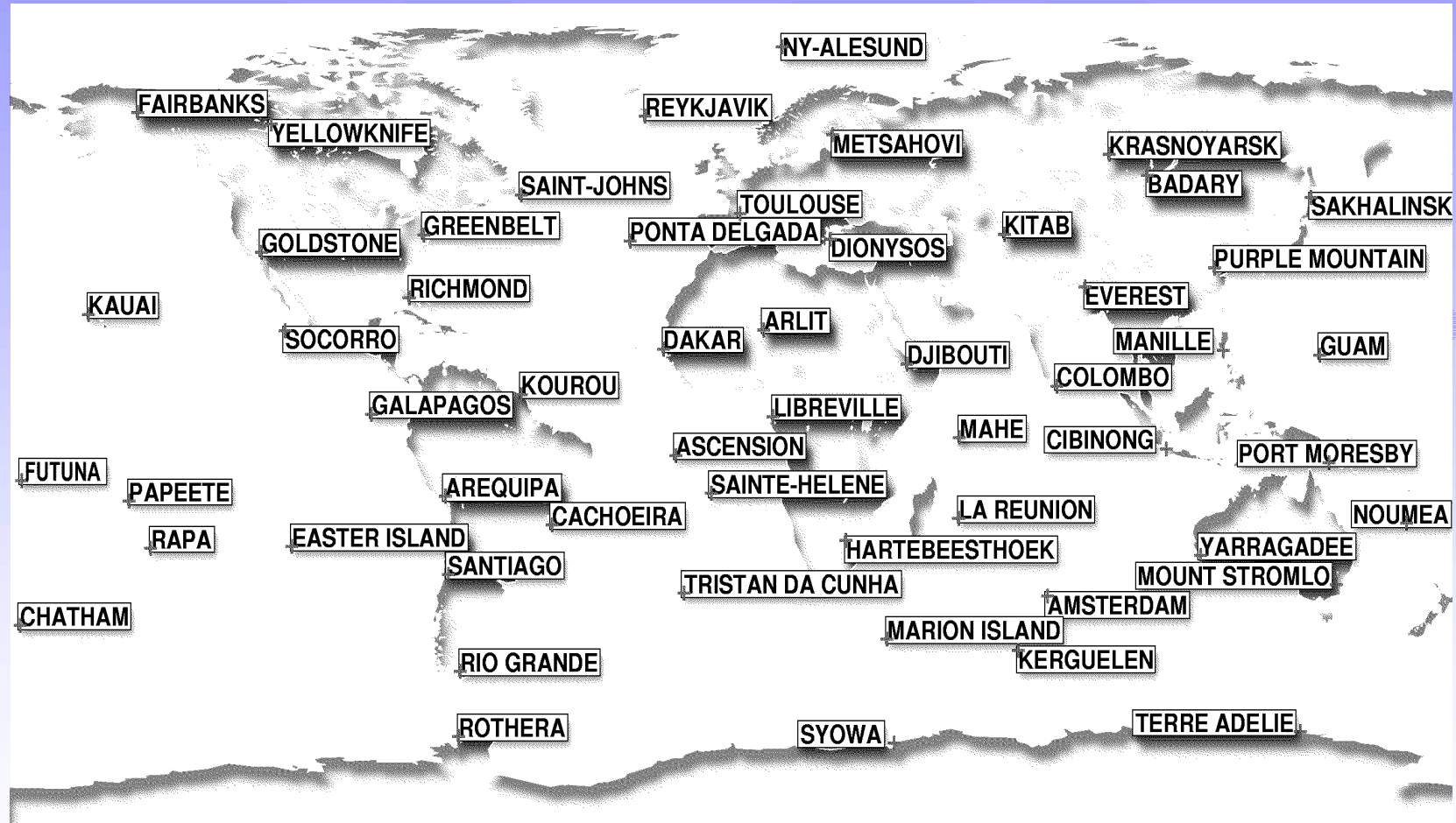


Ten centimeters orbits in real-time on-board of a satellite : DORIS-DIODE current status

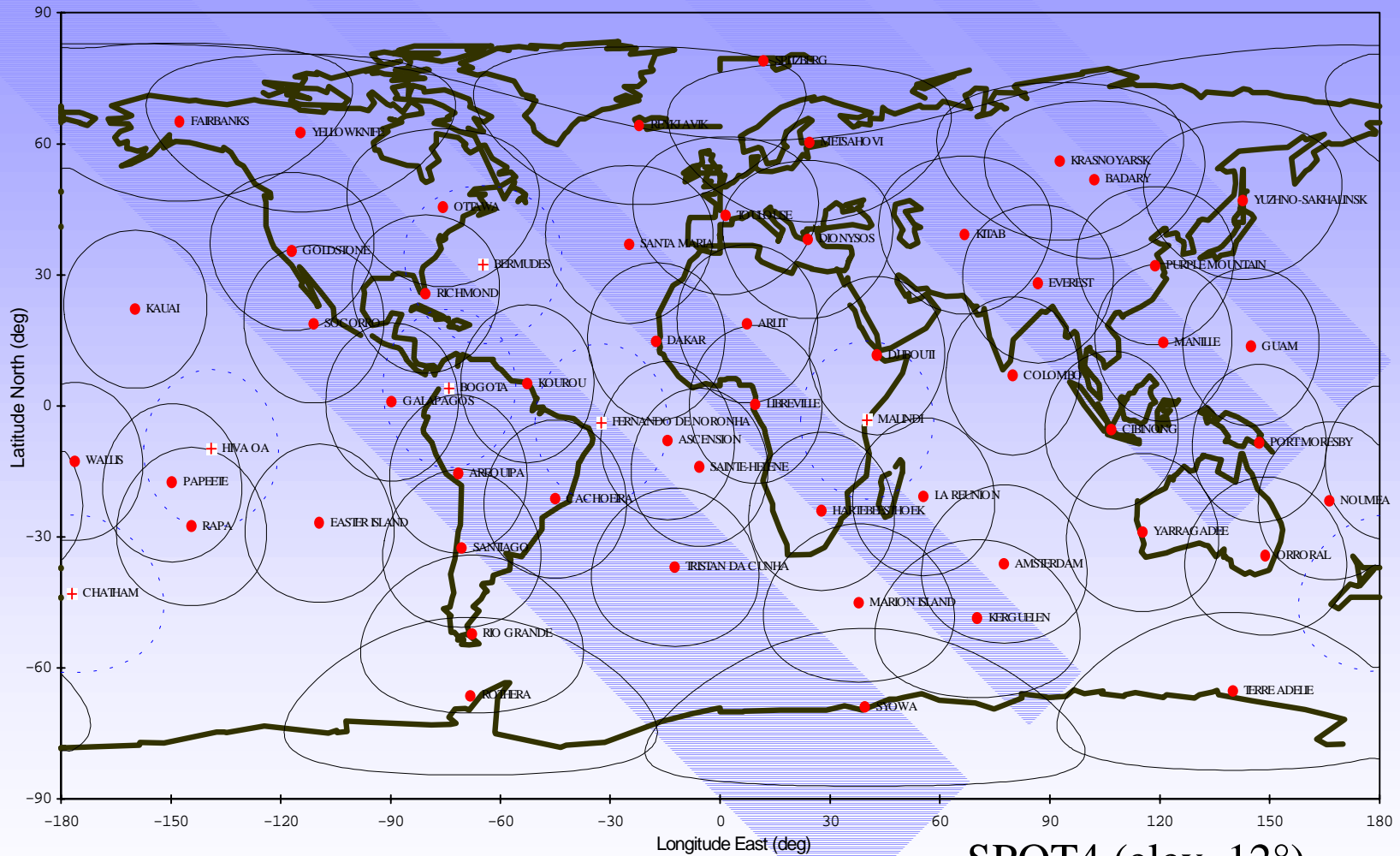
- DORIS & DIODE main features
- DIODE / SPOT4 conclusions
- DIODE / Jason-1 in-flight results
- News about DIODE/ENVISAT
- DIODE / SPOT5 in-flight results
- current status



The DORIS network



DORIS coverage



SPOT4 (elev. 12°)



DIODE

- On-Board Orbit Determination function, providing :
 - satellite position/velocity (plus a quality assessment),
 - TAI time-tagging (plus a quality assessment),
 - ancillary products (next beacon, expected Doppler, ...),
 - elaborated on-board and in real-time every ten seconds.
- Products are useful for :
 - platform and payload,
 - ground processing of the data (images, altimetry, ...),
 - DORIS receiver (self-programming and reduction of Doppler tolerances).



DIODE / SPOT4 conclusions

- Conclusive probatory experiment
- After more than four years :
 - » accuracy = a few meters RMS,
 - » availability \cong 99.5% (MTBF \cong one year),
 - » meet specifications (200 m MAX) > 99.9%),
 - » good behaviour during manoeuvres.
- Users of the products :
 - » POAM several times a day (near poles),
 - » SPOT IMAGE : DIODE is the nominal source for image positionning,
 - » VEGETATION (permanent since July 1999).



DIODE / Jason-1

- Complete mission, including :
 - improved dynamical model,
 - improved autonomy :
 - » self-initialisation (« lost in space »),
 - » self-programming of the DORIS receiver,
 - TAI (or UTC) time-tagging of external events.
- Users of the products :
 - quick-look processing of altimetric data,
 - possible use by the platform,
 - and by the ground Control Center.



DIODE / Jason-1 : main evolutions

■ New fonctionnalités :

- self-initialisation algorithm (4 passes, two filters),
- receiver programming (prediction of the next-to-come beacon, optimal choice, Doppler shift).

■ Improved models :

- adjusted : Earth pole coordinates, Hill accelerations, thrust accelerations,
- force model = 40x40 optimised E.G.F., moon&sun attractions, solar pressure (box&wings), air drag.

■ improved quality assessments.



DIODE / Jason-1 performances

■ Performances :

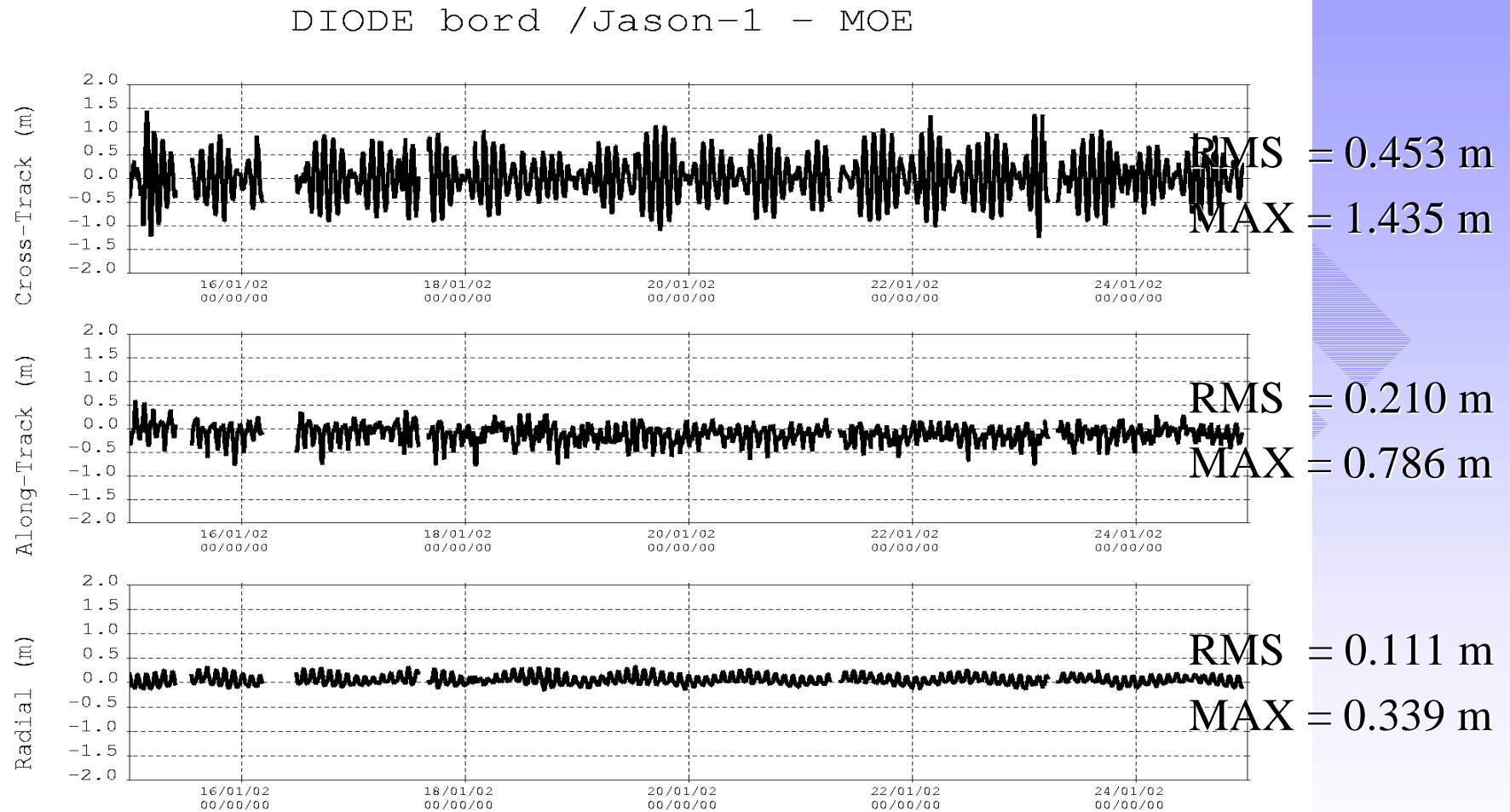
- routine accuracy : 1m RMS 3D, between 10 and 30 centimeters radial RMS,
- self-initialisation :
 - » ten hours after launch (without any TC, in barbecue mode),
 - » in January, first position 35 mn after restart.
- time determination (between 1 and 2 microseconds),
- operationnal use of the self-programming mode.

■ Availability : 100 % until now.

» (except 35 mn due to a DORIS restart)

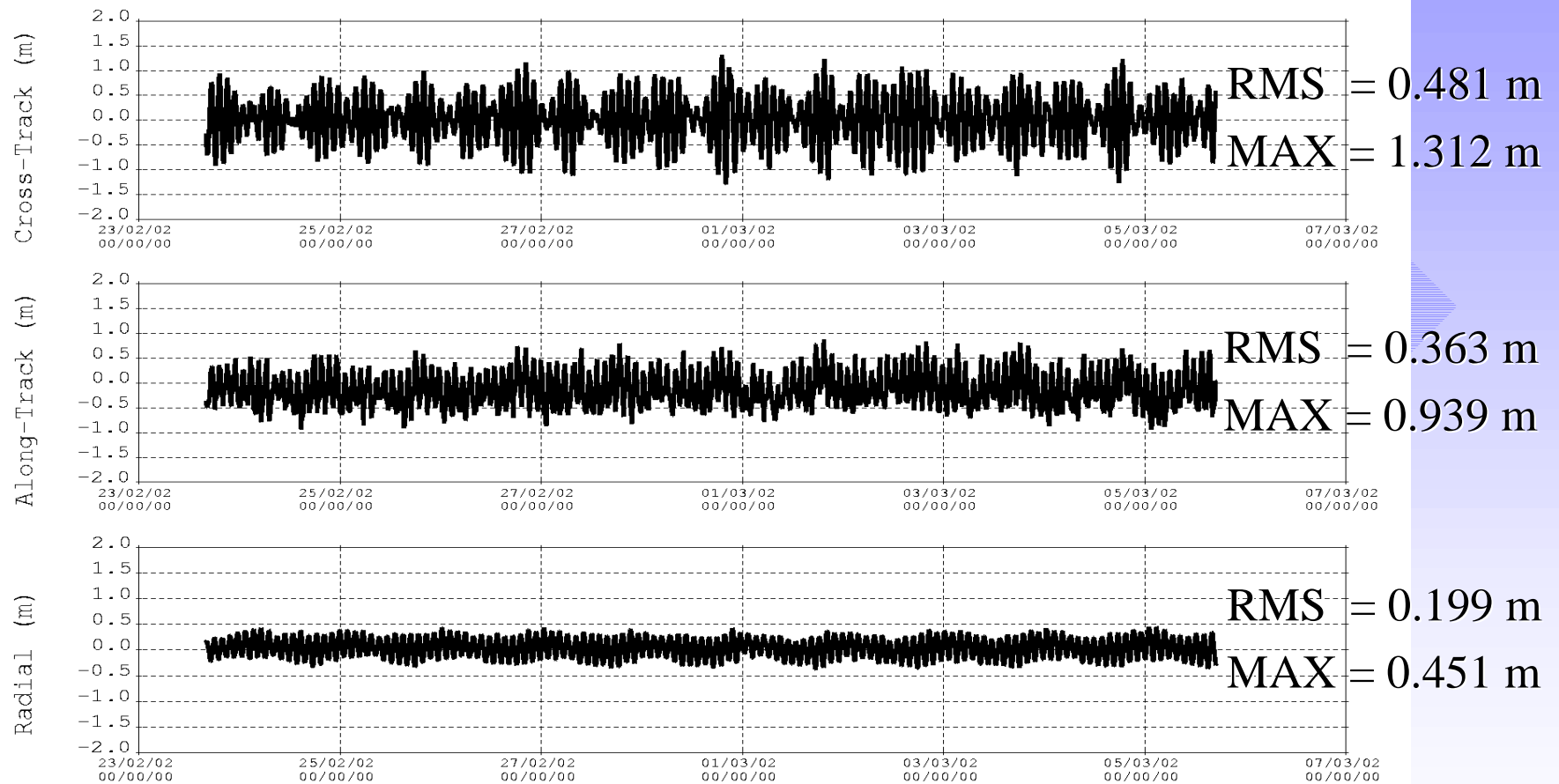


DIODE/Jason-1 on-orbit results

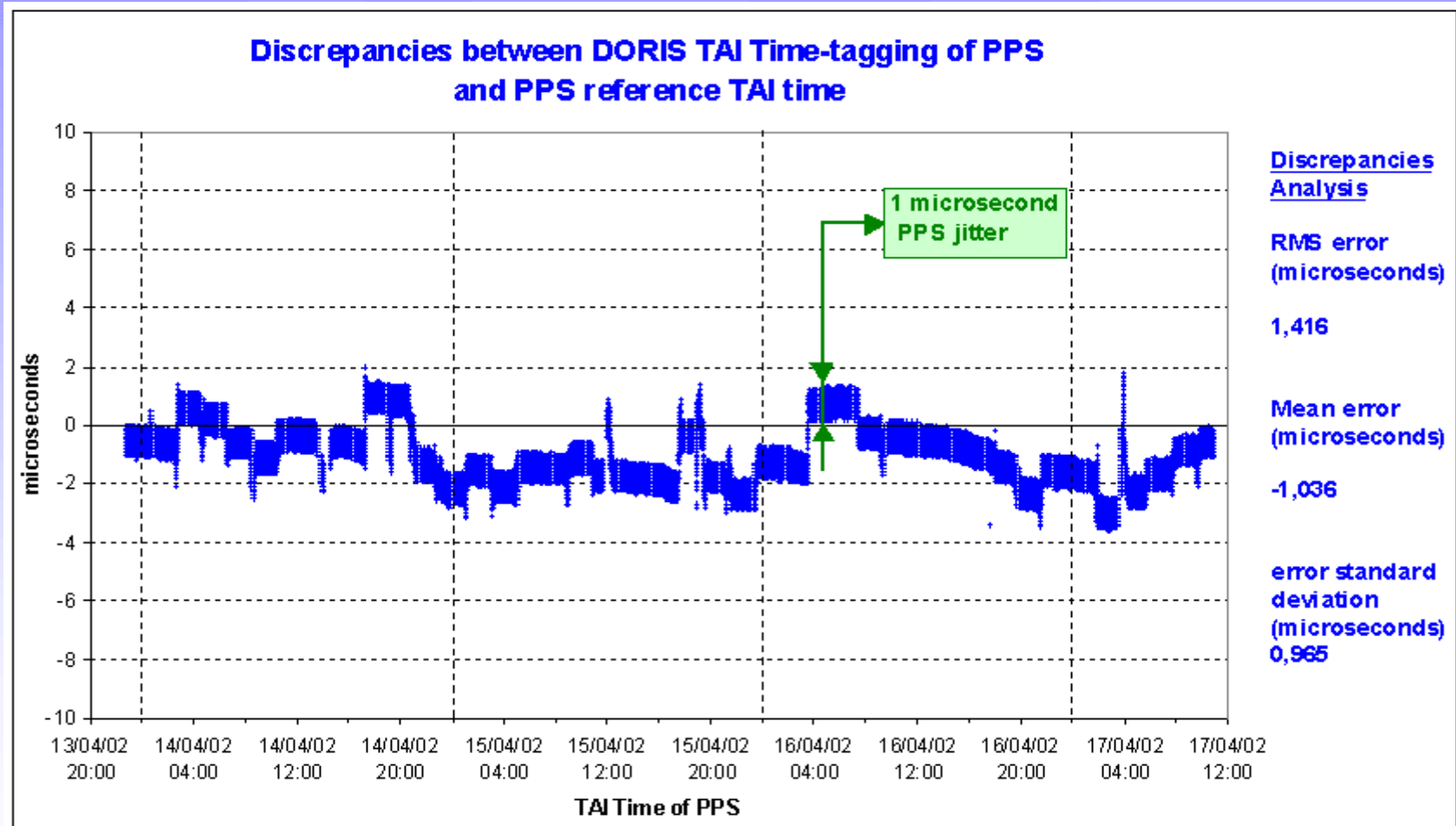


DIODE/Jason-1 on-orbit results

DIODE bord - POE /Jason-1



Time determination results (DIODE/Jason-1)



DIODE/ENVISAT

- Operating since April 12, 2002.
- Undergoing on-orbit acceptance test
 - comparisons with ground orbits,
 - time determination results.
- Operationnal use of the self-programming mode.



DIODE / SPOT5 performances

■ Performances :

- routine accuracy : better than 1m RMS 3D, \cong 15 centimeters radial RMS,
- DORIS full self-initialisation :
 - » routine mode 8 hours after DORIS ON,
 - » less than 2 orbits after the first pass over a master-beacon.
- time determination used for the images,
- operationnal use of the self-programming mode.

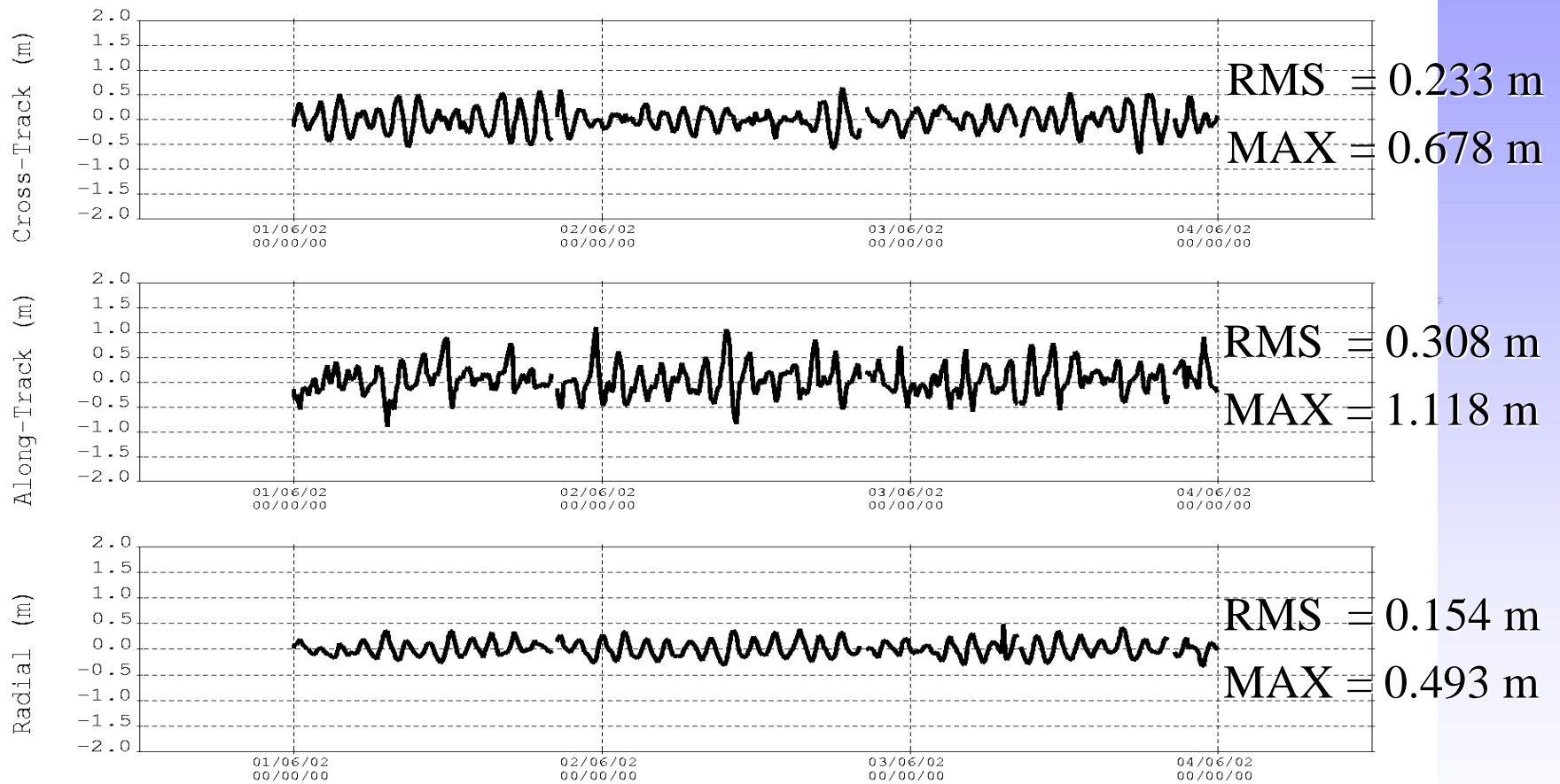
■ Availability : almost 100 % until now.

- » Except 40 mn after the first orbit acquisition manoeuver.



DIODE/SPOT5 on-orbit results

DIODE bord - MOE / SPOT5



DIODE current status

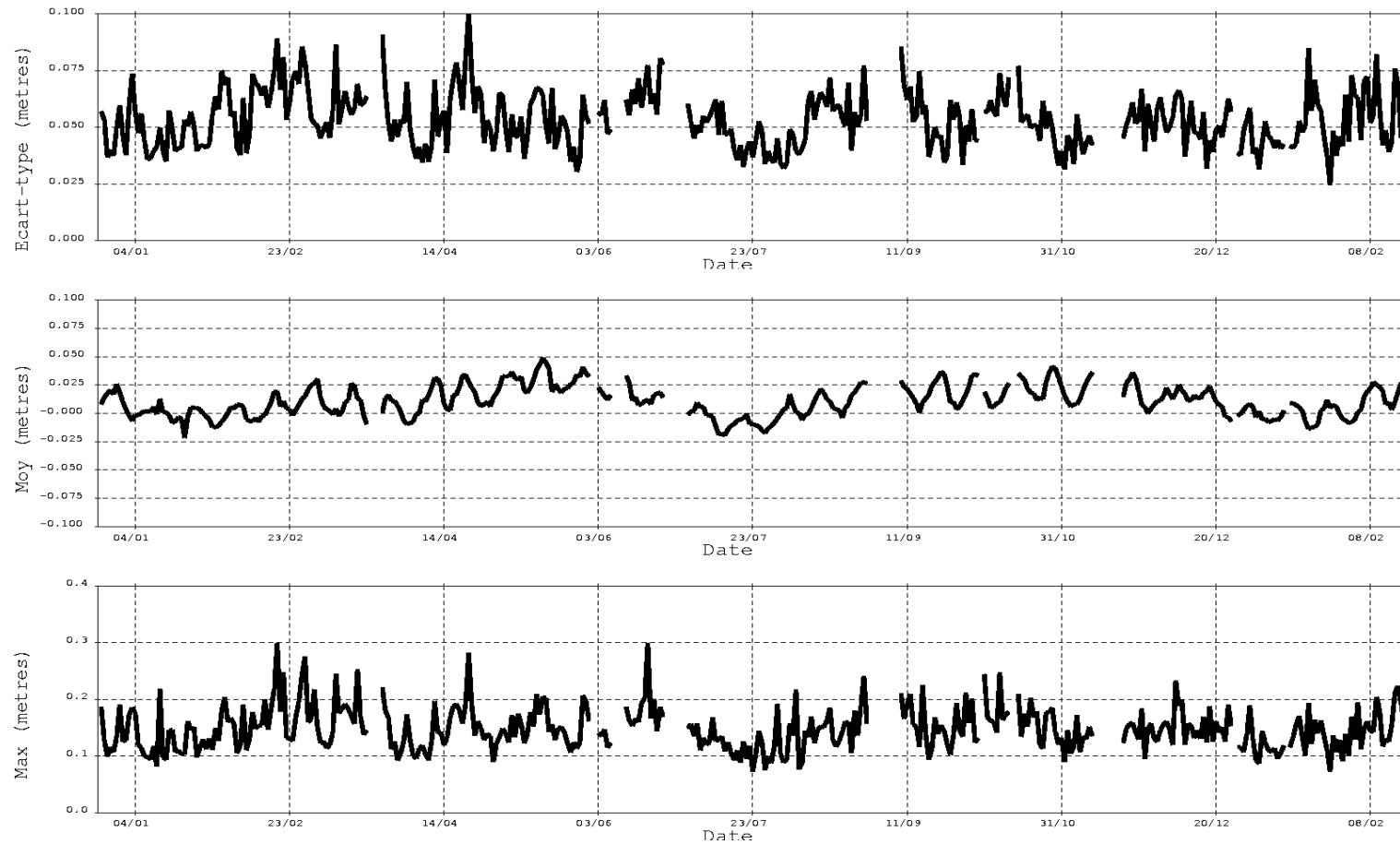
- On-orbit : SPOT4, Jason-1, ENVISAT, SPOT5.
- Waiting for flight : a retrofit on SPOT4,
- On Skybridge, DORIS/DIODE has been evaluated as technically acceptable,
- First CRYOSAT version under validation (ERC32 64 bits processor),
- Currently under study :
 - AltiKa, Jason-2, NPOESS, Pléiades, ...



DIODE/TOPEX radial errors

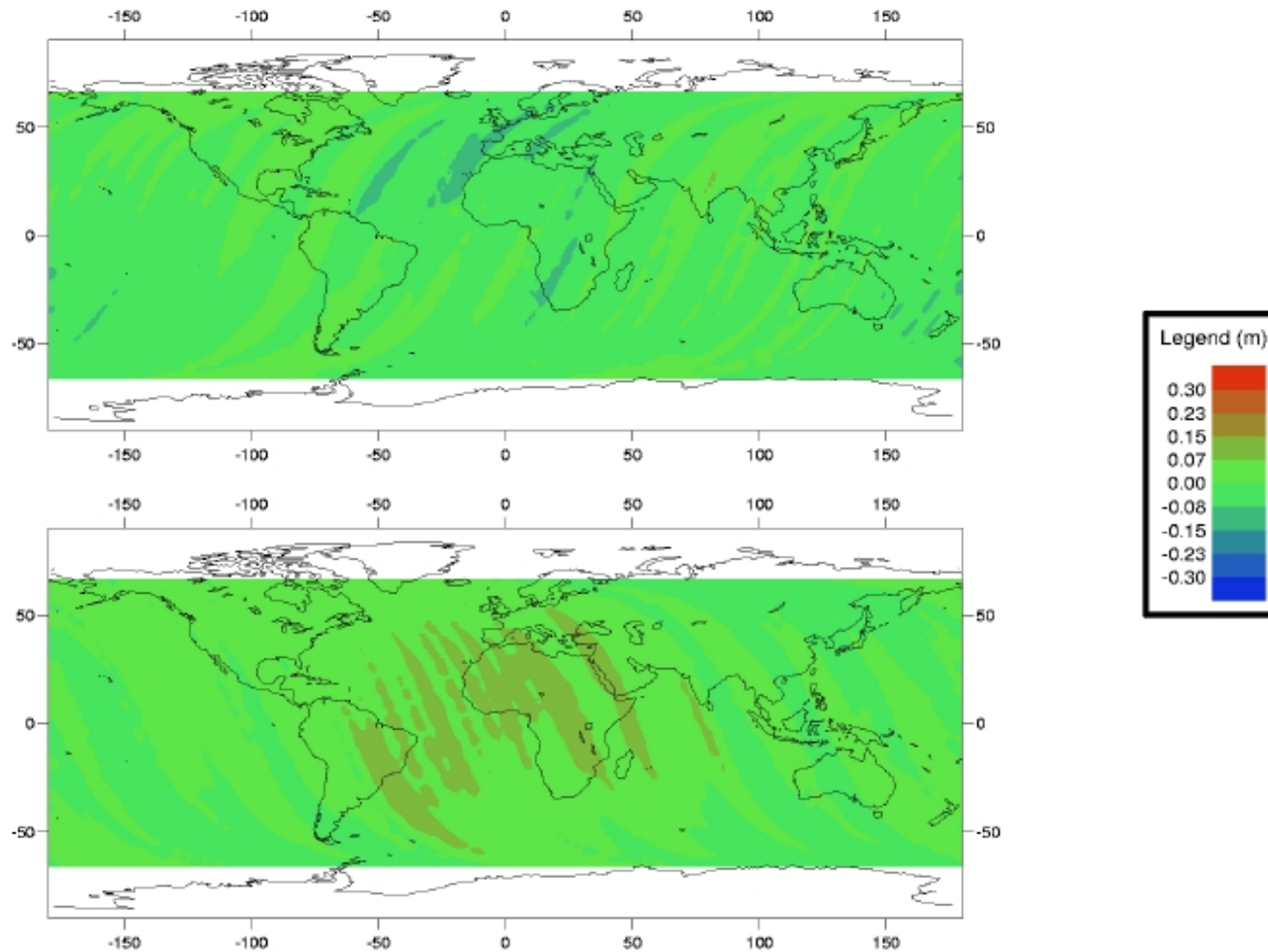
– (64 bits SPARC processor)

DIODE - ZOOM / TOPEX measurements



DIODE/TOPEX cy 232 radial errors

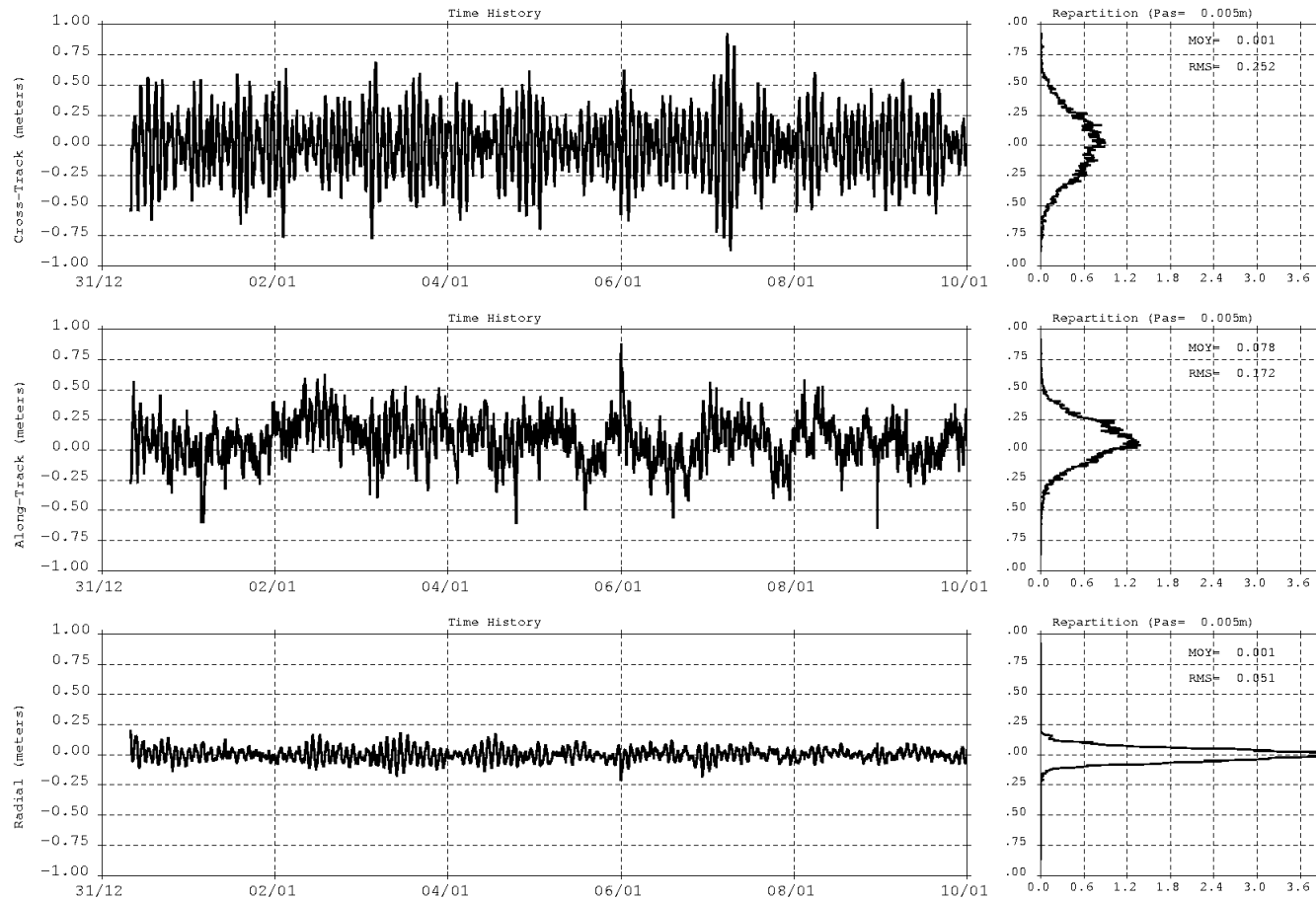
– (64 bits SPARC processor)



DIODE/TOPEX ground results

– (64 bits SPARC processor)

TOPEX cy232 31/12/98 – 10/01/99



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