



Effects of thermosphere total density on a LEO orbit during severe geomagnetic conditions (October-November 2003) using DORIS data

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SUMMARY

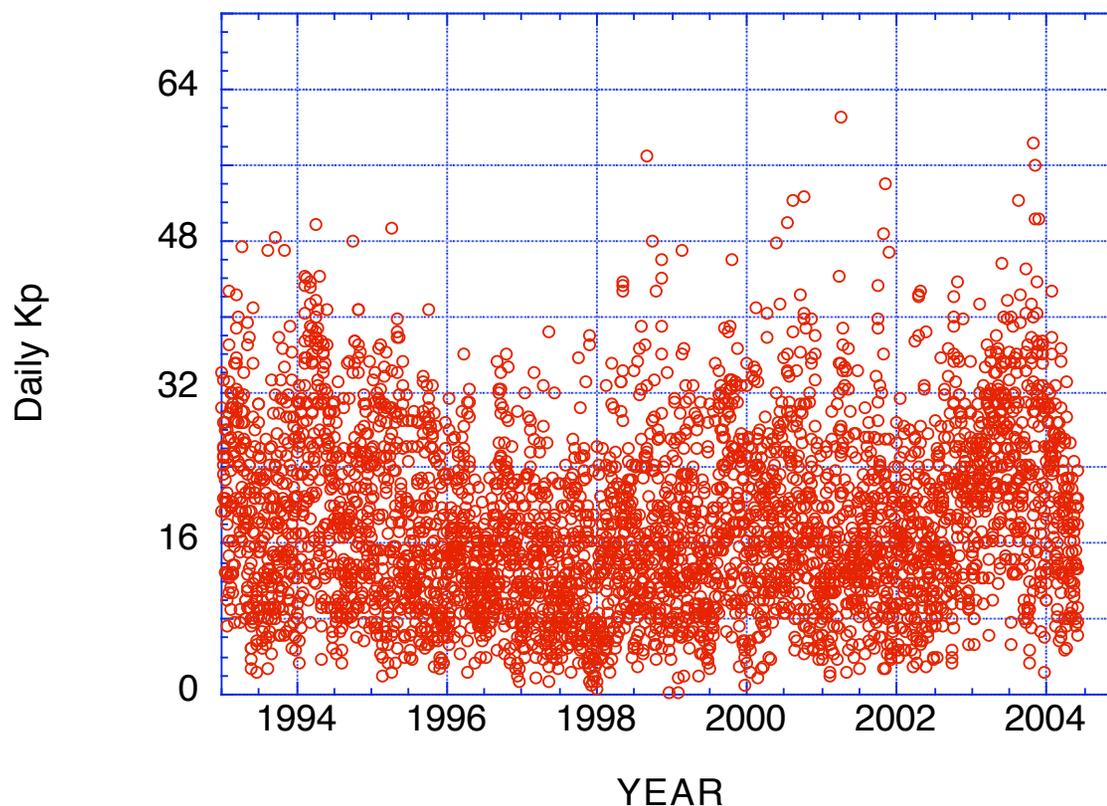
- Geomagnetic storms: definition and effects
- **DORIS** investigation (**Fall 2003 storm**)
 - Normal data analysis vs specific estimation
- **SLR** investigation (**11 year analysis**)
 - DTM Model quality assessment
- Conclusions

GEOMAGNETIC STORMS

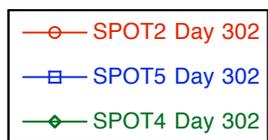
- **Causes:**
 - Solar wind generating particles precipitations at the high latitudes
- **Consequences:**
 - Atmosphere
 - Communications
 - Satellite orbits (through drag)

THE OCTOBER 29 - 31, 2003 GEOMAGNETIC STORM

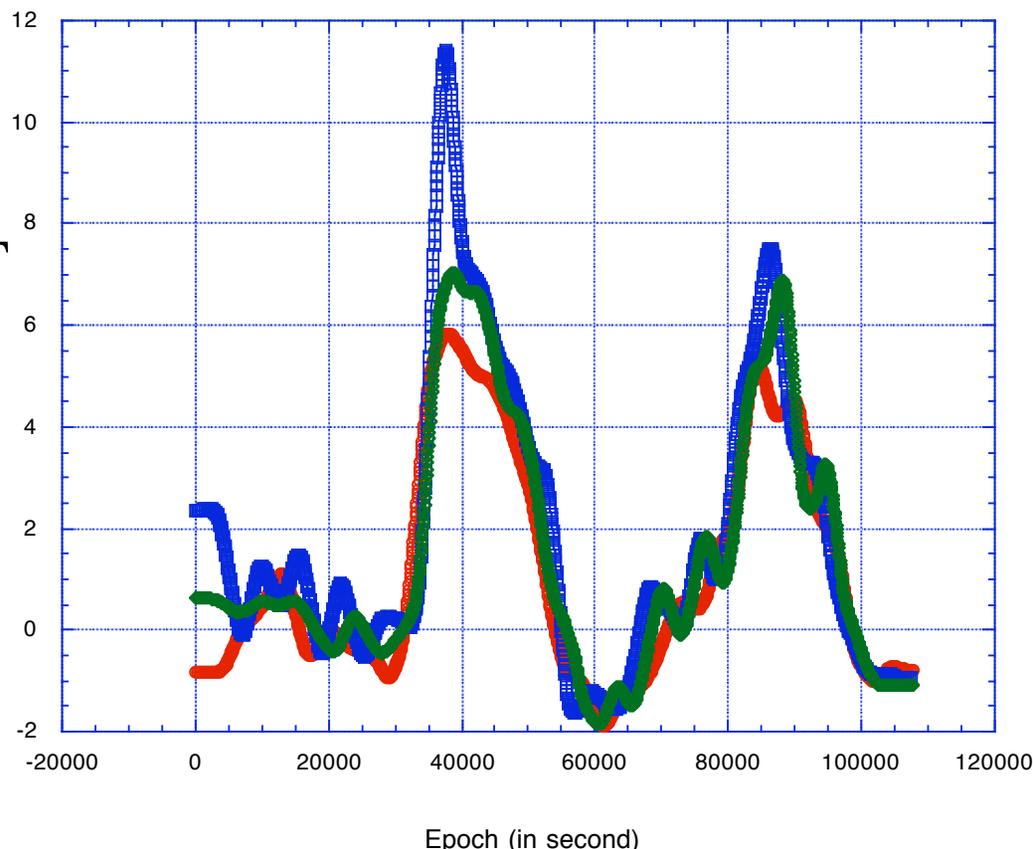
- A rare phenomena



ESTIMATING THE DRAG PARAMETER MORE FREQUENTLY



drag_spot2_random.txt



To be redone
+ add ENVISAT

DORIS RESULTS DURING THE GEOMAGNETIC STORM

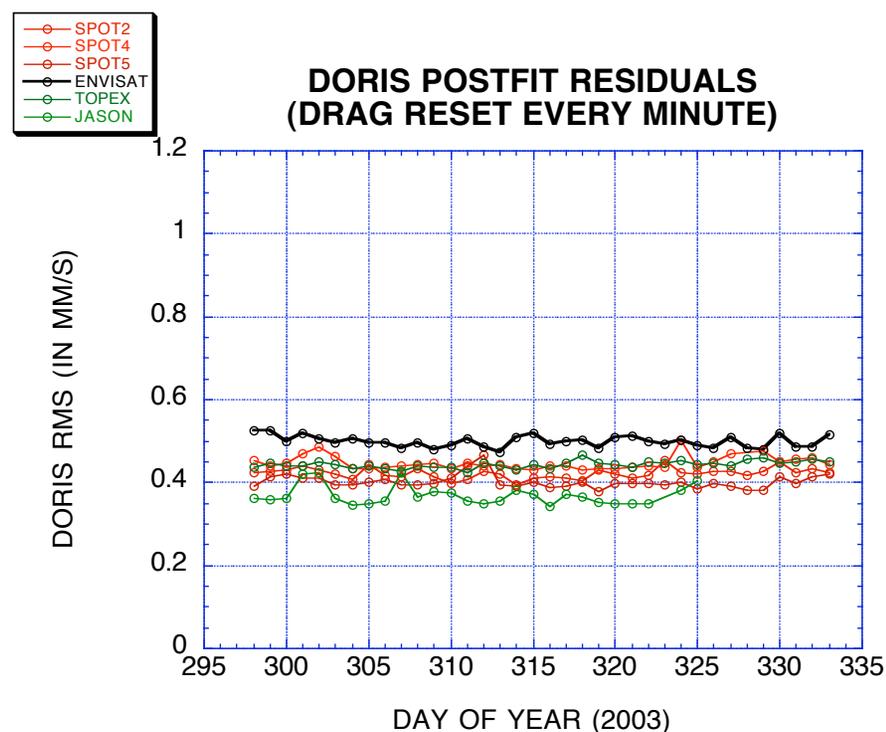
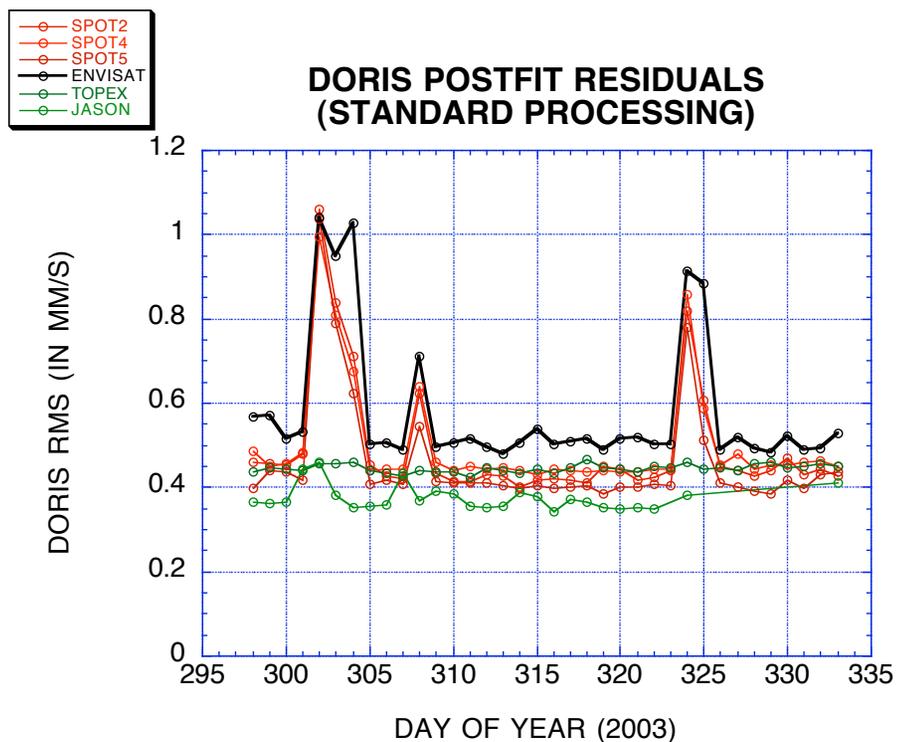
1 drag parameter per 6 hour

VS

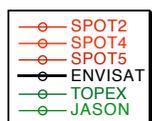
1 drag parameter per minute (+ constraint 5.0)

- DORIS postfit residuals
- Orbit overlaps (every minute over a 6-hour period)
- Stations coordinates weekly results (multi-satellite)

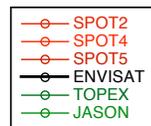
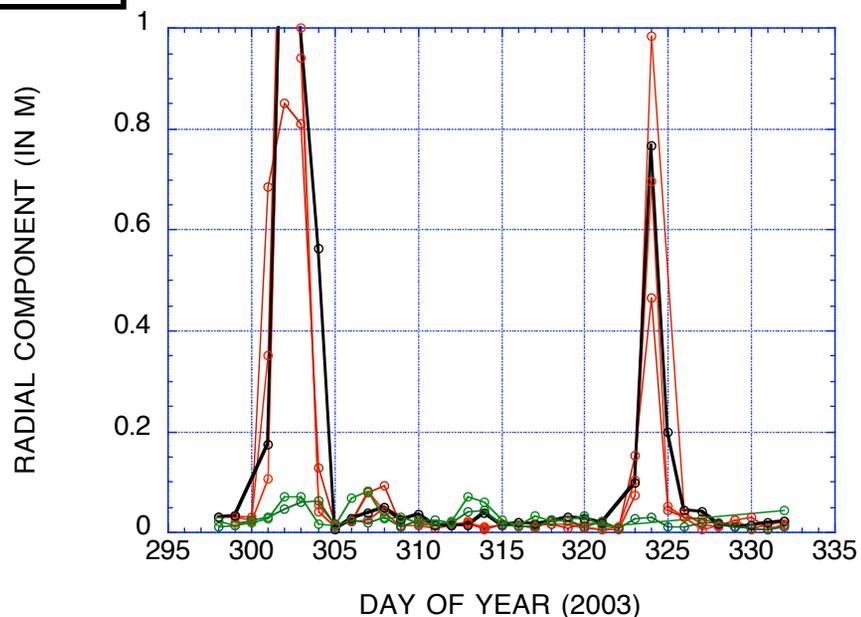
POD results / residuals



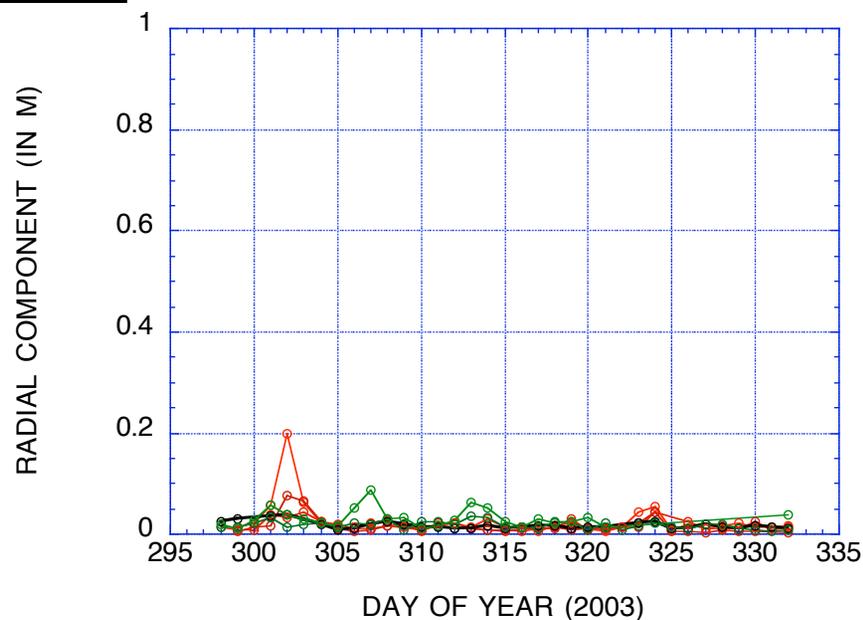
POD results / orbit overlaps



**DAILY ORBIT OVERLAPS - OVER 6 HOURS
(STANDARD PROCESSING)**



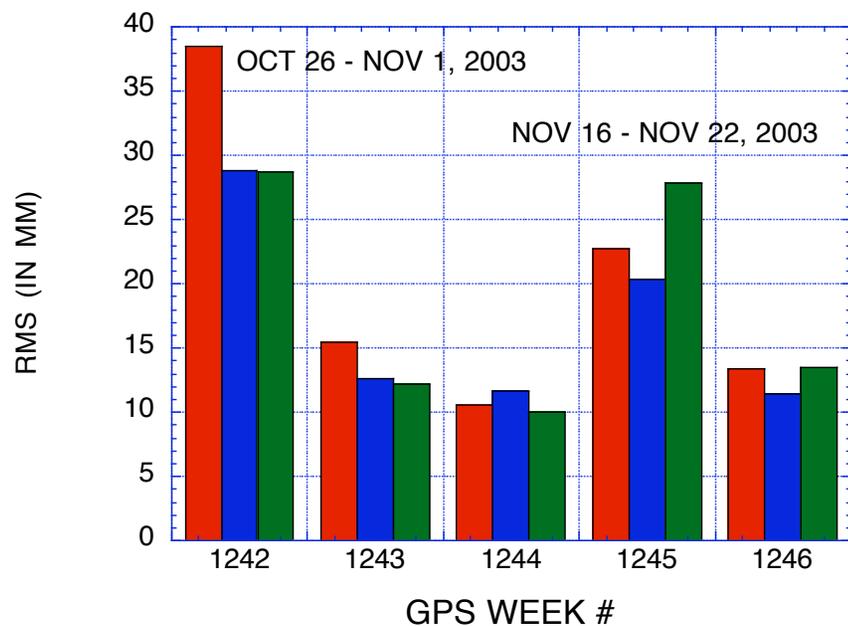
**DAILY ORBIT OVERLAPS - OVER 6 HOURS
(DRAG RESET EVERY MINUTE)**



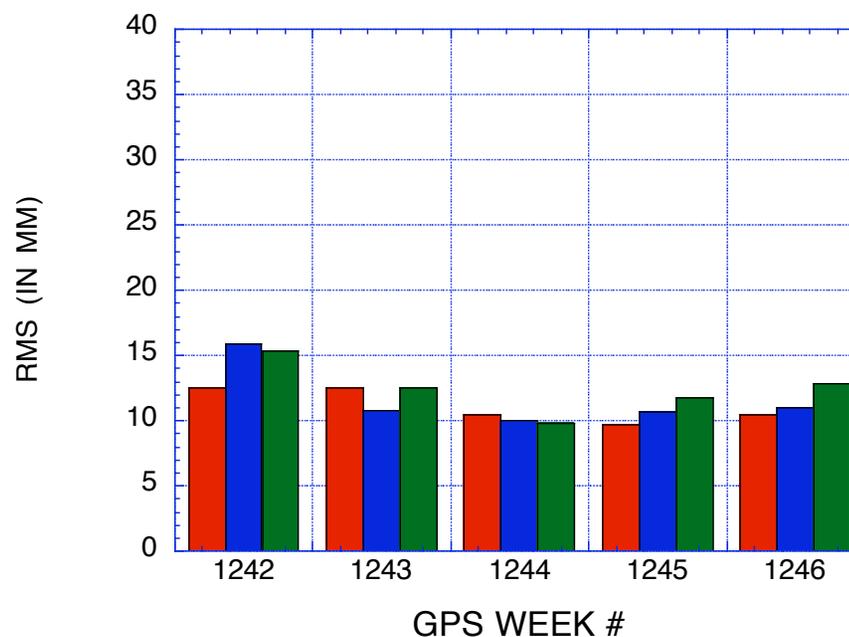
Geodetic results / stations coordinates



**DORIS WEEKLY POSITIONING
(STANDARD PROCESSING)**



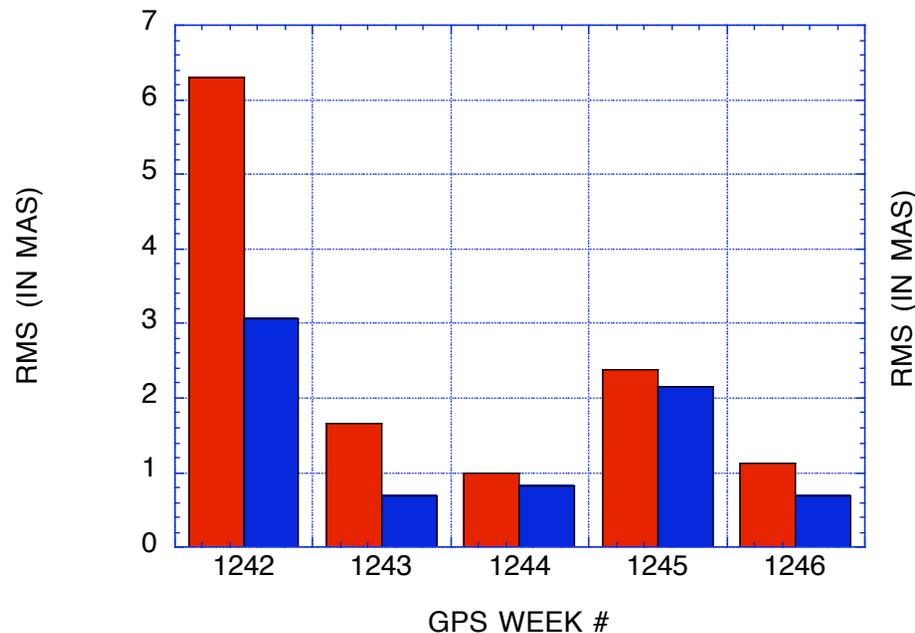
**DORIS WEEKLY POSITIONING
(DRAG RESET EVERY MINUTE)**



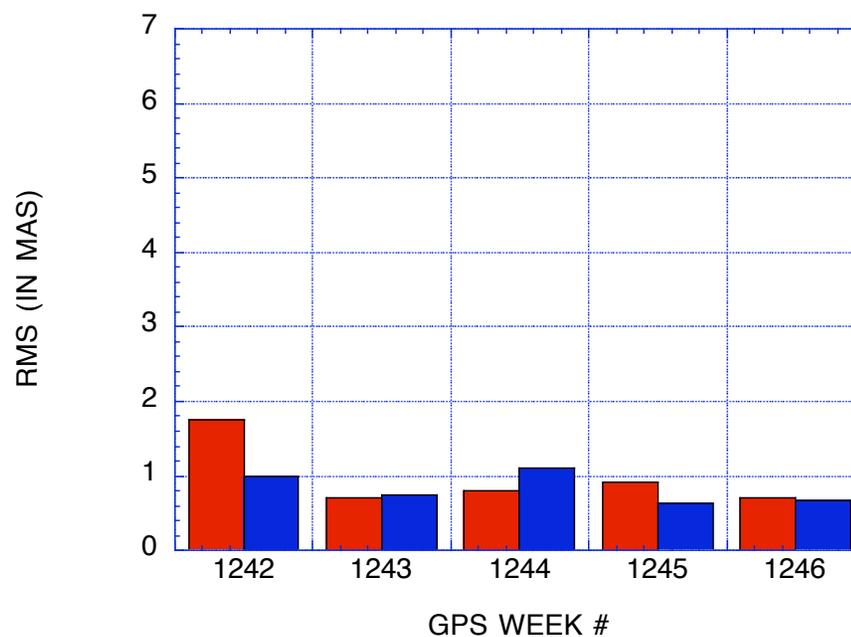
Geodetic results / polar motion



**POLAR MOTION
WEEKLY COMPARISON WITH IGS/GPS
(STANDARD PROCESSING)**

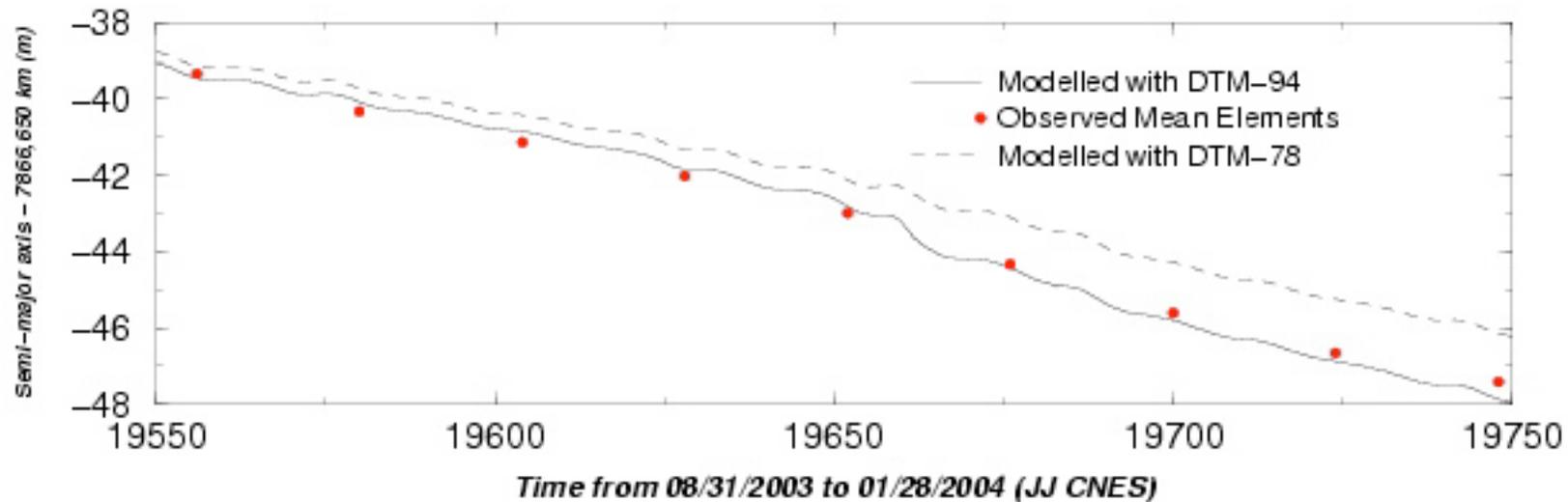


**POLAR MOTION
WEEKLY COMPARISON WITH IGS/GPS
(DRAG RESET EVERY MINUTE)**



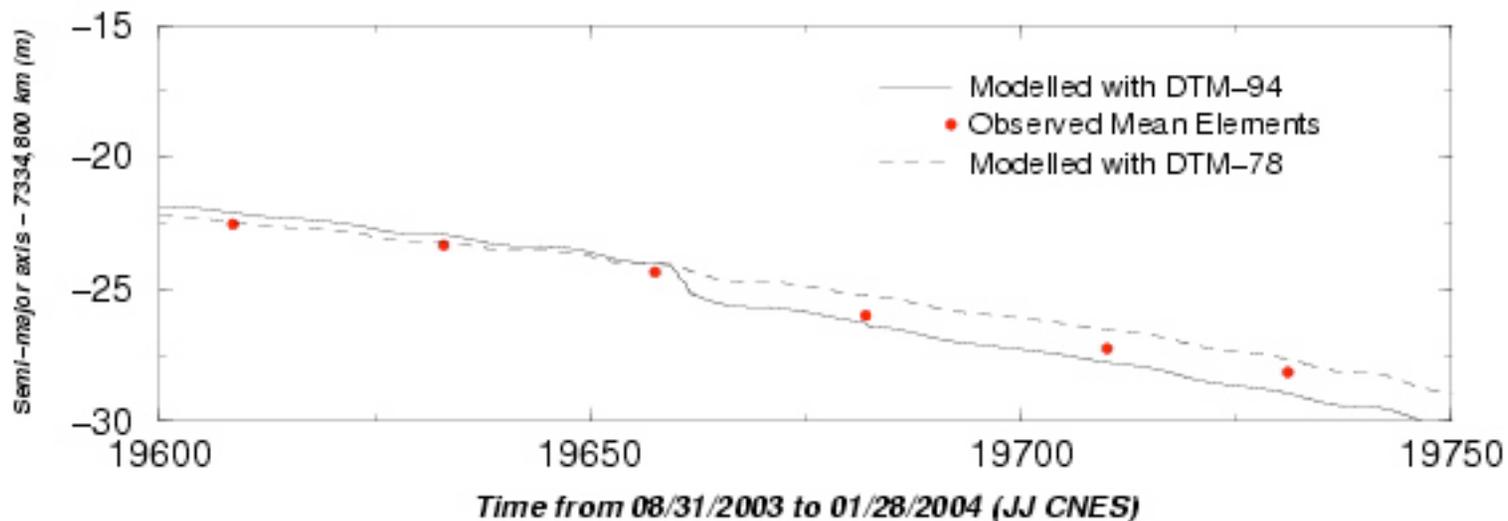
MODEL QUALITY ASSESSMENT USING SLR DATA

AJISAI



STELLA semi-major axis evolution during geomagnetic storm

STARLETTE



CONCLUSIONS

- The October 2003 geomagnetic storm had a large effect on DORIS results (fortunately a rare event)
- Effects can be overcome with appropriate new estimation strategy (1 per minute + constraints).
- DORIS/IDS products were submitted without any degradation.
- New DORIS strategy provides better results (even for regular days)
- Effect observed on SLR orbit (semi-major axis) and compared to DTM94 model