EVALUATION OF THE IDS COMBINATION THROUGH ANALYSIS OF THE STATION PERFORMANCES

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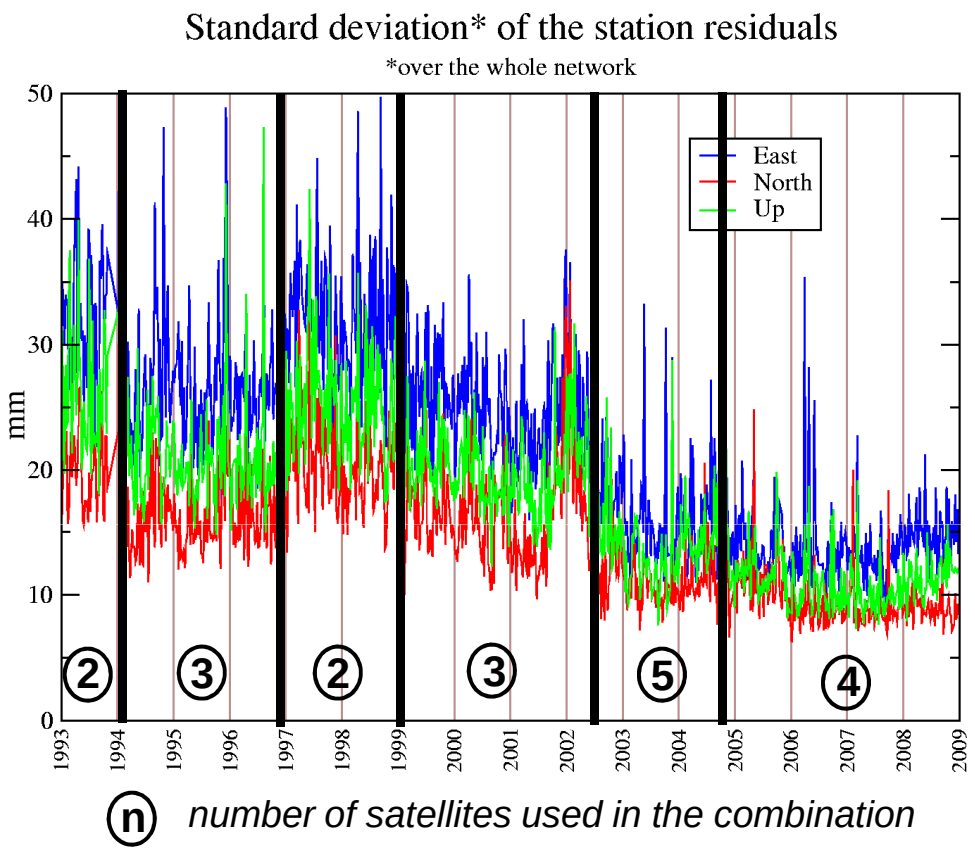
Content

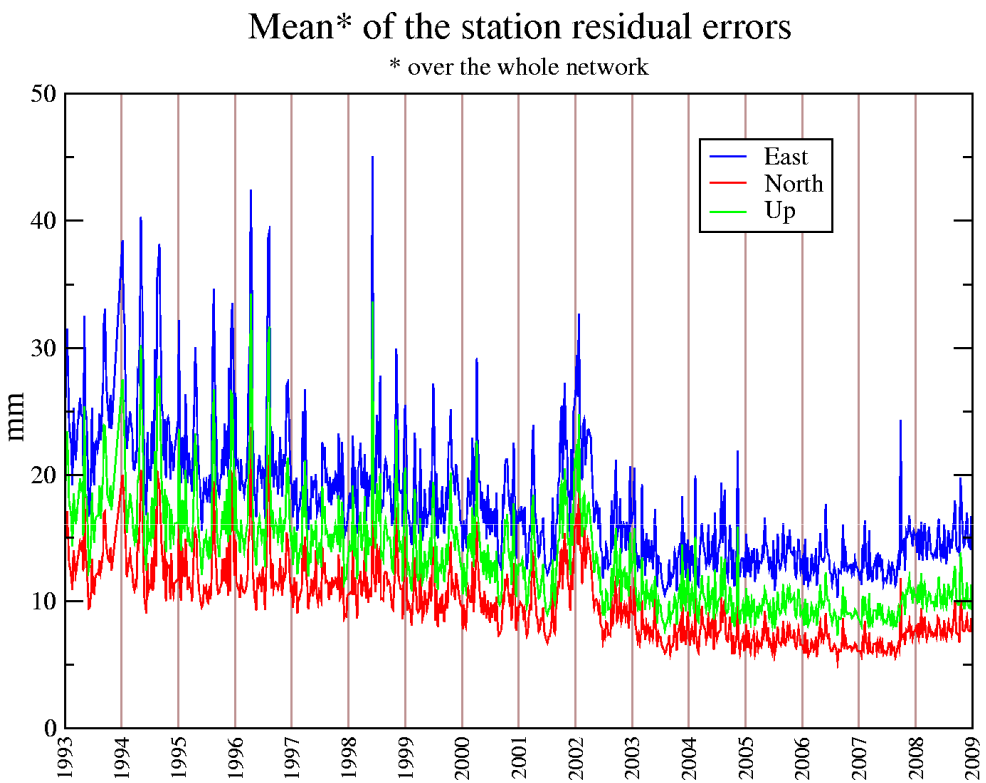
- Data analysed
- Evolution of the global performance
  - Comparison to POE RMS
  - Correlation with environment parameters
- Local performance (per station)
  - Station-related problems
  - Latitude dependancy
  - Comparison to ITRF2005 velocities

Data analysed

- For each station (JJV) :
  - Time series (min 1993, max 2008) of weekly combined coordinates
  - A solution of positions & velocities (X,V) has been derived over the whole period
  - The **residuals** (and associated errors) of the weekly time series w.r.t the (X,V) solution were calculated
- For a global (whole network) evaluation of the combined solution, some statistics have been processed on the residuals time series (next slides)

Global performances

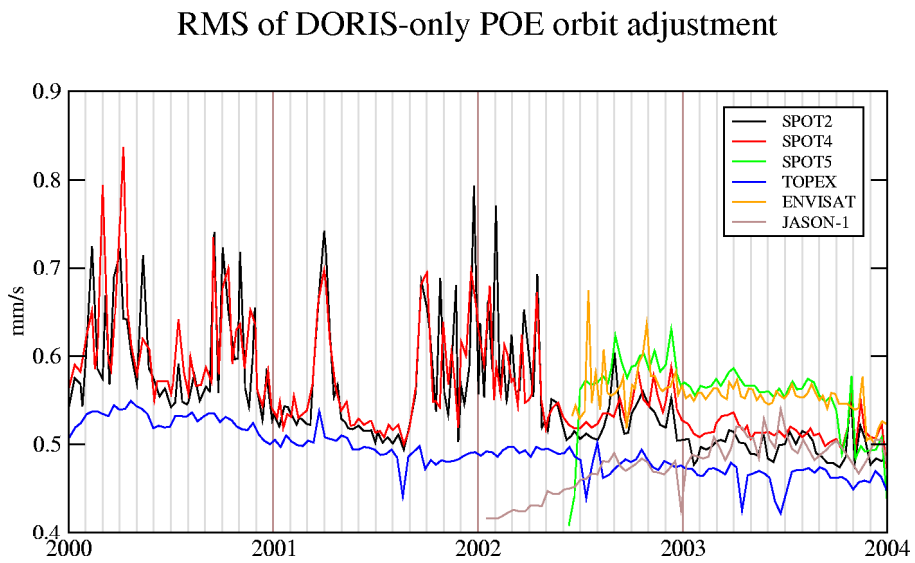




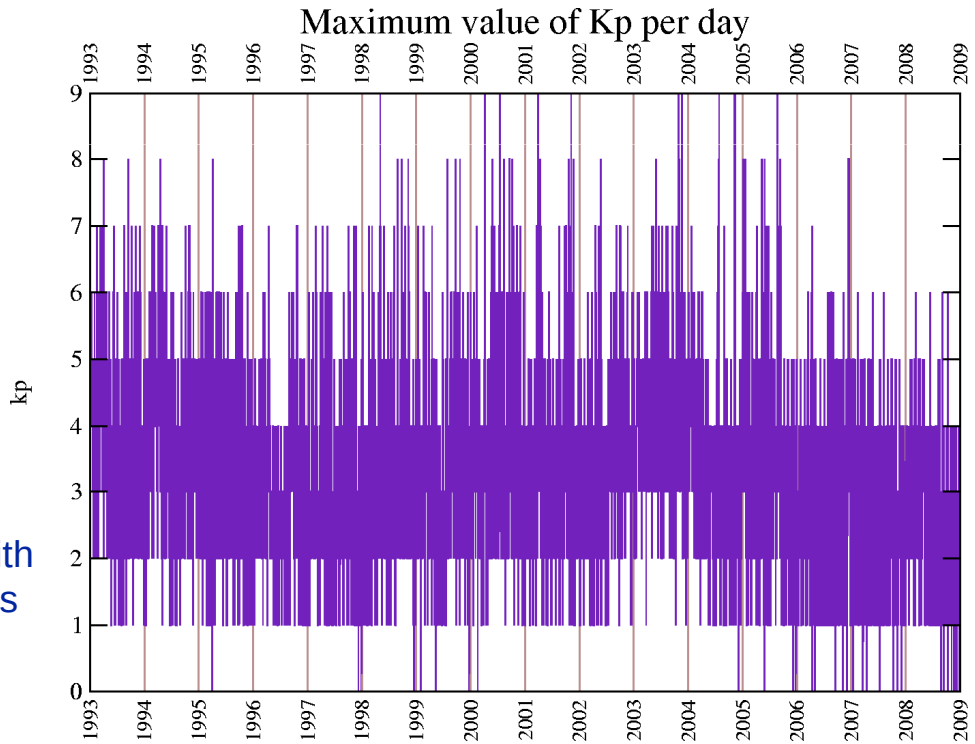
ⓝ *number of satellites used in the combination*

- Left : the evolution of the residuals reflects the **evolution of the number of satellites**
- Both figures : increase of the residuals & errors starting **from September 2007** : reason ???
- Both figures : high values during ~8 months **from Sept-2001 to Apr-2002** (see next slide)

Global performances

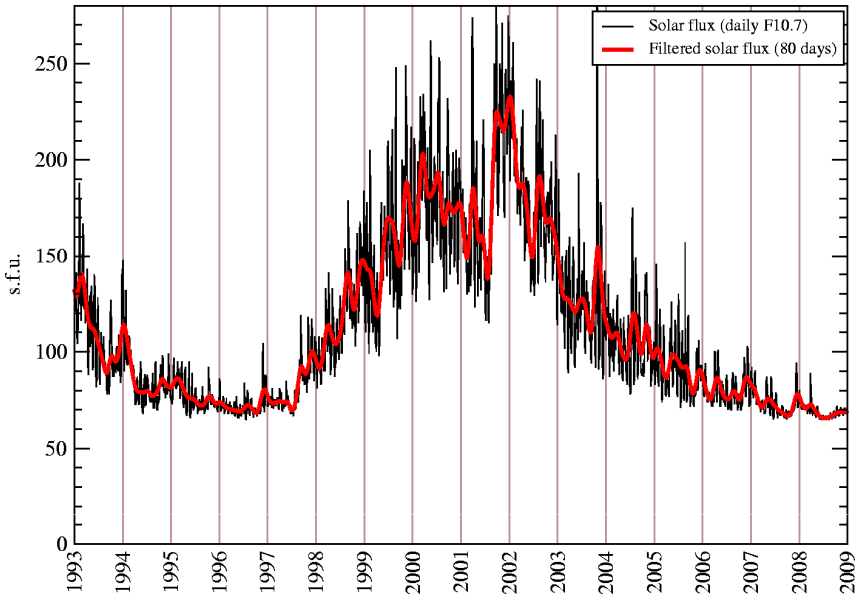


- High values of POE RMS for the same period, **only for SPOT2 et SPOT4**, not for TOPEX/POSEIDON.
- → might be a question of drag → Kp ??

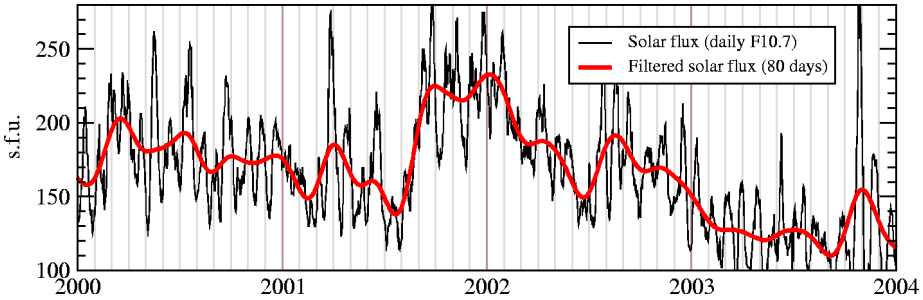


- We do not observe a long period (several months) with consecutive high Kp values
- → Solar flux ? (next slide)

Global performances

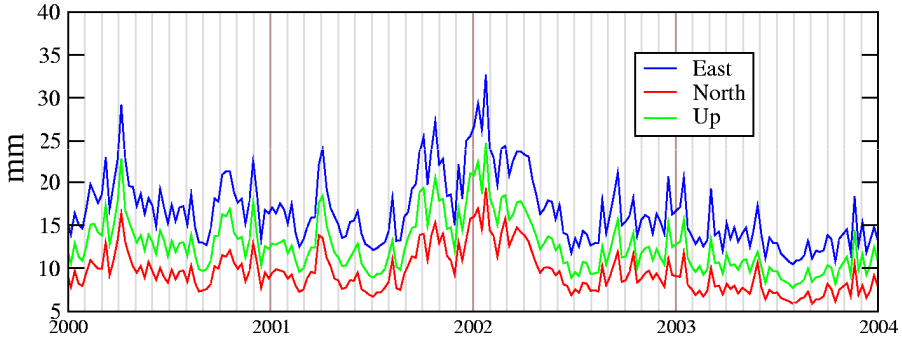


- Strong value of solar flux (> 200 s.f.u.) for several months before & after 2002.0
- Figures on the right show the comparison with the station residuals & associated errors



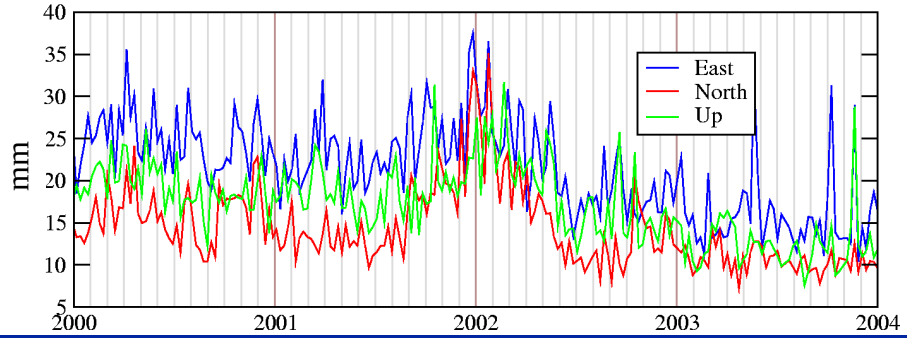
Mean* of the station residual errors

* over the whole network



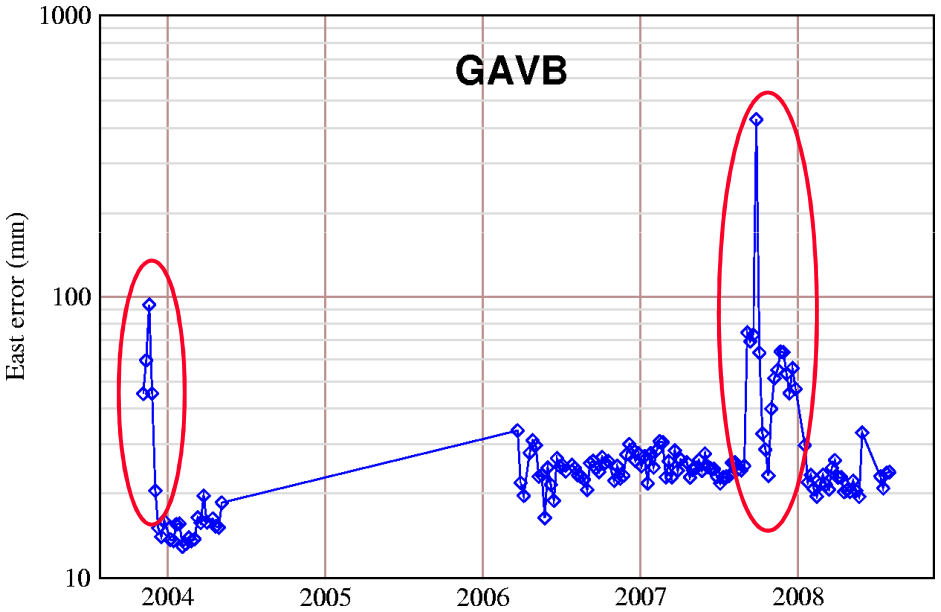
Standard deviation* of the station residuals

*over the whole network



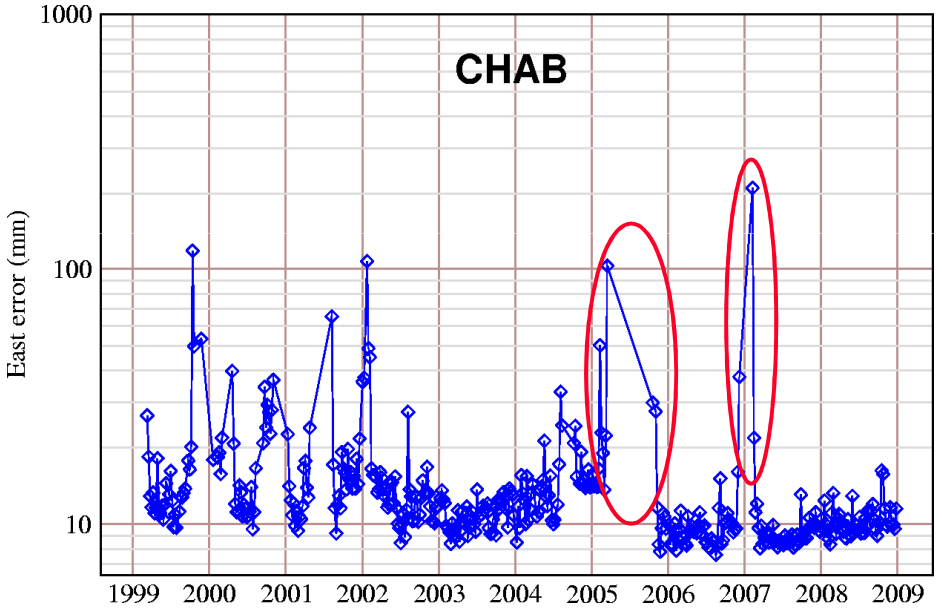
Per station results

- 140 stations have been processed. We focus here on singular peaks observed for a given station in the time series of residual errors (East component)



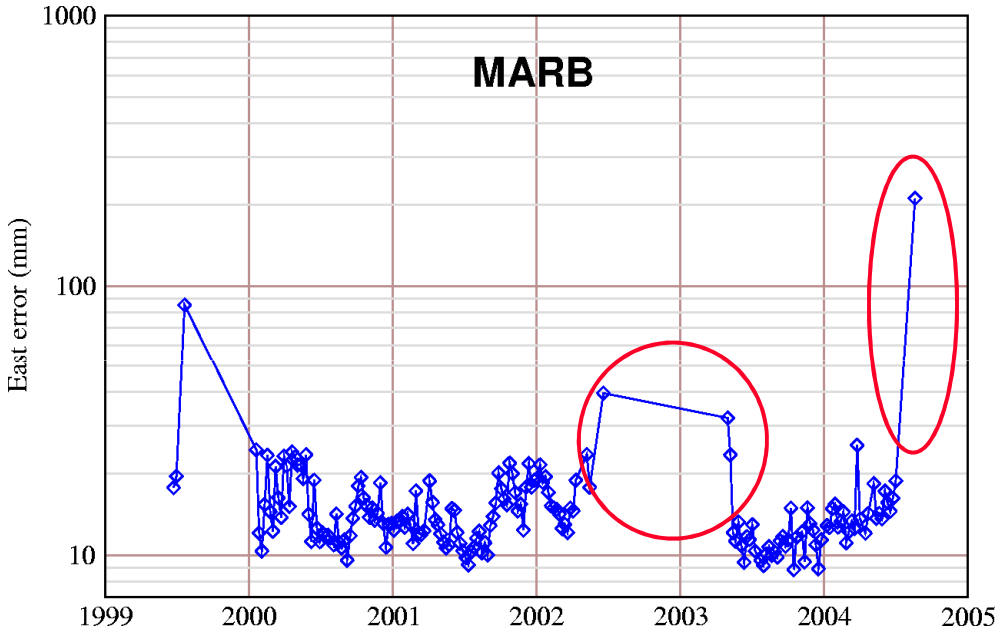
Start of beacon

Perturbated period



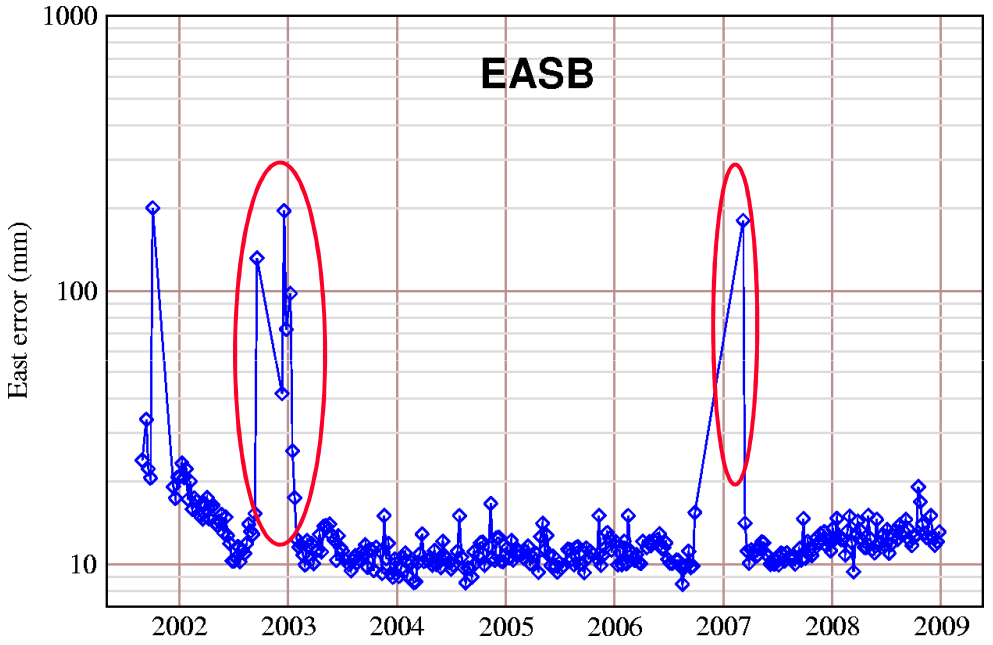
Stops & restarts ?

Per station results



Stops & restarts ?

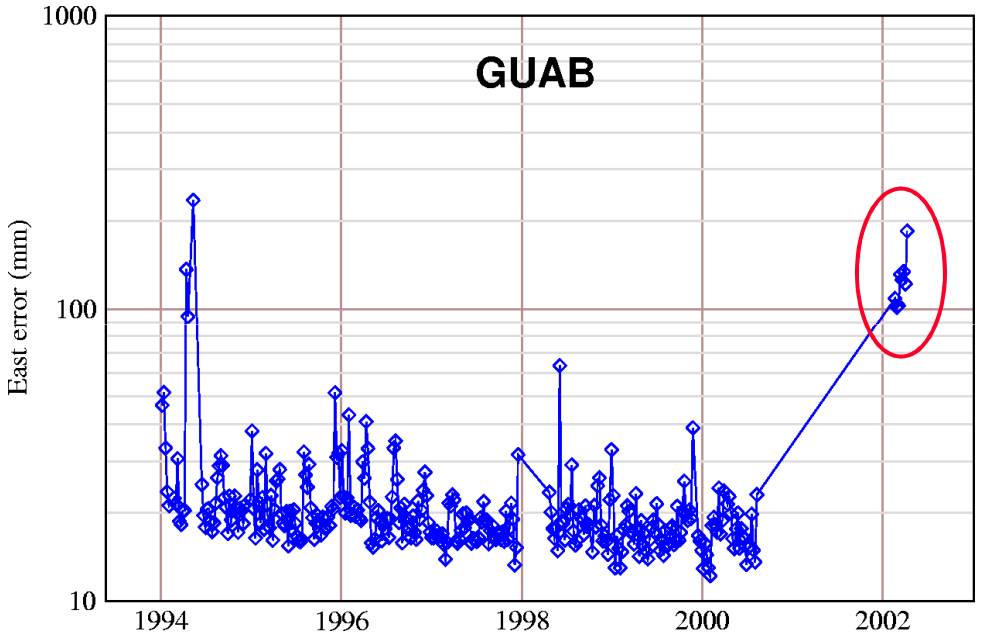
Before incident ?



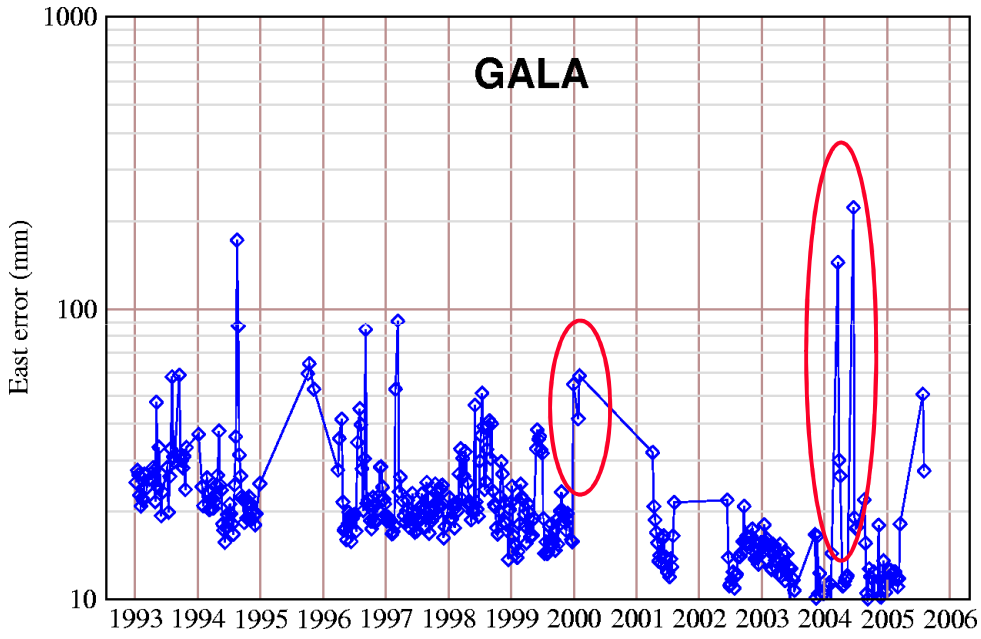
Stops & restarts ?

restart

Per station results



Perturbated period

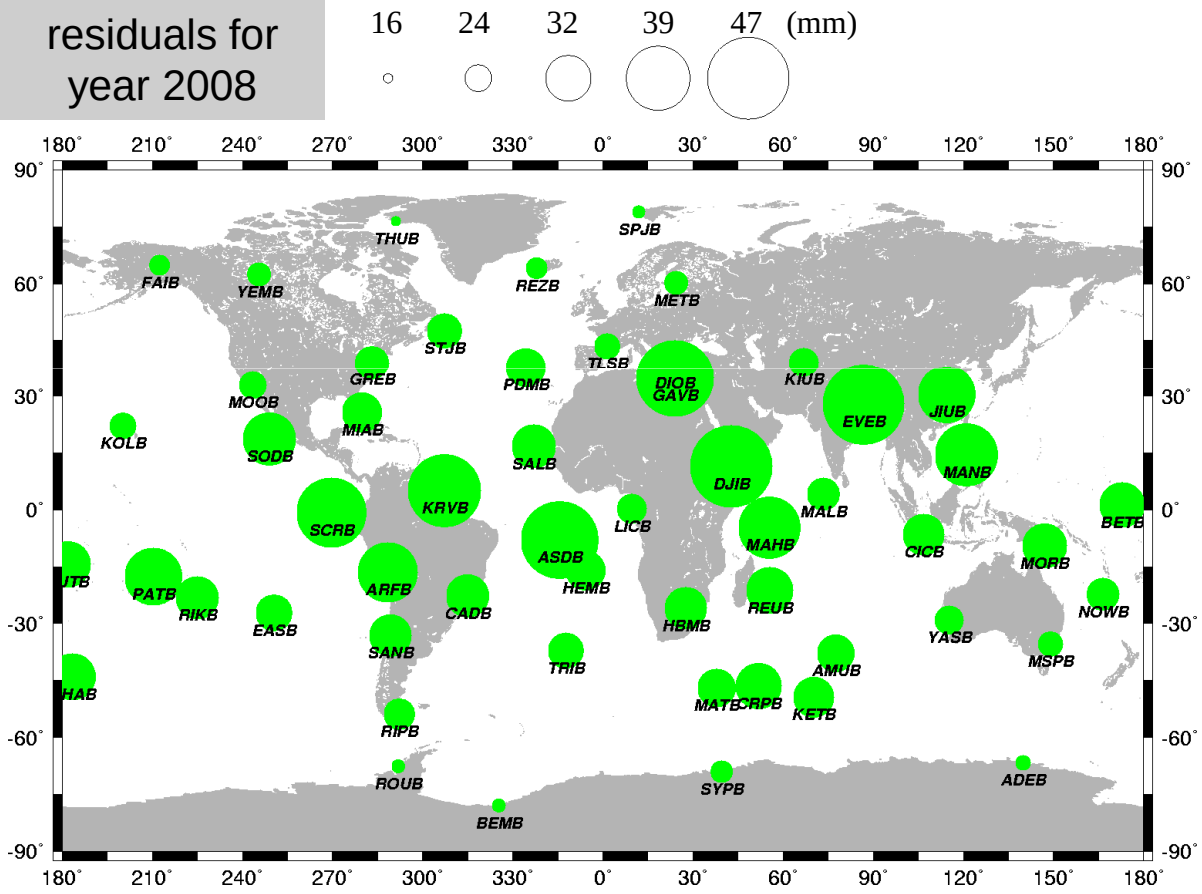


Before incident ?

Perturbated period

Per station results : latitude effect

RMS of station residuals for year 2008



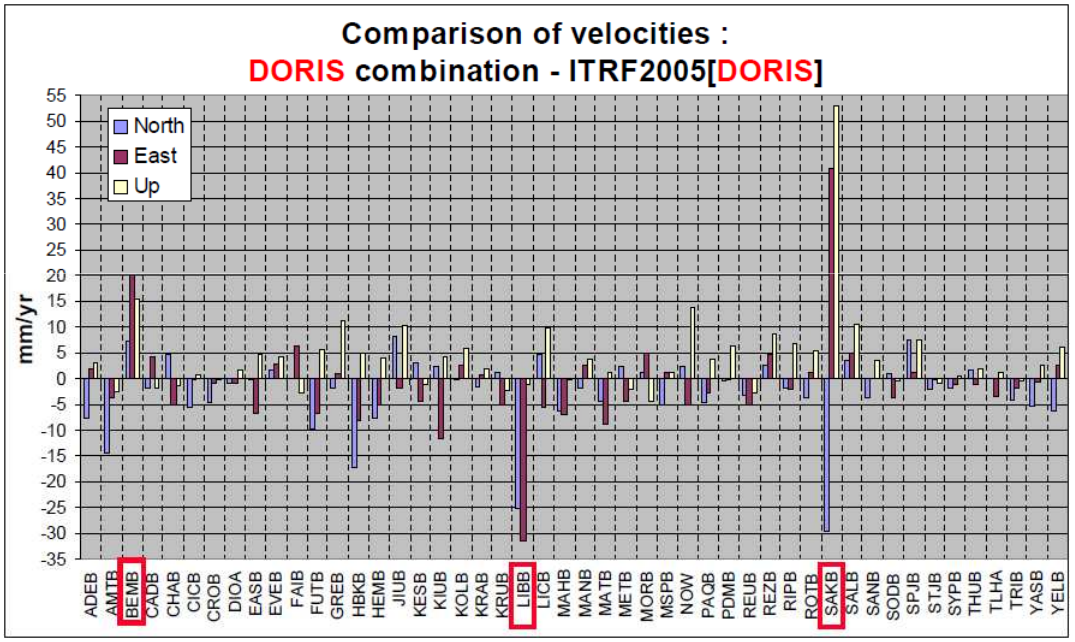
The residuals are clearly correlated with the station latitude. Two contributions :

1) Better density of measurements for high latitude (especially for quasi-polar satellites such as SPOTs & ENVISAT)

2) Wet tropospheric delay is more difficult to solve for equatorial stations

Per station results : comparison to ITRF2005 velocities

The 2005-2007 combined solution (AWG June 2008) showed a good agreement of the derived velocities w.r.t. ITRF2005 (**9 mm/yr** 3D-RMS difference) except for 3 stations



What about the new solution for those 3 stations ?

3D difference of velocities w.r.t. ITRF2005 (mm/yr)

	2005-2007 Solution	1993-2008 Solution
BEMB	**22.2**	**15.0**
LIBB	**40.3**	**1.8**
SAKB	**73.1**	**8.2**

Conclusions

- The evolution of the combined solution has been analysed
  - Correlation with the **number of satellites**
  - Correlation with the **highest solar flux values**
  - Unsolved problem : **increase of residuals since end of 2007**
- Dependance of latitude : good station at high latitude
- For some stations, perturbated periods might be eliminated (before an incident, after a restart), in general a few weeks.
- For 3 stations, the disagreement previously observed with ITRF2005 velocities has been fixed in the new solution