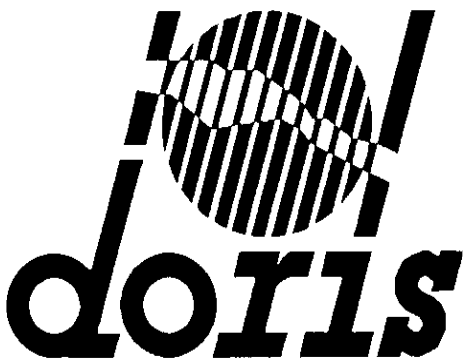
DORIS Performances



Contents

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(See following DORIS Products Quality presentation for MOE and POE performances)

DORIS Mission

- Main mission of DORIS, Doppler ORbitography Integrated by Satellite, is to provide to various users satellite Ephemerides
- Integrated real-time 3D navigator on-board, one block date/position/velocity/quality every 10 seconds
- Real-time time-tagging is done on-board on BCP2/4 pulses
- DORIS Doppler data are processed off-line on ground for precise orbits

Operations Summary

- 15 March - Switch-On of USO and MVR, and first Doppler measurements from DORIS beacons
- 12 April, the DORIS on-board navigator was successfully started
- Conducted activities have showed a nominal functioning of DORIS

Data Availability at Instrument Level

- DORIS on-board unavailability is mainly driven by ICU and satellite unavailability
- Only one DORIS incident, on navigator only, on 22 May just before an ICU problem
  - this incident was properly reported in the navigator TM, by orbit and datation quality indicators (HexFFFF)

Instrument Performances - Doppler data

- DORIS Doppler data residuals from currently calculated MOE orbit are 0.55-0.60 mm/s
- Quality of the Doppler data is as expected, similar quality is achieved on other DORIS instruments (SPOT5…)

Instrument Performances - Navigator

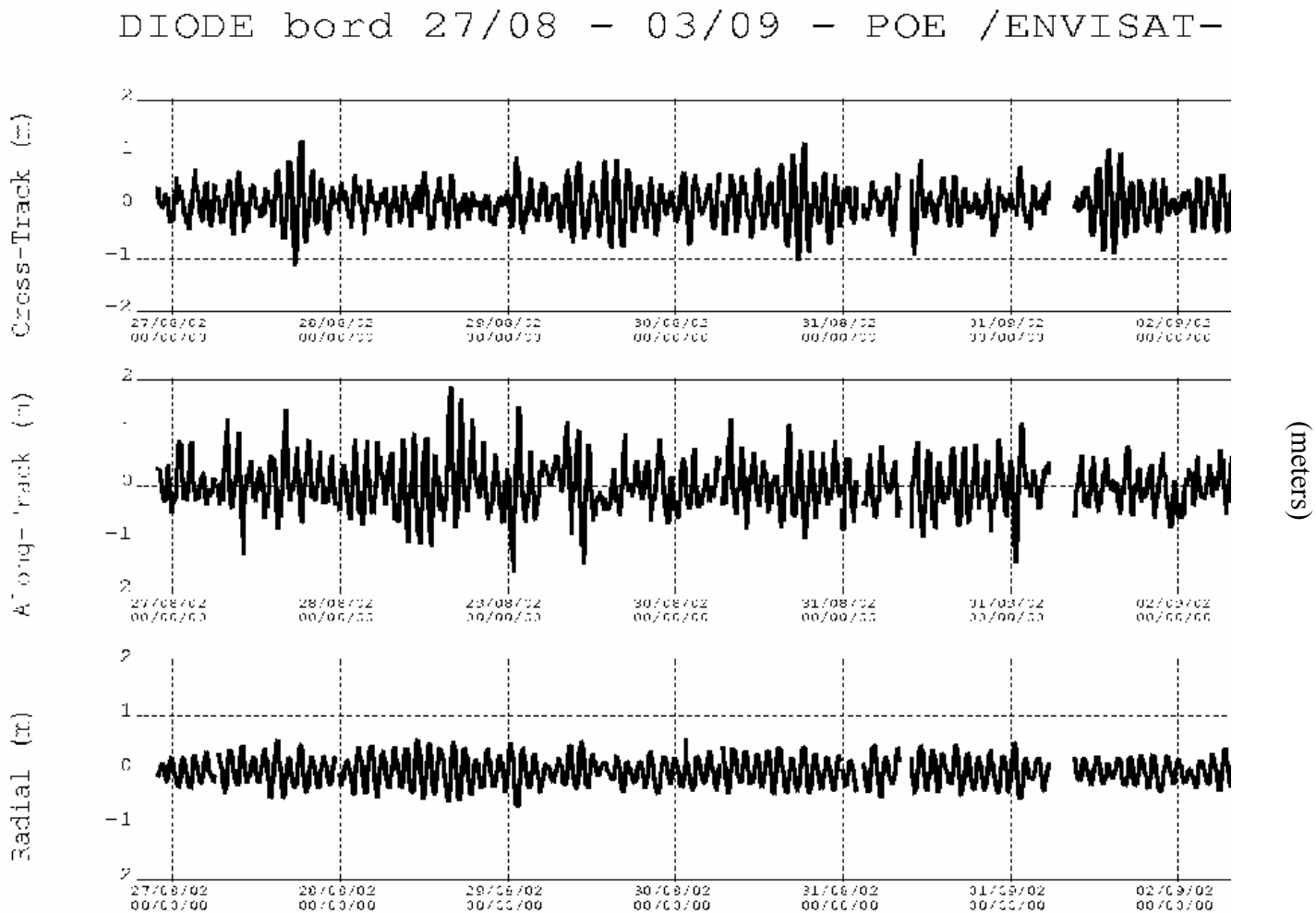
- Navigator accuracy is good and stable :
  - 20-30 cm radial RMS
  - Less than 1 meter 3D RMS
- Evaluation on 27 Aug-3 Sept 2002 compared to POE Orbit :

	NB POINTS	MINIMUM	MAXIMUM	MEAN	STANDARD DEV
Pos Radial	9572	-0.642743	0.595467	-0.015875	0.231335
Pos Along-Track	9572	-1.627002	1.869909	0.020870	0.421595
Pos Normal	9572	-1.116451	1.235177	0.034071	0.359720
Distance	9572	0.028018	1.947165	0.541433	0.263354
Vel Radial	9572	-0.001879	0.001694	-0.000020	0.000471
Vel Along	9572	-0.001042	0.001095	0.000004	0.000365
Vel Normal	9572	-0.001433	0.001682	0.000122	0.000470
Velocity	9572	0.000029	0.001897	0.000710	0.000297

Position in meters, Velocity in m/s

RMS radial = 23,19 cm
RMS 3D = 60.21 cm

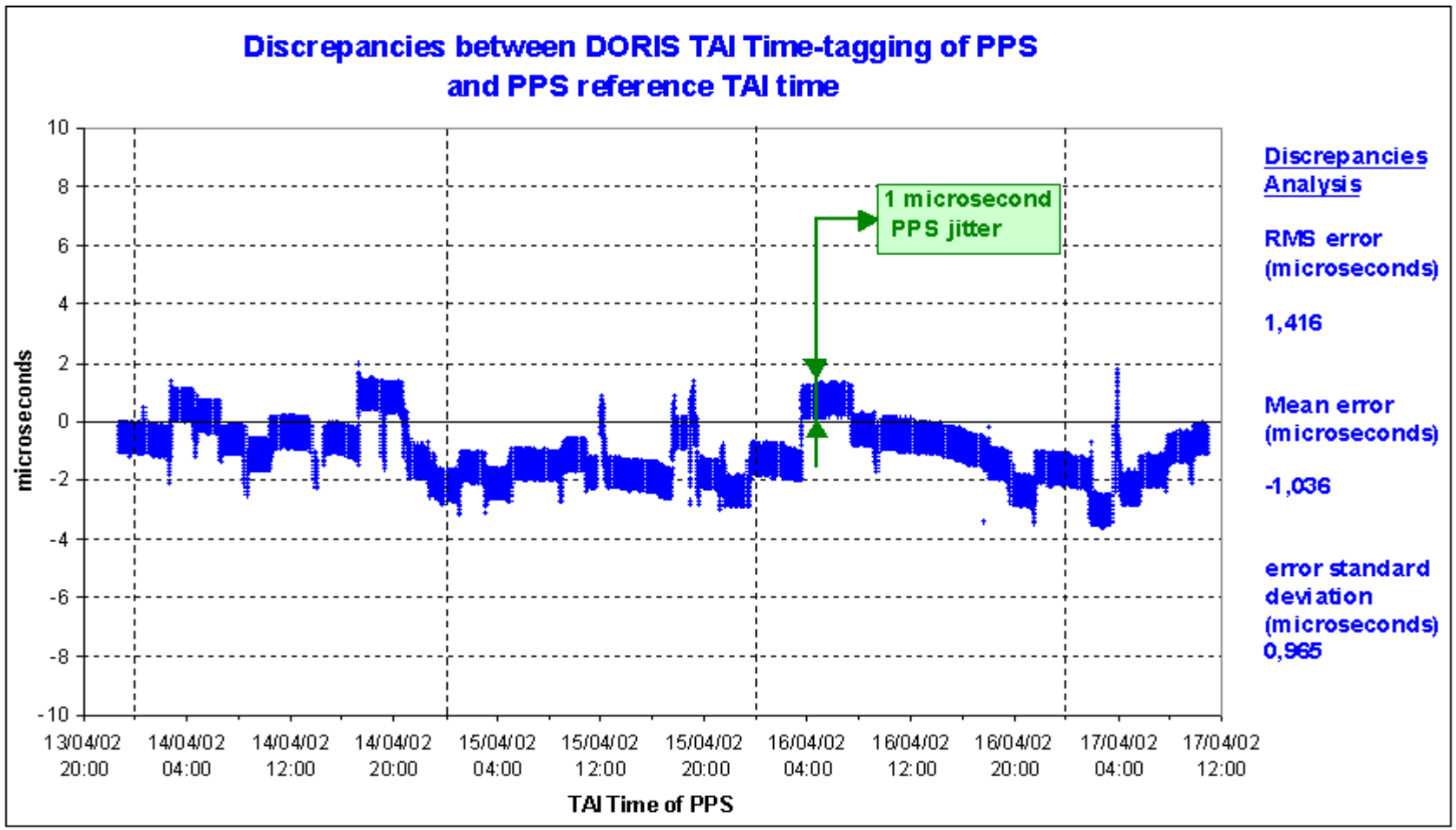
Navigator/POE Orbit Comparison on 27 Aug-3 Sept 2002



Instrument Performances - DORIS Time-Tagging

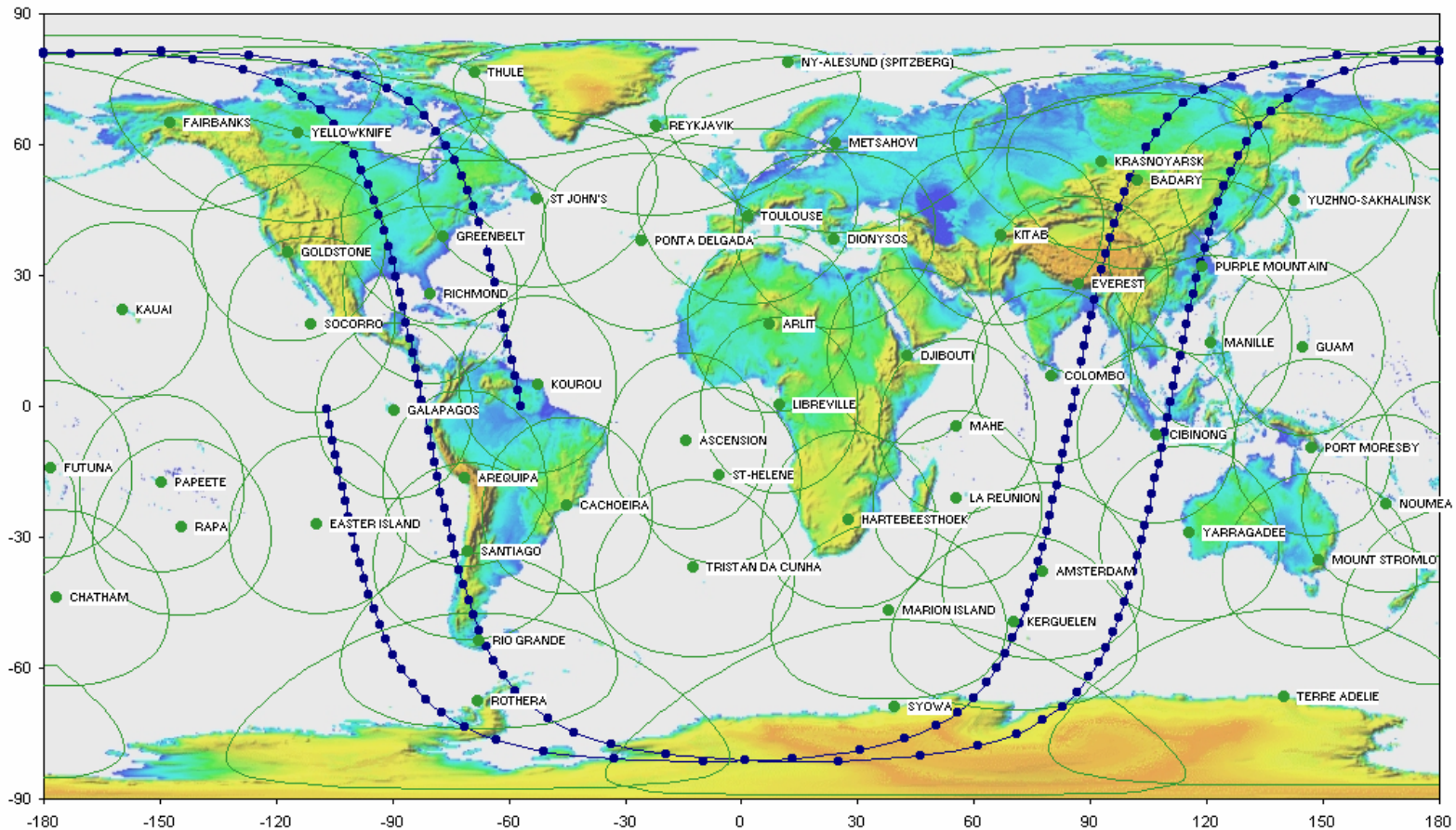
- DORIS Real-Time On-Board Datation Accuracy is OK (on BCP2 pulse following a BCP4),
  - 100 microseconds specification has been reached with the first navigator start (16 April 2002)
  - On-board transit times for DORIS updated on 13 July 2002 (74 microsecond biais corrected), no biais after.
  - Mean biais of 5 microseconds (max 10) from 8 Sept to 10 Oct 2002 due to DORIS Kourou master beacon resynchronisation (corrected on 10 Oct on-board)
  - Since 10 October 2002, DORIS/ENVISAT datation accuracy is estimated at A FEW MICROSECONDS
    - accuracy of datation on DORIS/JASON is better than 2 microseconds as compared to GPS on-board

Comparison between DORIS/JASON and GPS/JASON Real-Time Datations



- DORIS Beacon Network performances are nominal with a very good coverage

DORIS Beacon Network Visibilities for the ENVISAT Satellite
Minimum elevation of 8 Degrees, 2 Orbit Tracks with 1 minute Between Two Points

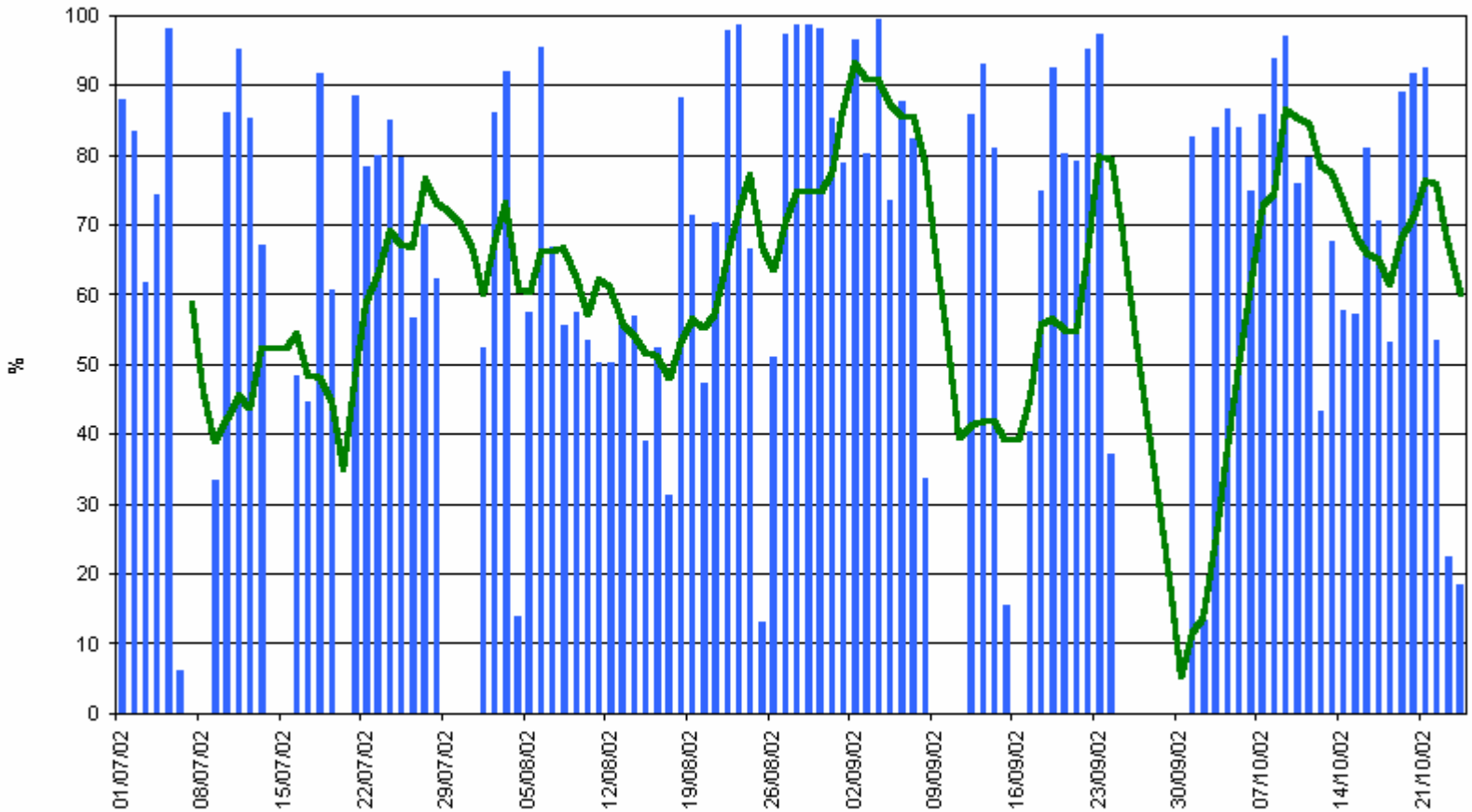


Open Issues

- New software version is under development to improve :
  - measurement performances (slightly)
  - robustness during manoeuvers
  - objective is to upload the new S/W in March-April 2003
- In October about 66% of DORIS Science data have been received at SSALTO (due to known PDS problems)
  - Still some problems to get data from PDHS-E (« blind » orbits for Kiruna), data from PDHS-K are now correctly received.

DORIS/ENVISAT Science Data Availability in July-October 2002

(with mean curve over last 7 days)



Conclusions

- Functioning and Performances of the DORIS instrument are very satisfactory
- Operations of DORIS are routine except for PDS data gaps (this has an impact on orbits)