DORIS/DIODE on-board Pléiades PHR1A : results and lessons learned

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. and the whole DORIS Team

## Analogic parameters :

- Consumption around 23W <u>OK</u>
- Receiver temperature around 3°, consistant with USO current = 90mA : USO thermical regulation <u>OK</u>
- Every status <u>OK</u>
- Every internal parameter : USO frequency, automatic programming mode, … <u>OK</u>

RadioFrequency status :

- No on-board jammer
- Same ground jamming results as other DORIS missions – no impact

DORIS network :

- Nominal reception of network stations
- A few measurements lost due to on-board masks – no impact, except during one manoeuver
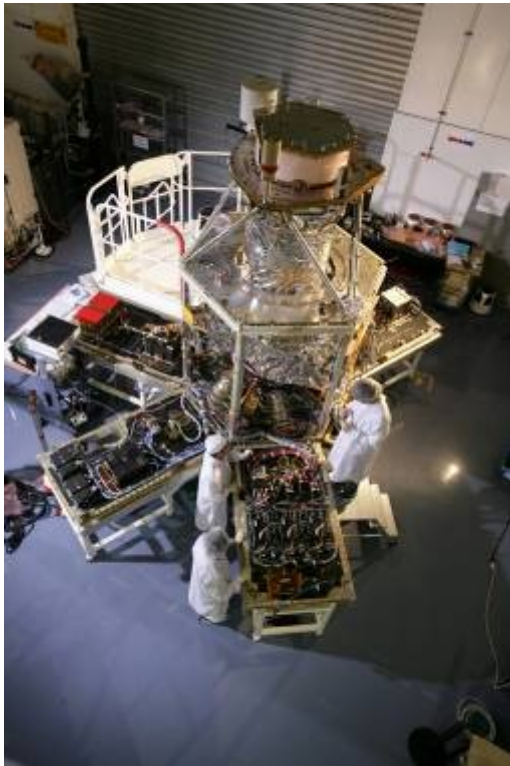
DORIS/DIODE : no failure, no gap in RT orbit delivery, routine integrity 100%.

For a satellite mispointing below 15° (mean value) and 50° (maximum value),

"**full performance**" specification on-board in Real-Time is :

● **Quality Index :**
Navigation quality index < 10 m in ITRF.   => OK RMS QI ITRF = 0,757 m
Navigation quality index < 20 m in J2000   => OK RMS QI J2000 = 1.2 m
Datation quality index < 20 microseconds   => OK RMS QI Dat = 1,5 microseconds

● **Position (each component) :**
< 2 m (99.7% of time) in ITRF
<10m (99.7% of time) in J2000
                => OK

● **Velocity (each component) :**
< 2 mm/s (99.7% of time)) in ITRF
<10mm/s (99.7% of time) in J2000
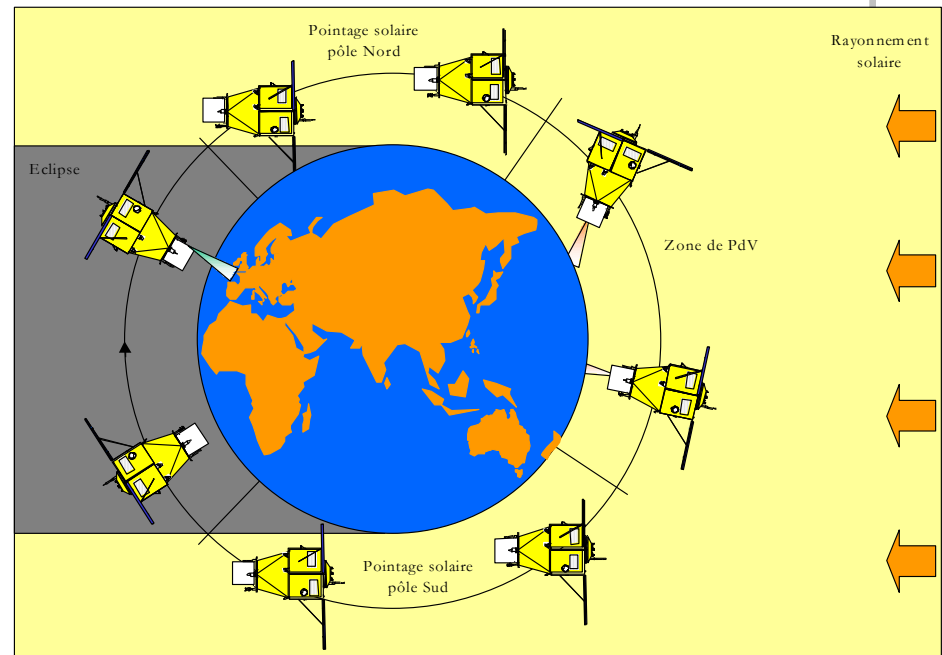   => OK

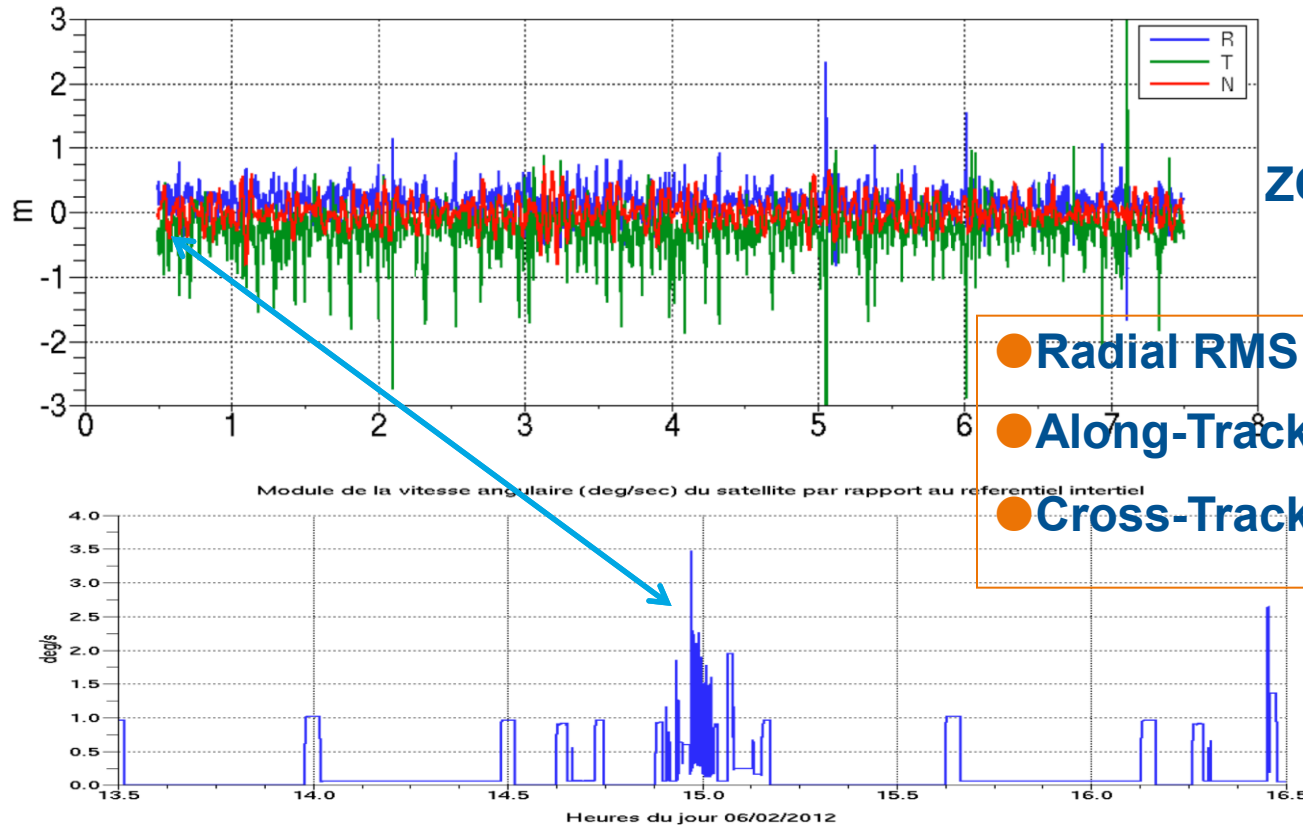● **TAI time-tagging accuracy :**
< 5 microsecondes RMS;
< 10 microsecondes (99.7% of time)
                => OK

ZOOM / DIODE comparison
(ZOOM is the software that computes Jason-2 POE)

ZOOM orbit – DIODE orbit :

- **Radial RMS** : **0.24 m**
- **Along-Track RMS** : **0.44 m**
- **Cross-Track RMS** : **0.21 m**

Module de la vitesse angulaire (deg/sec) du satellite par rapport au referentiel intertiel

Heures du jour 06/02/2012

- **Peaks are linked with night GAP and day SUP attitude transitions (out of mission specifications)**
- **During taking of images (e.g. around 3h00 p.m. on Feb., 6th), difference between both orbits is a few tenths of centimeters**

Behaviour during orbit acquisition manoeuvers

No specification for orbit-acquisition manoeuvers

Specification for routine orbit-control manoeuvers : back to Full Perfo ITRF QI < 10 meters in less than 1 orbit (1h40)

Phase control manoeuvers = a few cm/s, inclination corrections = 4,26 m/s in two thrusts, once a year.

	MCO1-1	MCO1-2	MCO2-1	MCO2-2	MCO3-1	MCO3-2
Delta V m/s	0.65	0.65	2.37	1.77	0.3	0.3
Thrust begins at	14:38:00	16:20:00	10:06:00	12:47:00	04:35:00	05:30:00
Back to full perf	14:47:00	19:40:00	10:41:00	13:04:00	04:41:00	05:54:00
Convergence delay	00:09:00	03:20:00	00:35:00	00:17:00	00:06:00	00:24:00

Only case of long delay has been analyzed and is due to : on-board masks, Santa-Cruz DORIS beacon failure, and old v3.07 version of the Flight Software. On the same measurements, recent v4.05 issue leads to a 53 mn convergence.

DORIS / DIODE Flight Software

On-board PHR1A, flight software issue is V5.0 + 4 patchs

Most recent DGXX flight software issue is V11.0

This new issue is already validated for CryoSat-2 and AltiKa-SARAL, and is undergoing validation for Jason-2.

This new issue could be uploaded on-board PHR1A , and/or PHR1B (after validation at DORIS labo).

•DORIS / DIODE behaviour is excellent.

•Performances are compliant with specifications, with good margins.

•Behaviour during manoeuvers is also excellent,

only a thrust where less measurements have led to longer delay for « back to full perfo »

DORIS/ DIODE is the only provider for position and time determination : reliability was a keyword for this mission

Very important robustness demonstration for DORIS receiver, DIODE navigator, and the whole DORIS system

Thank you !