

Evolution of the content of the DORIS data files

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Conclusions of IDS-2003 meeting

- ➔ **At the IDS-2003 meeting 3 changes to the DORIS data files were approved to start validation campaigns with users**
 - **use the on-board USO frequency bias and drift model to correct measurements within passes**
 - ◆ to make measurements and time scale strictly compatible
 - **switch to a new ionosphere delay correction algorithm**
 - ◆ more in tune with standard dual frequency computation
 - **use of data output by the MOE instead of the POE**
 - ◆ to secure delivery schedule

- ➔ **Priority was given to more important user campaigns in 2003**



Actions taken in early 2004 (1/2)

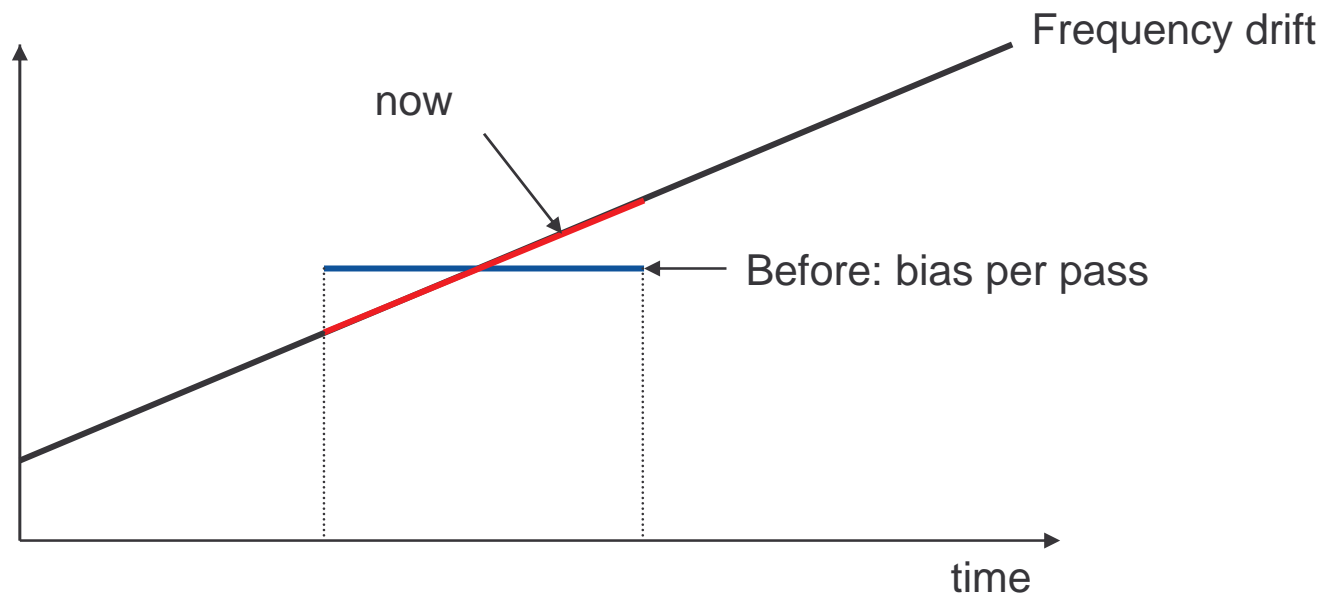
- ➔ **A problem with the troposphere correction was found and corrected beginning of Feb. 2004**
 - correction was computed with the wrong reference direction (normal to the sphere instead of normal to the ellipsoid)
 - error was higher for mid-latitude station
 - impact most significant on low elevation data (primarily SPOT 5)

- ➔ **Change notified in in DORIS mail # 301 (15 Feb. 2004)**
 - before that tropo correction provided in data files was slightly incorrect



Actions taken in early 2004 (2/2)

- ➔ The same software upgrade introduced the use of the bias and drift model to correct Doppler measurement
 - impact about 0.01 mm/s for all satellites except Jason-1 (~ 0.1 mm/s)
 - impact on users has been tested with P. Willis in 2002
 - could improve USO warm-up periods



Next step

➔ Remaining changes would have significant advantages

- **change in ionosphere correction algorithm would enable delivery of all the edited data**
 - ◆ currently when the whole pass is edited out, the ionosphere correction is incorrect and the data cannot be delivered (for example, for new beacons)
 - ◆ there is no risk involved (the ionosphere correction is as good)
- **delivering MOE data would shorten the production delay**
 - ◆ currently data are produced in the preliminary POE step, 2-3 weeks later
 - ◆ there is a risk involved that a problem might not have been seen before delivery (timing problem, editing problem, etc)

➔ running full user campaigns to test these changes is too constraining

- **Is it possible to identify test users who would be available to run tests ?**



Support slides



DORIS, present and future

IDS Plenary Meeting
Paris - 3-4 May 2004

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New ionosphere correction

- ➔ Old iono correction is computed from 400 MHz residuals

$$I = \frac{V'}{\alpha} - \frac{c}{\alpha^2} \frac{\eta'_2 - \eta'_1}{\Delta T} \quad \text{with } \alpha = \frac{f}{f'} \quad \text{and } \eta = \text{propagation time}$$

- ❖ strong dependence upon beacon frequency offset in V' means that iono corrections for passes unprocessed at CNES are wrong

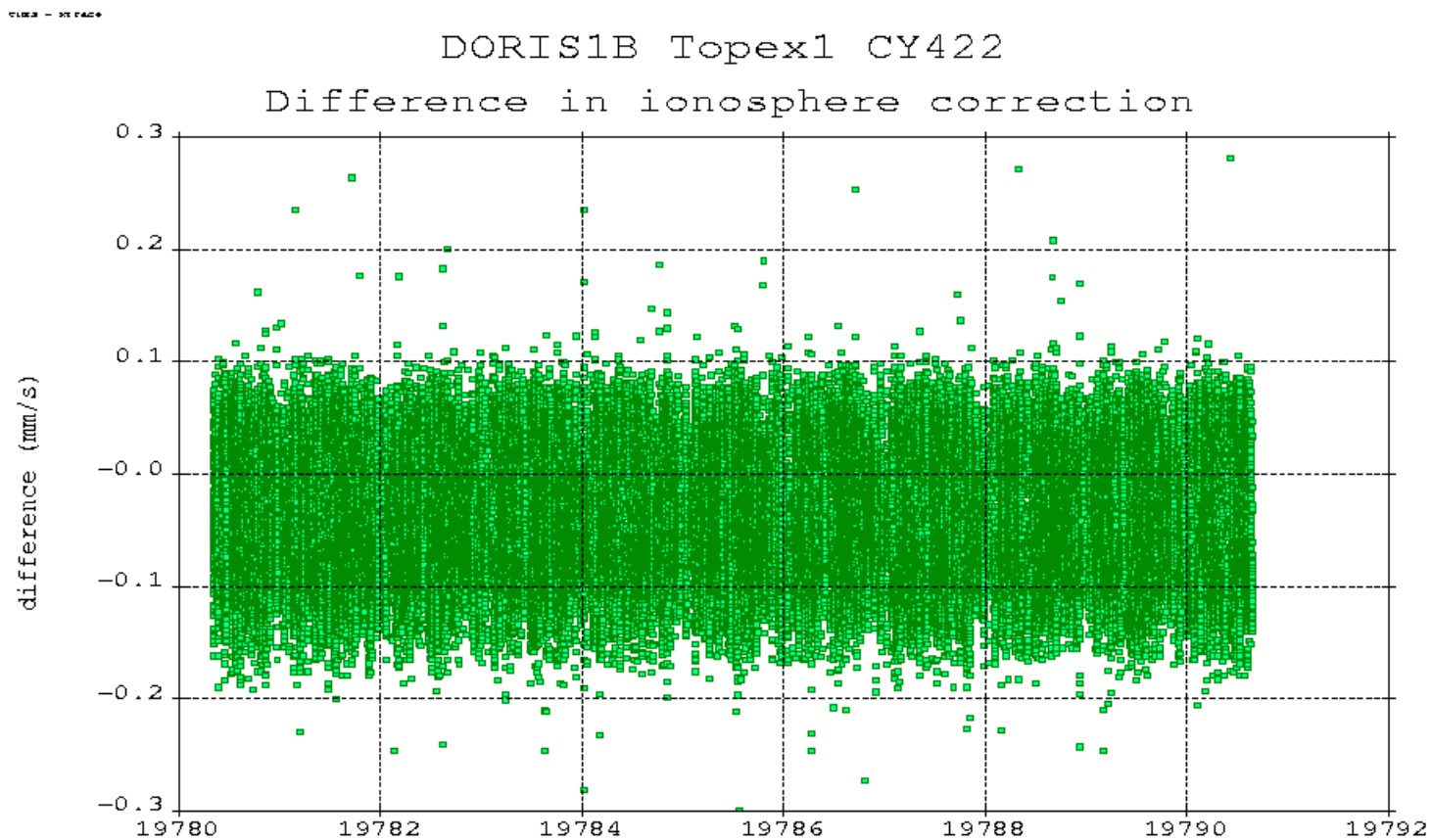
- ➔ New iono correction

$$I = \frac{V - \beta V'}{1 - \alpha^2 \beta} - c \frac{\delta f_{\text{beacon}}}{f_{\text{beacon}}} \frac{(\eta_2 - \eta_1) - \beta(\eta'_2 - \eta'_1)}{(1 - \alpha^2 \beta) \Delta T} \quad \text{where } \beta = \frac{\Delta t}{\Delta t'}$$

- ❖ takes into account differences in center of phase location and in measurement times at the two frequencies
- ❖ almost completely orbit and frequency independent => correction can be computed very early in the processing chain



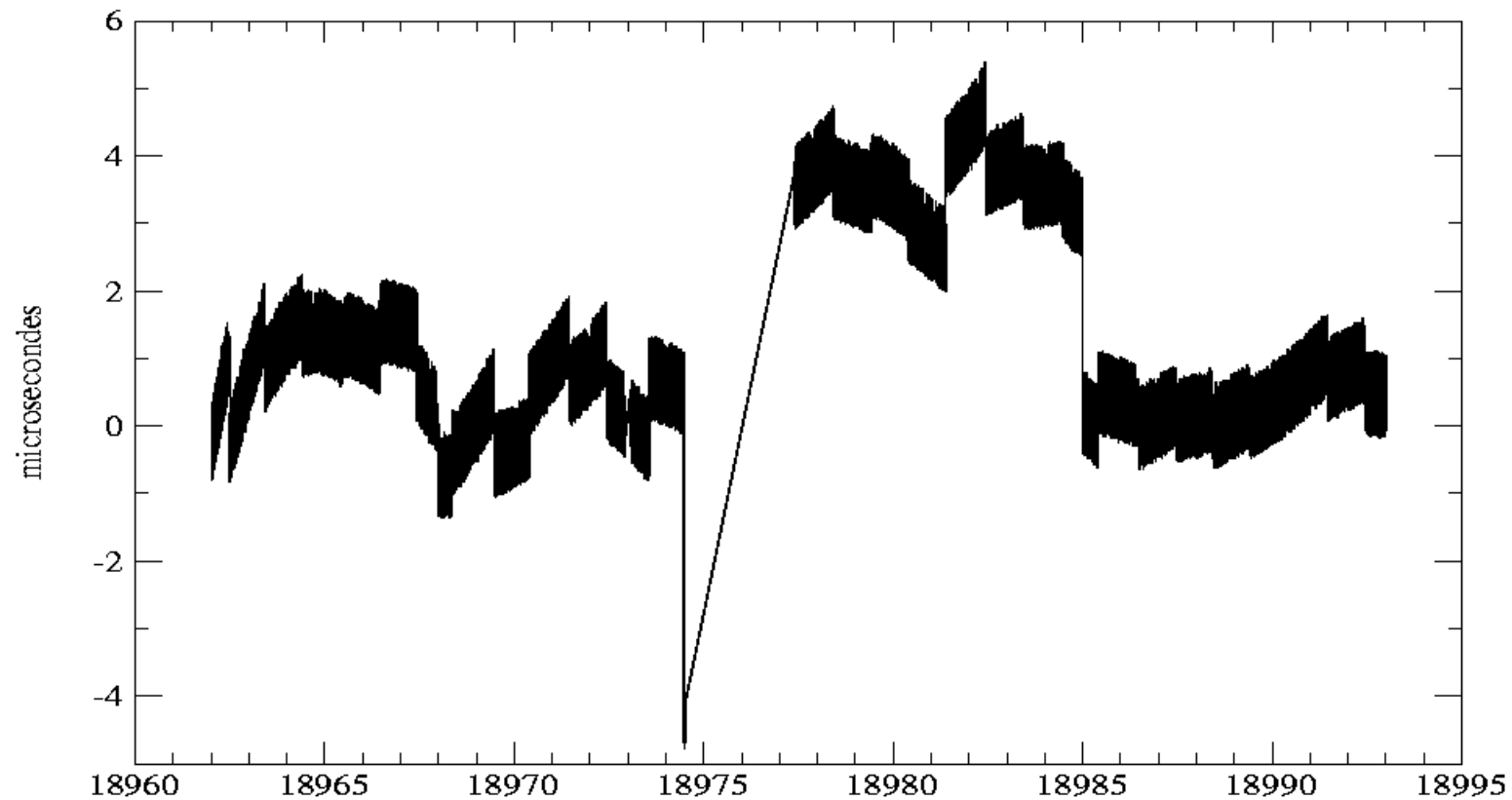
Impact of the new ionosphere algorithm



Difference between MOE and POE data

Exemple of potential timing problem

Spot2 Cecembre 2001



POE timing polynomial is degree 2 over the 10 day cycle
MOE timing polynomial is linear over days J, J-1, J-2, J-3

MOE vs POE data routine timing difference

