Preliminary results on the sensitivity to radiations of the back-up DORIS/Jason oscillator

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References

Conclusion
The new DORIS/Jason receiver is also sensitive to radiations over the SAA. This does not affect the current Precise Orbit Determination (POD) results but it totally forbids one use for geodetic applications. Preliminary results (computed using only 2 months of data) show that the amplitude of the effect has opposite sign that is unable to be linear.

First step
Analyzing time series of stations coordinates on a station by station basis

Second step
Analyzing apparent residual velocity per station and per DORIS receiver

Analyzing multi-satellite solutions
For each station, we have divided the DORIS time series in two consecutive data sets (before and after June 29, 2004). For each data set and for each station, we have estimated the apparent residual drift in all components (latitude,longitude,altitude) as well as its estimated precision. The geodetic effect has previously been removed.

Each point of the plot corresponds to a unique station.
Y = estimated drift before June 29, 2004
Y = estimated drift after June 29, 2004
Units are in cm/year
No atmospheric velocity can be detected. Sigma in Y are very large as the residual drift is computed using only 2 months of data.

Analyzing Jason-only solutions
The same analysis done with Jason-only results shows some significant results. These are abartal velocity affected during the first months of operation is clearly related to the SAA effect on the DORIS clock. By comparing the mean step Y vs X we could get an idea of the differences of sensitivity to the radiation between the two DORIS instruments. However, the first 2 months of operation do not seem to be sufficient to derive any reliable estimate of this value.

One solution would be to impose that the effect should be 0 in December 2001 (launch of the satellite) but plots above also show that the error does not have a truly linear behavior.

Figure 1: Preliminary results on the sensitivity to radiations of the back-up DORIS/Jason oscillator

All results are affected by the SAA. Results for Jason (black line) are totally different from station to station, probably as explained by global velocity model derived using all DORIS receivers for the 1999-2004 period.

Jason-1 and Jason-2 velocities are identical.

Jason-1 and Jason-2 in the SAA but not in its close neighborhood.

No atmospheric velocity can be detected. Sigma in Y are very large as the residual drift is computed using only 2 months of data.

