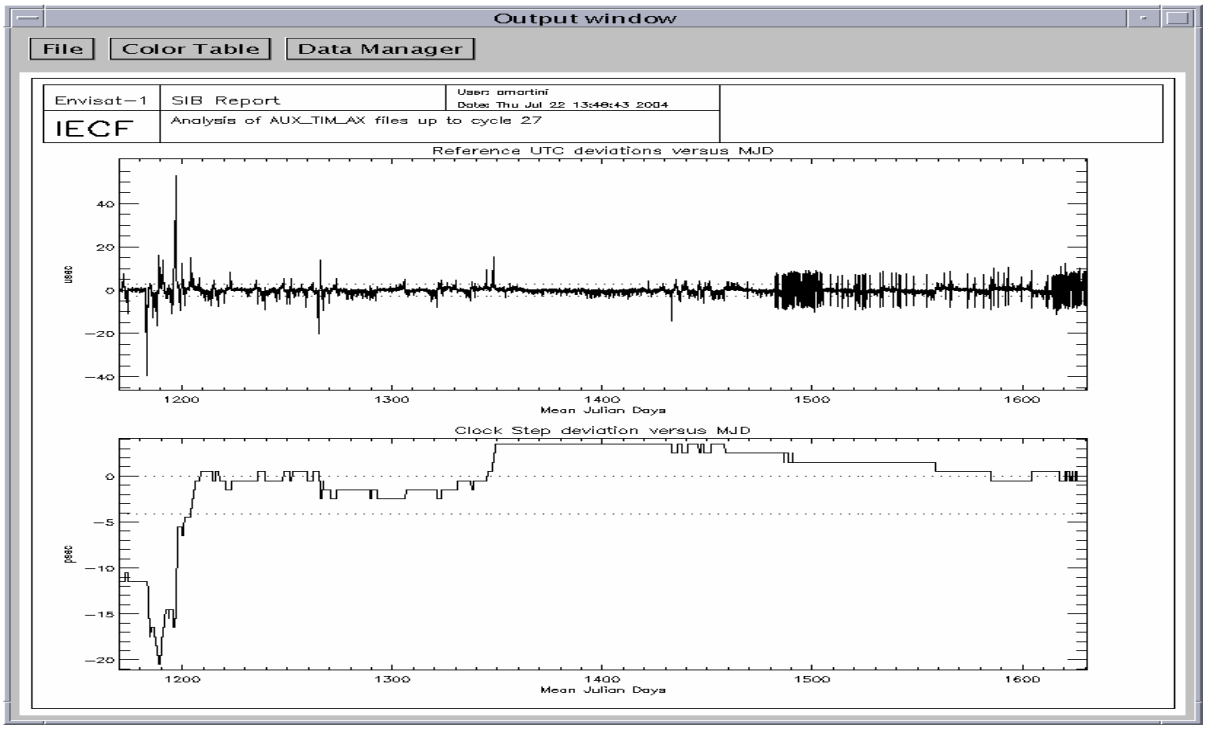

Figure 22: UTC deviations and ICU clock period up to cycle 27

9.1.5 MISPOINTING

In Figure 23 the overall mispointing squared trend (averaged over each orbit) is plotted for cycles 16 to 27. The jump occurred on November the 26th 2003 is correlated to the upload of IPF version 4.56; the abrupt decreasing of the mispointing squared value is due to the usage of a new RA2_IFF_AX IF mask auxiliary file.
On the other hand, it can be noticed that the mispointing squared assumes lower values just after an instrument anomaly; showing an increasing trend until it reaches back a standard mispointing value. This particular behavior can be explained by the different shape that the over-ocean average waveform has before and after an anomalous event as visible in Figure 24. Observe, in particular, the disappearance of the small dip in the waveforms acquired after the anomaly. This problem will be solved with the introduction of an updated mispointing retrieval algorithm with the next version of the processing software as described in par. 5.4.4.

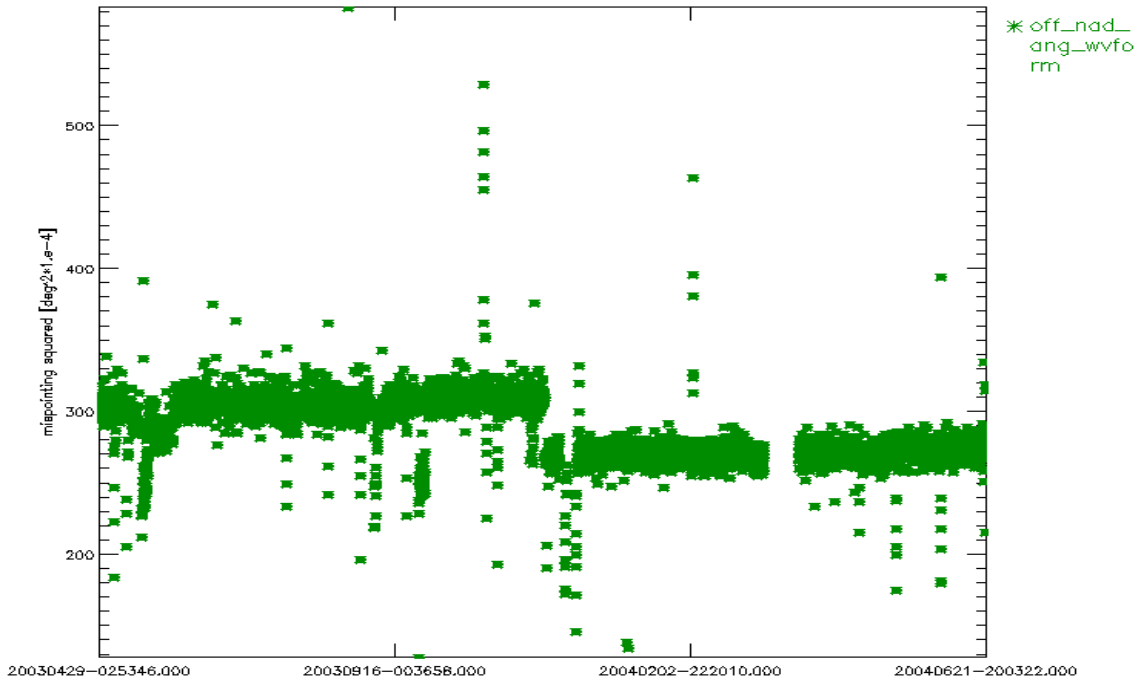

Figure 23: Smoothed mispointing squared trend until end of cycle 27 (deg^2*10e-4)

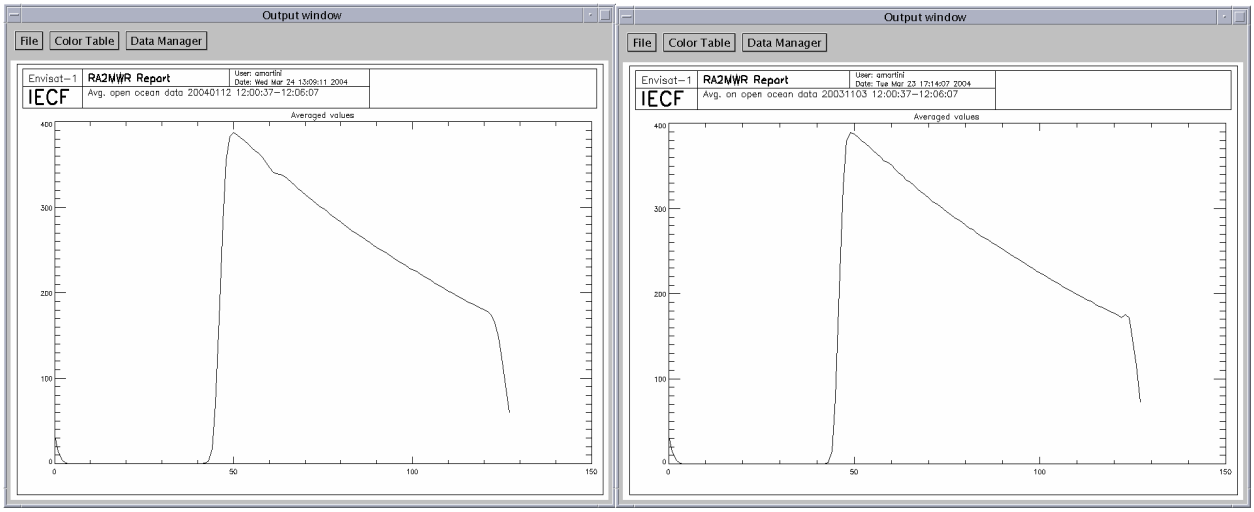

Figure 24: Open Ocean average waveforms before (left) and after an anomaly (right)

9.1.6 S-BAND ANOMALY

In the percentage of data per cycle that are affected by the so-called “S-Band” anomaly is reported. The figures are quite stable between 2.5% and 8.1%.
The relatively high value recorded for cycle 27 is due to the fact that on the day 1st of June, the S-band anomaly started at around 14:30 while the instrument didn’t switch to mode Heater 2 when

foreseen (at about 15:50). For this reason the S-Band anomaly continued for the next 24 hours until the next Heater 2 mode on June the 2nd.

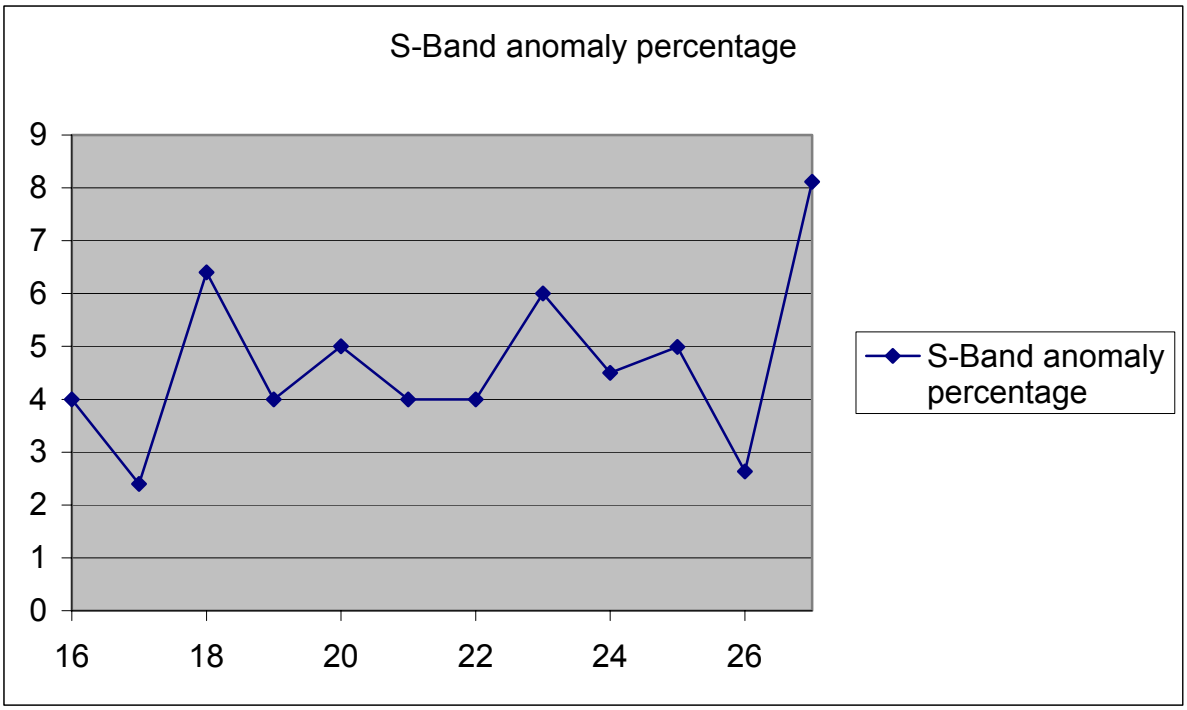

Figure 25: Percentage of data affected by the "S-Band Anomaly" for cycles 16-27

9.2 Products Monitoring

9.2.1 AVAILABILITY OF DATA

Hereafter the percentage of the different levels of products unavailability is reported for different cycles up to number 27. Considering as reference the instrument unavailability, it is possible to notice that in the last four months the situation is greatly improved for all levels of products.

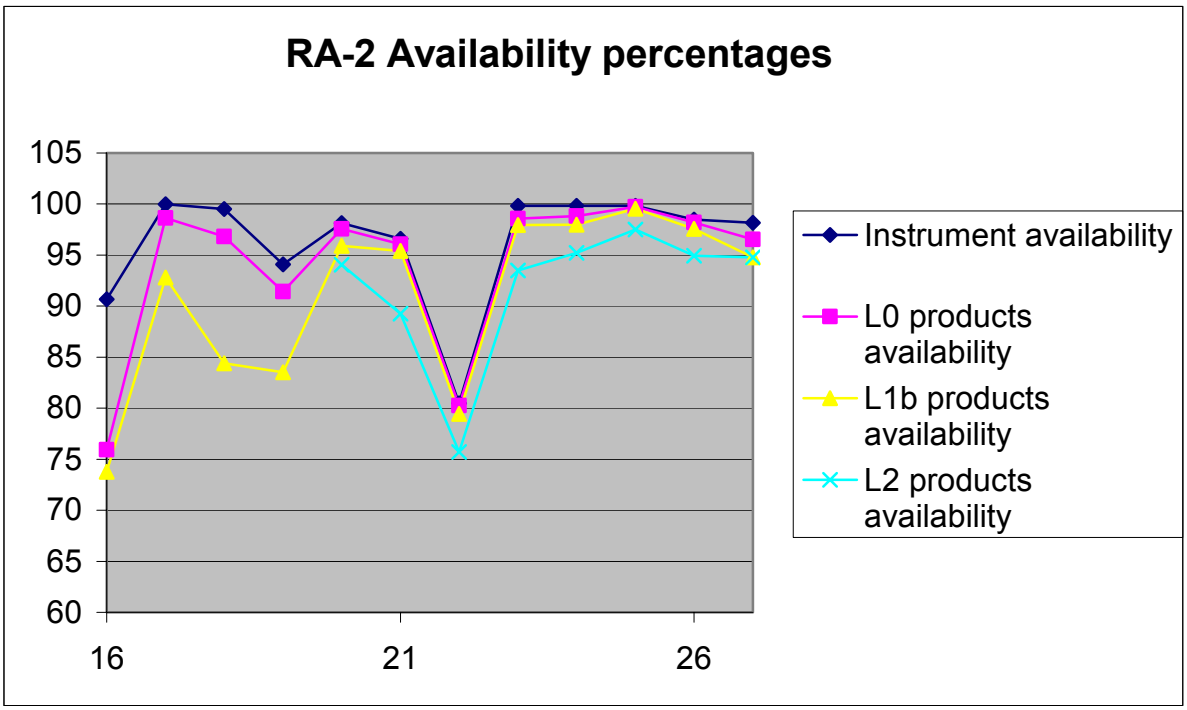

Figure 26: Percentage of Products unavailability up to cycle 27

9.2.2 RA-2 ALTIMETER PARAMETERS

Hereafter a summary of the main Altimetric parameters performances is reported; these results have been obtained with the editing criteria mentioned in par. 8.3.

9.2.2.1 Altimeter range

No current results for the time being. The monitoring of the RA-2 FD altimetric range shall be done once the NRT products shall be upgraded with the DORIS navigator NRT orbital information.

9.2.2.2 Significant Wave Height

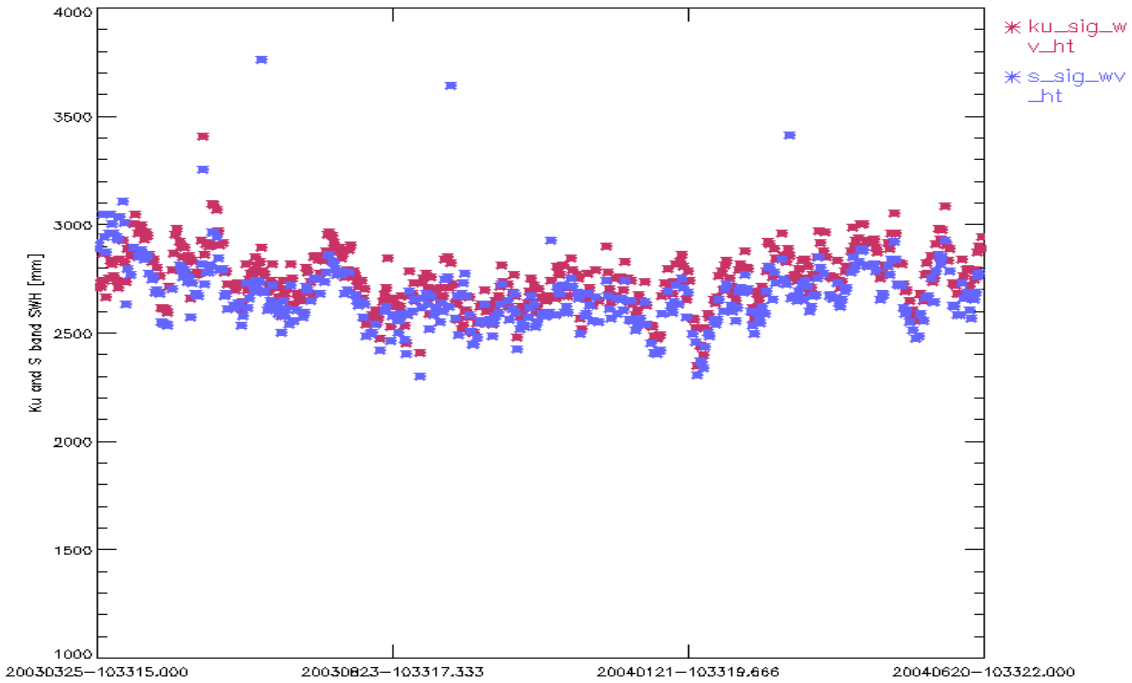

Figure 27: Ku and S SWH daily average up to cycle 27 (mm)

The Ku-Band SWH shows a stable behavior during the whole period. On the other hand, the S-Band SWH shows a drop on April the 9th 2003 corresponding to the operational up-load of IPF version 4.54; furthermore the high daily means reported (sometimes plotted outside the figure range) are due to the so-called S-Band anomaly (ref. par.7.1.7).

9.2.2.3 Backscatter coefficient – Wind Speed

The Ku-Band Sigma_0 trend, reported hereafter, is characterized by a jump of in average 3.24 dBs concomitant with the operational up-load of IPF version 4.54 occurred on the 9th of April 2004. To be said that this change is due to the upload of a new RA2_CHD_AX ADF file that artificially shifted the RA-2 real Sigma_0 in order to align it with ERS-2 Sigma_0 and make it coherent with the Witter and Chelton empirical wind model. A similar change in trend, but in the opposite direction, is also visible in the Wind Speed trend reported afterwards.

Beyond the huge jump occurred in April 2003, the S-Band Sigma_0 reports a smaller jump occurring on November the 26th 2003. Following the installation of the IPF processing chain V4.56, the average values of the RA-2 S-Band backscattering parameter, shows an increase of ~0.65 dBs, the new S-band sigma0 being higher with respect to the previous versions. See chapter 8.5.4.

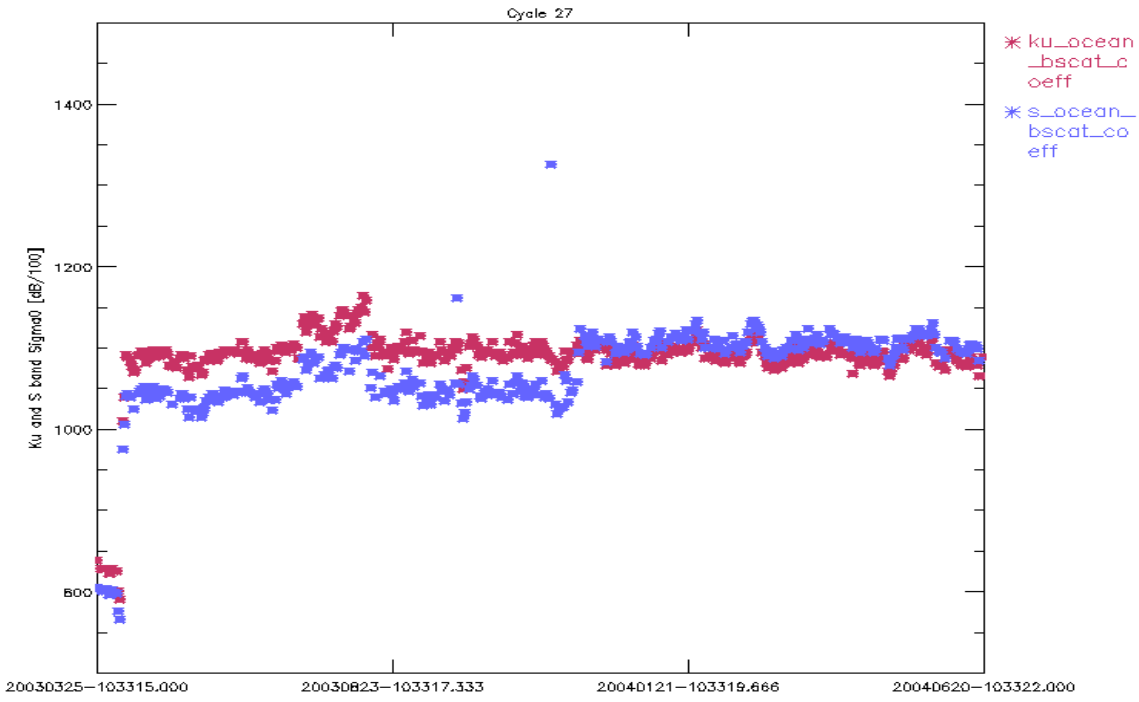

Figure 28: Ku and S Sigma_0 daily average up to cycle 27 (dB/100)

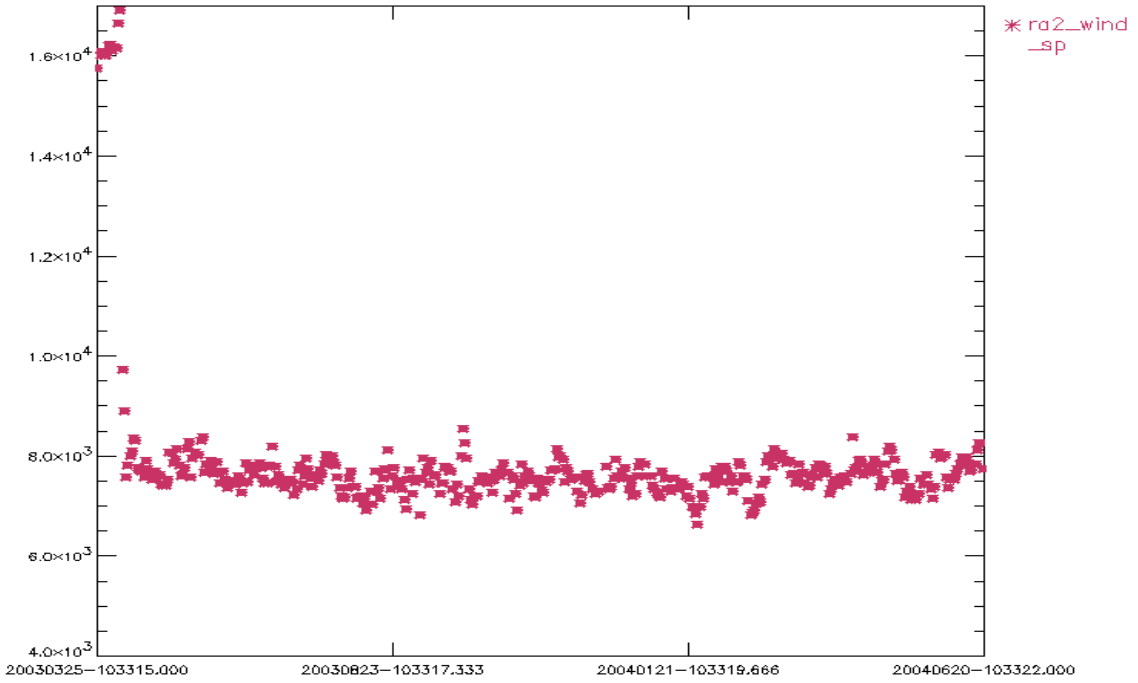

Figure 29: Wind Speed daily average for cycle 27 (mm/s)

10 PARTICULAR INVESTIGATIONS

During cycle 27 no special investigation has been performed.