

# Doris 1B products evolution

IDS Venice 2006

CNES POD Team (\*)

(\*) F. Mercier, L. Cerri, S. Houry,  
A. Guitart, P. Broca, C. Ferrier, J.P. Berthias



CENTRE NATIONAL D'ÉTUDES SPATIALES

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## Evolutions in Doris 1B files

2005

Elevation limitations

Zero Doppler measurements

Restart mode of stations

Preprocessing (changes in validated measurements)  
(more SAA measurements for Jason)

Correction of the troposphere model  
(geodetic vertical instead of radial direction)

Future

SAA correction

Ionospheric correction (formulations)

## Elevation limitations, zero Doppler, restart mode

<u>Elevation</u>	before oct. 2005	after oct. 2005
Spot2, Spot4 :	13 °	13 °
Spot5 :	12 °	12 °
Envisat :	12 °	8 ° (flight sw)(*)
Jason :	8 °	0 ° (*)
Topex :	8 °	

(\*) no limitation on ground processing

### Zero Doppler

New instruments may deliver incorrect measurements around zero Doppler (middle of a pass).

Completely eliminated for a few months before feb. 2005

Present and flagged since feb. 2005

### Measures on stations in restart mode (RS=1)

When the emitter is started, the oscillator needs a certain time to be stabilised.

Flagged since oct. 2005

## Preprocessing changes

### New preprocessing procedure (now active on Jason and Envisat)

initial objective : handling of SAA signatures for Jason  
 avoid rejection due to frequency behaviour of oscillator

### Removed old criteria

rejection on elevation  
 rejection on pass signatures (Along track error, line of sight error)  
 pass symmetry : on board acquisition strategy gives  
 asymmetrical passes, eliminated by the standard processing

### Characteristics

#### on iono-free residuals

along track error + polynomial  
 max rms of the pass  
 max residual  
 min size

	Jason	Envisat
Degree	4	1
rms (cy)	0.05	0.05
residual (cy)	0.25	0.1
size	10	10

### Consequences

low elevation measurements are now present  
 measures with more important errors are present (increase of max values)

## Global results

### Spot2, Spot4, Spot5, Envisat, Jason, Topex

for each POE arc :

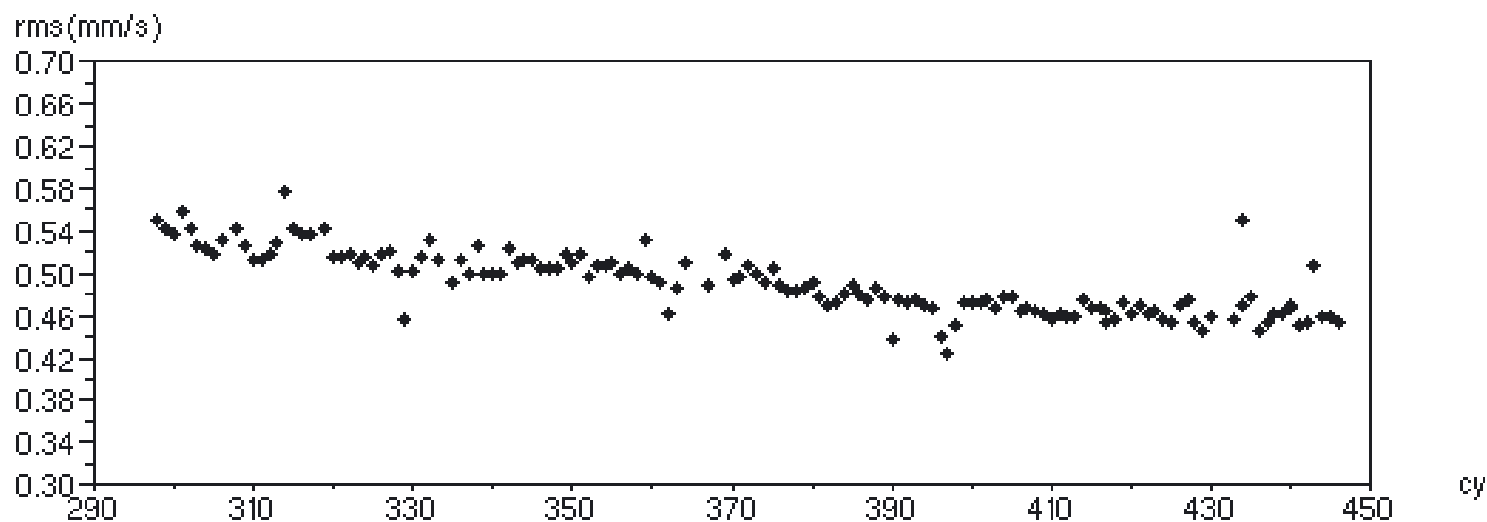
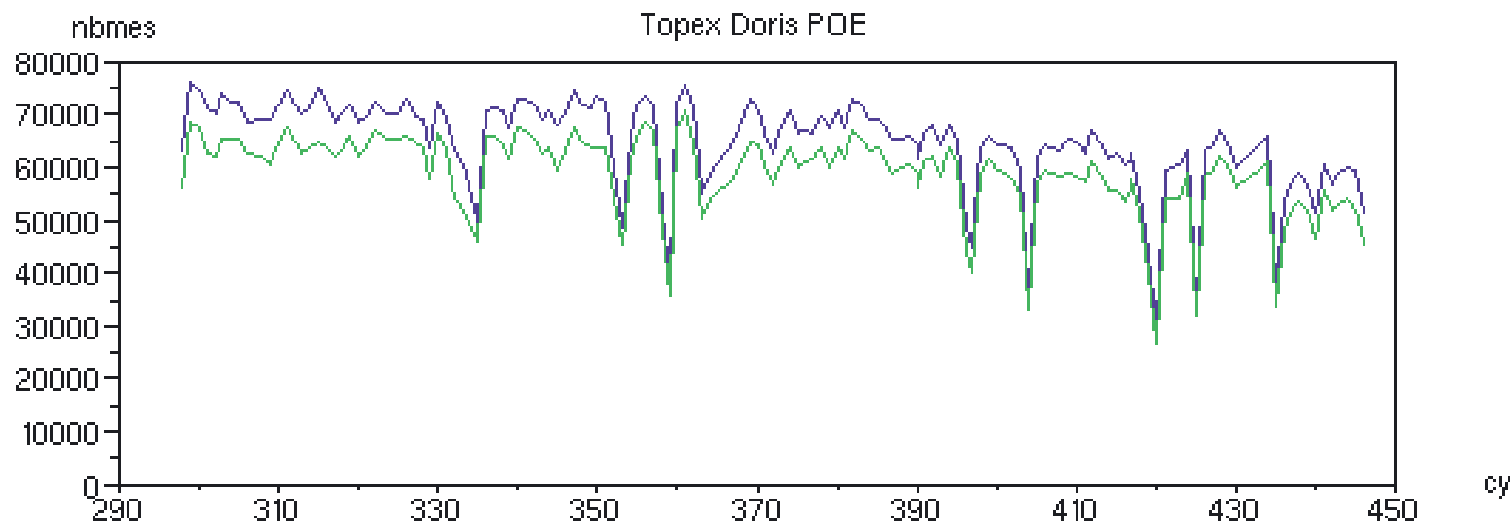
initial number of measurements	—————
validated number of measurements	—————
weighted rms values for each POE arc	◆ ◆ ◆ ◆

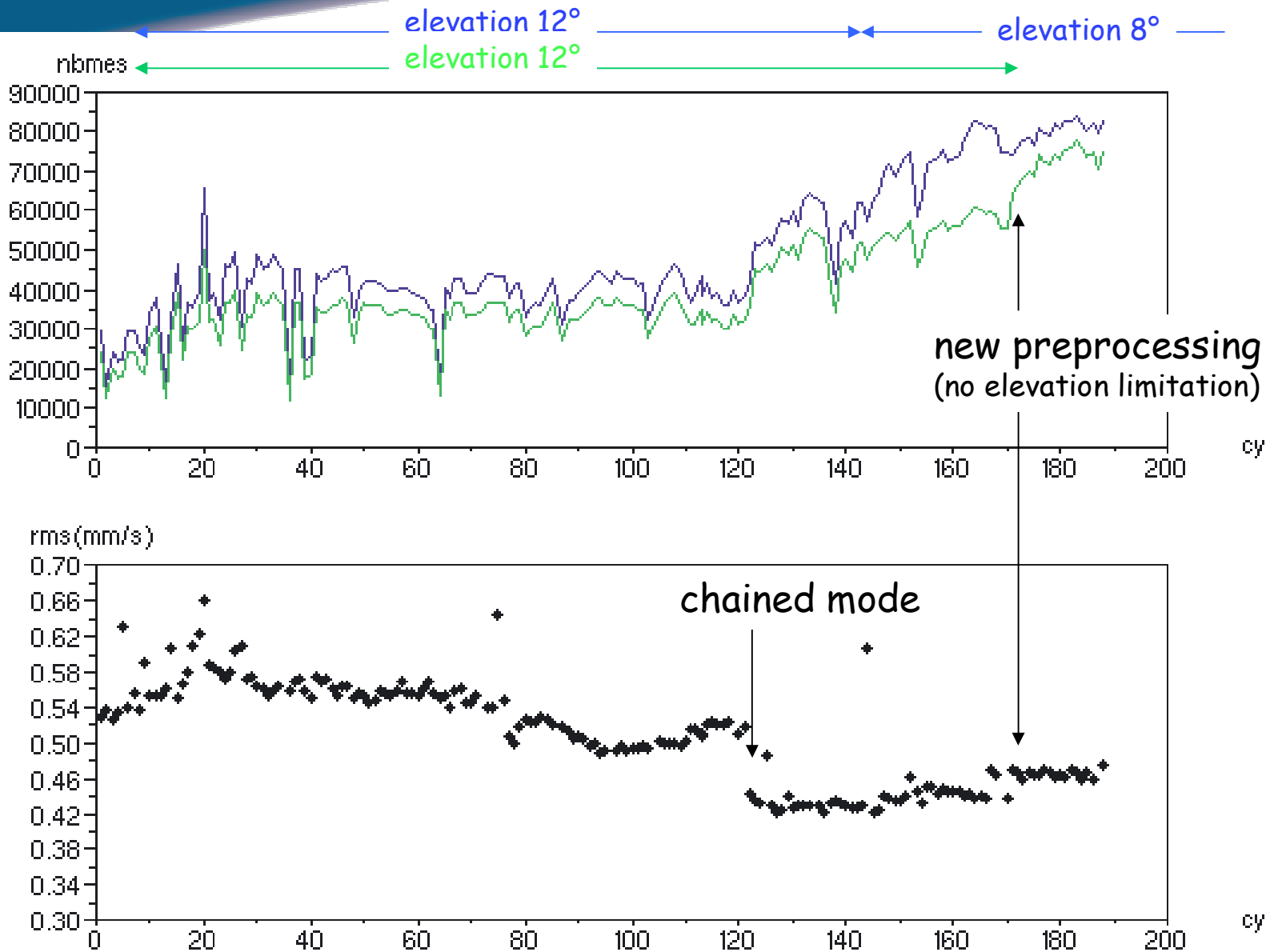
### Remarks

if arc length not constant  
number of measurements not stable for different cycles  
(case of Spot satellites)

SAA stations down weighted (Jason)  
changes in rms values for Jason

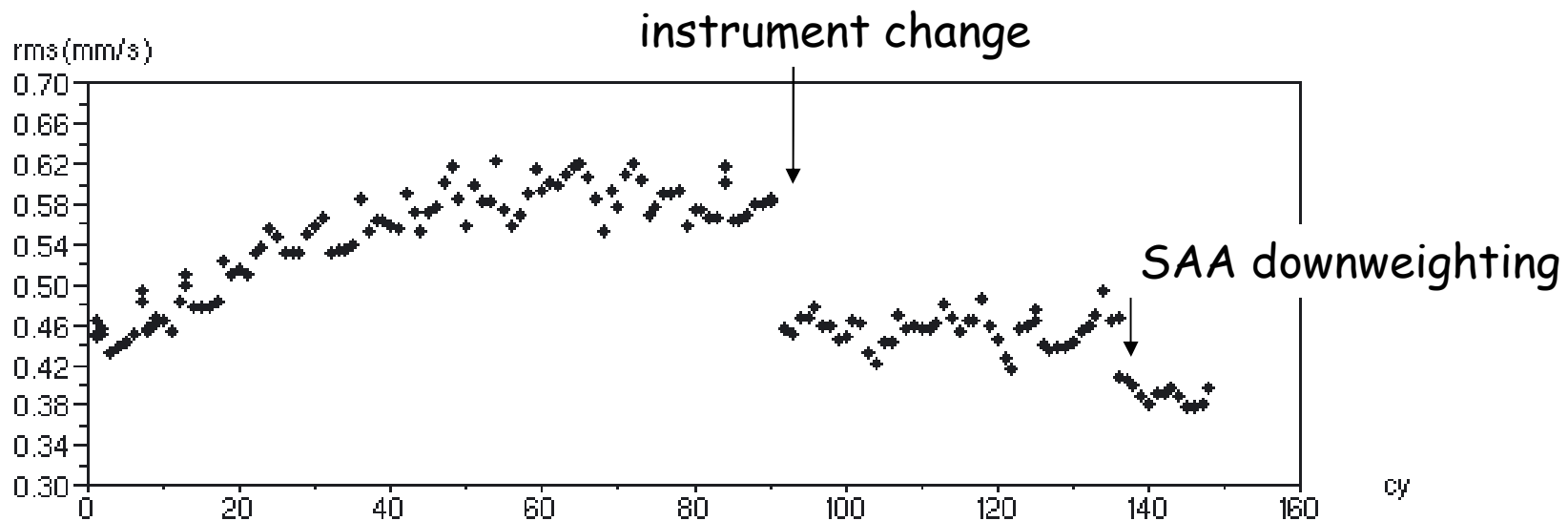
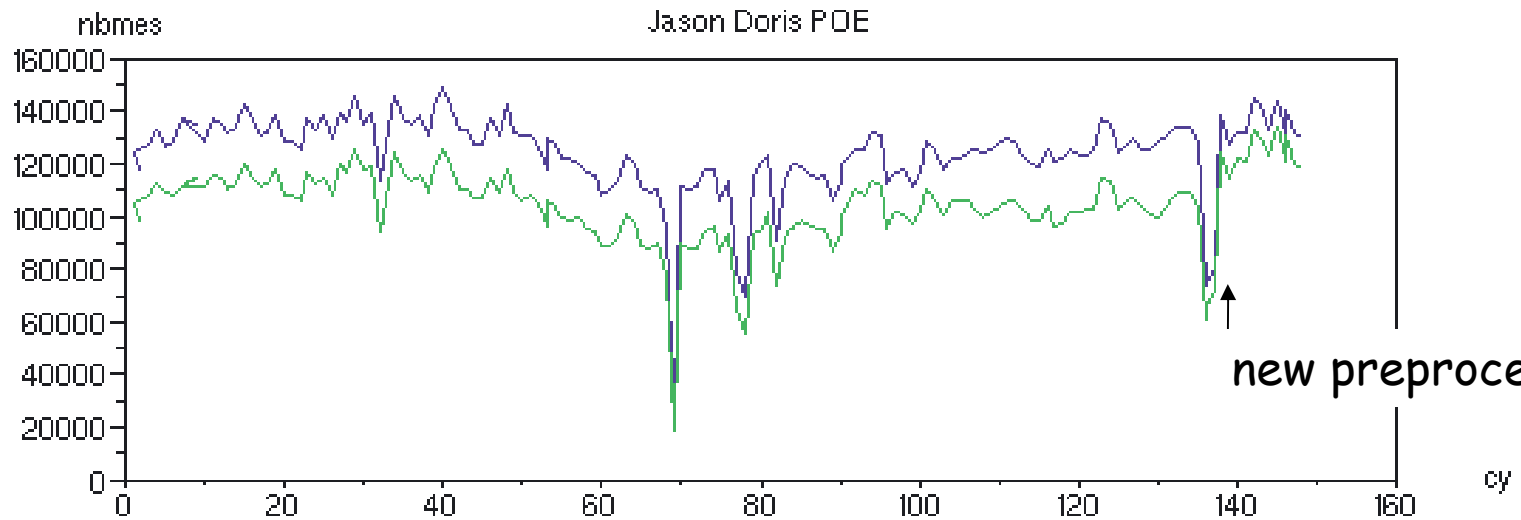
# Topex Doris measurements



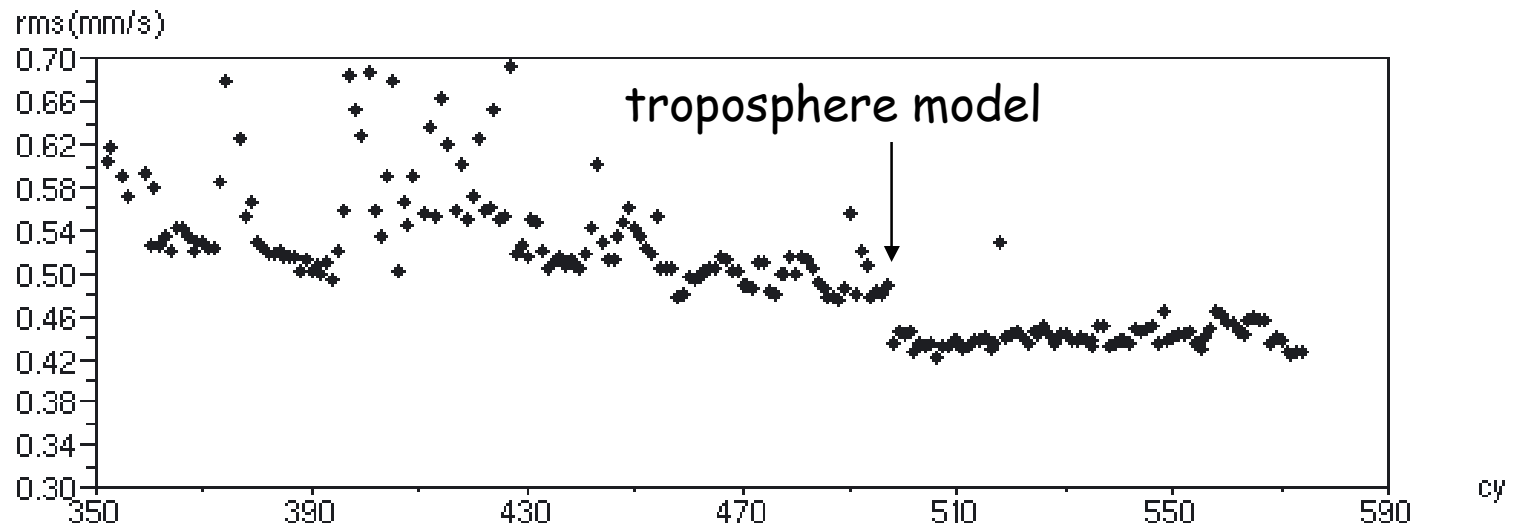
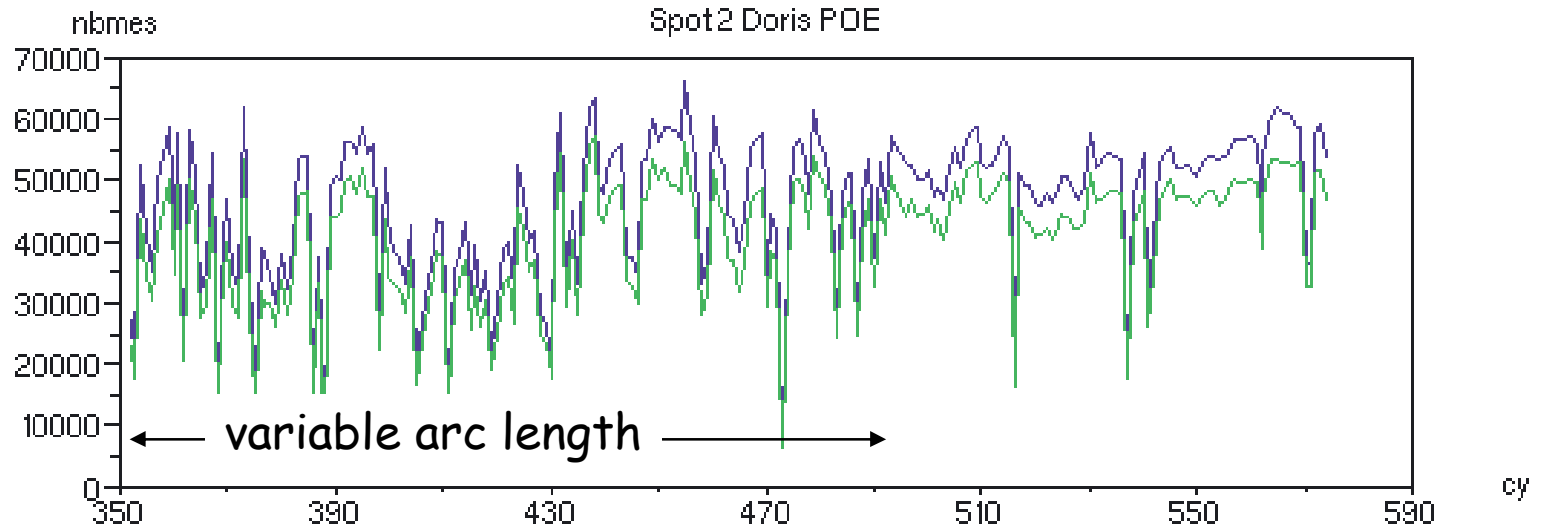




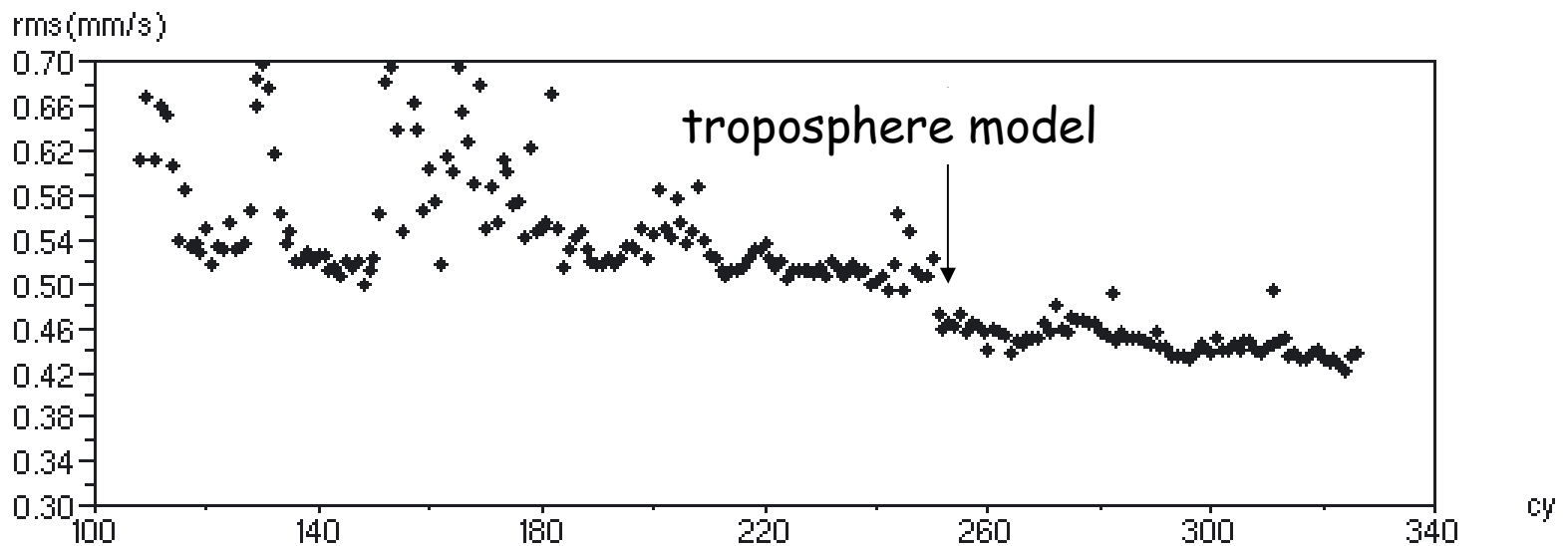
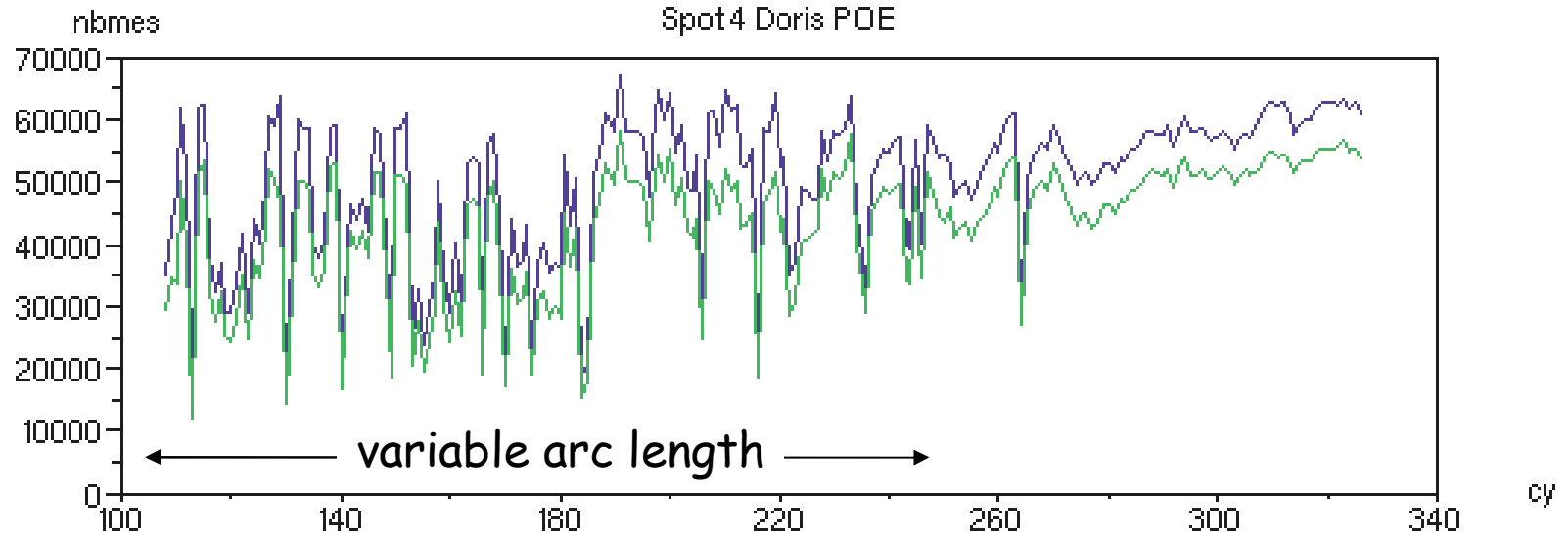
# Jason Doris measurements



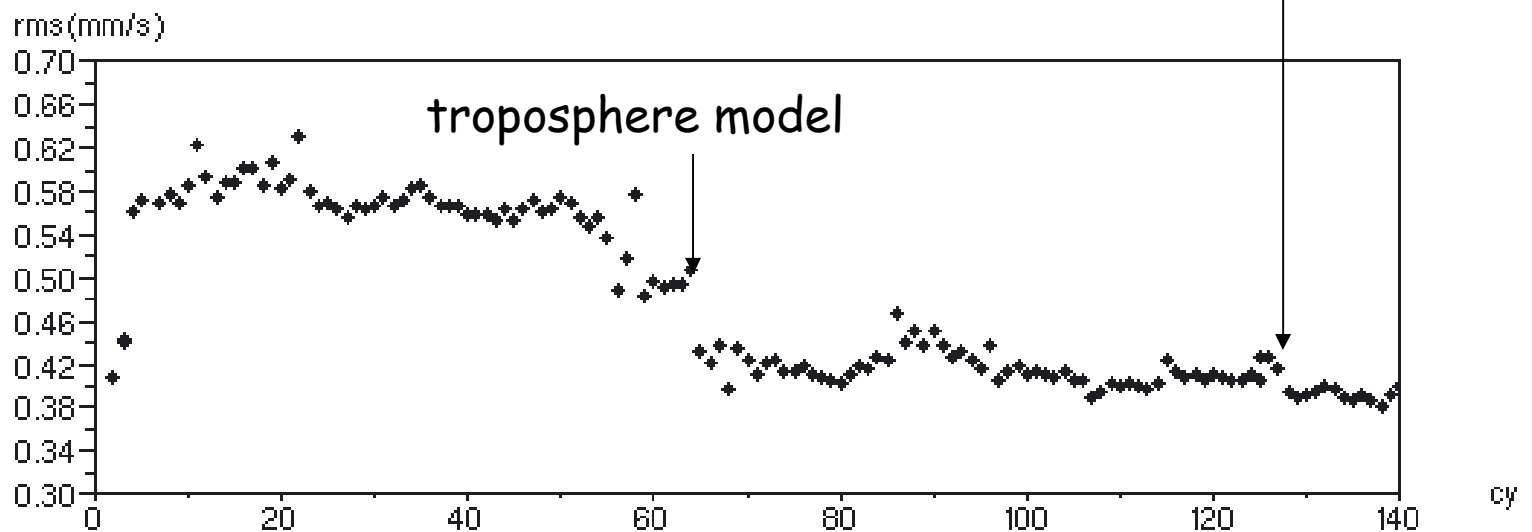
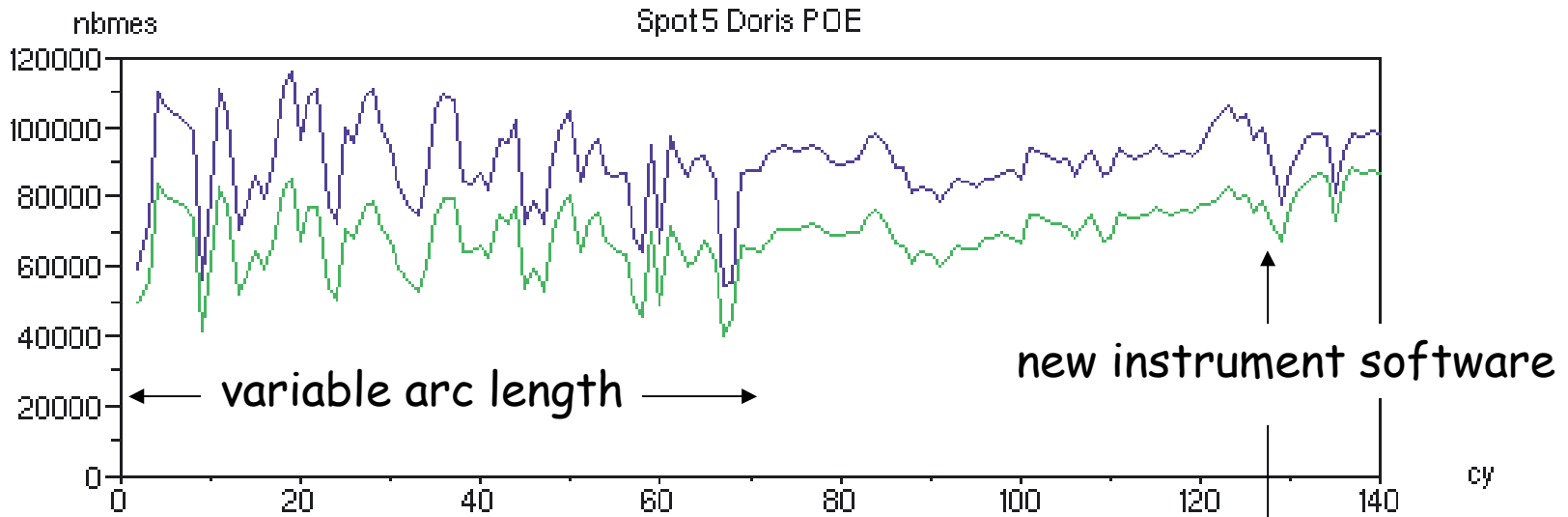
# Spot 2 Doris measurements



# Spot 4 Doris measurements



# Spot 5 Doris measurements



## Ionospheric correction

### Ionospheric correction :

#### current procedure :

needs orbit and frequency bias for ionospheric  
correction computation

→ **eliminated measurements are not processed**

#### alternative procedure (proposed for future distribution)

direct computation of ionospheric correction using  
direct combination of 2 GHz and 400 MHz measurements

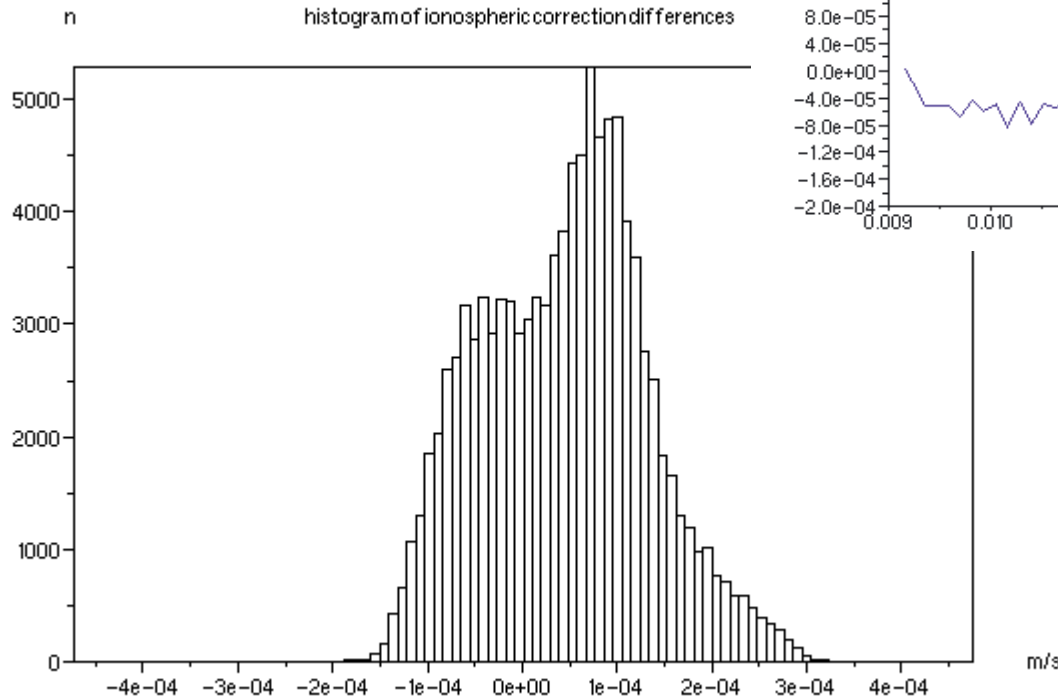
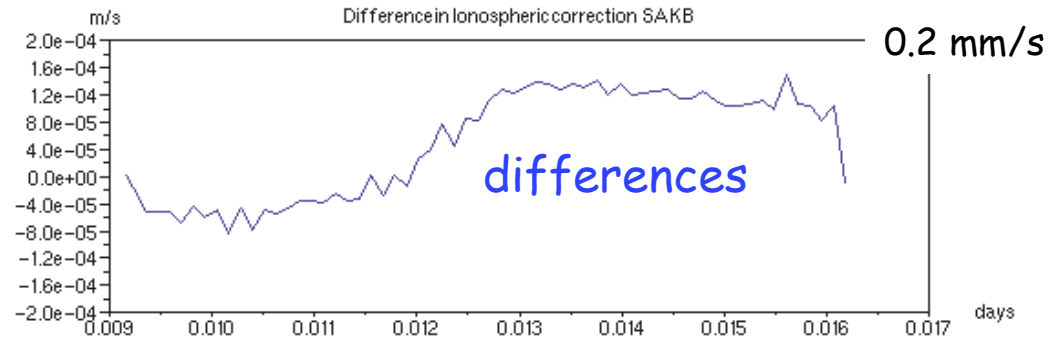
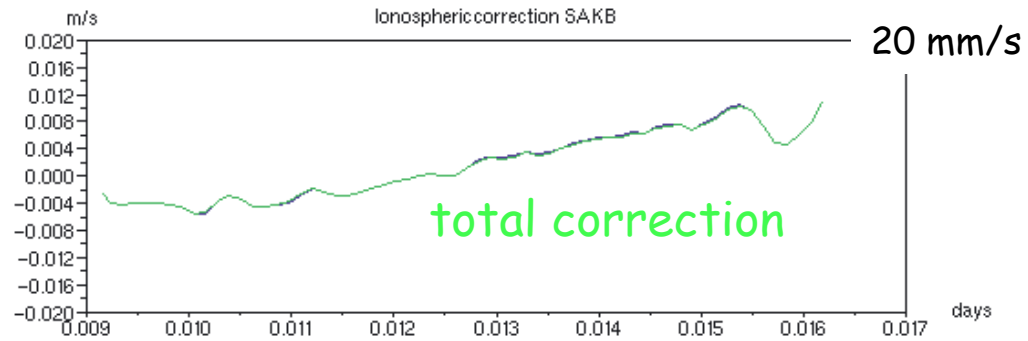
→ **all measurements can be processed**

Use of this alternative correction was proposed in the past but never implemented

It is possible to replace rapidly by this correction in the Doris 1B product

new correction - current correction

- error between -0.2 and 0.3 mm/s
- bias  $\sim 0.1$  mm/s
- structured errors



effects

- on orbit determination ?
- for iono users ?

## Conclusion

### Current characteristics :

**Preprocessing** : evolutions will give more validated values  
the new preprocessing handles correctly SAA stations (Jason)

**Low elevation** measures now possible for Envisat and Jason

**Zero Doppler and restart mode (RS=1)** : flagged

### Future changes :

**SAA corrections (Jason)** : not applied in the delivered files  
can be corrected after with a specific procedure

**Ionospheric correction** : possible formulation using measurements only

- some differences with the current procedure
- can be computed for eliminated measurements