GRGS Combination Research Centre

Participation to the IERS Combination Pilot Project

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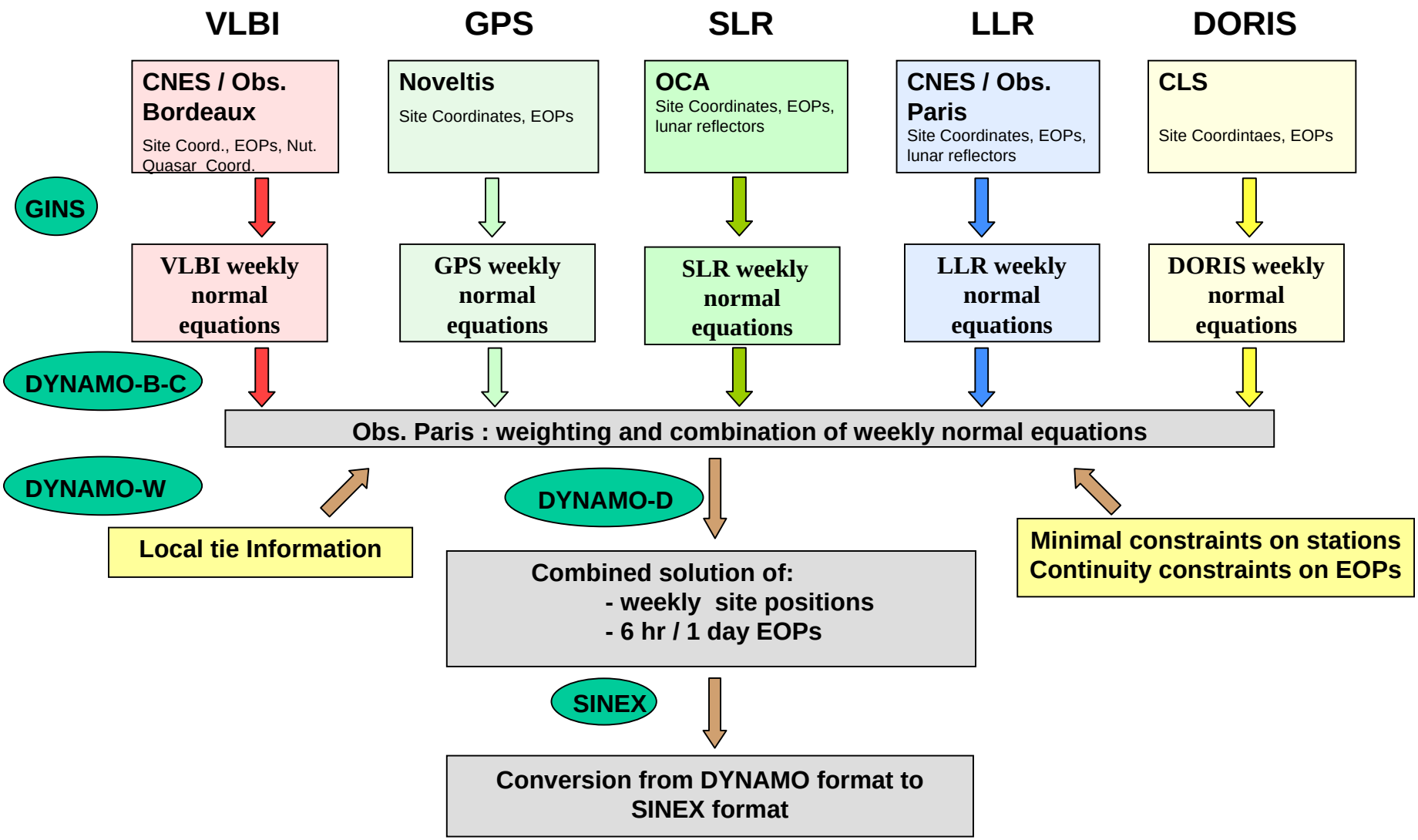
GRGS organization



- **Introduction**

Our participation to the CPP has started with the first week of 2005. Until now, 8 weeks of SINEX files were delivered. We provide weekly solutions for the Earth orientation parameters: Pole-X, Pole-Y, UT1, Nutation-ψ, Nutation-ε per day and stations coordinates per week by combining 5 space techniques in an homogeneous and simultaneous computation.

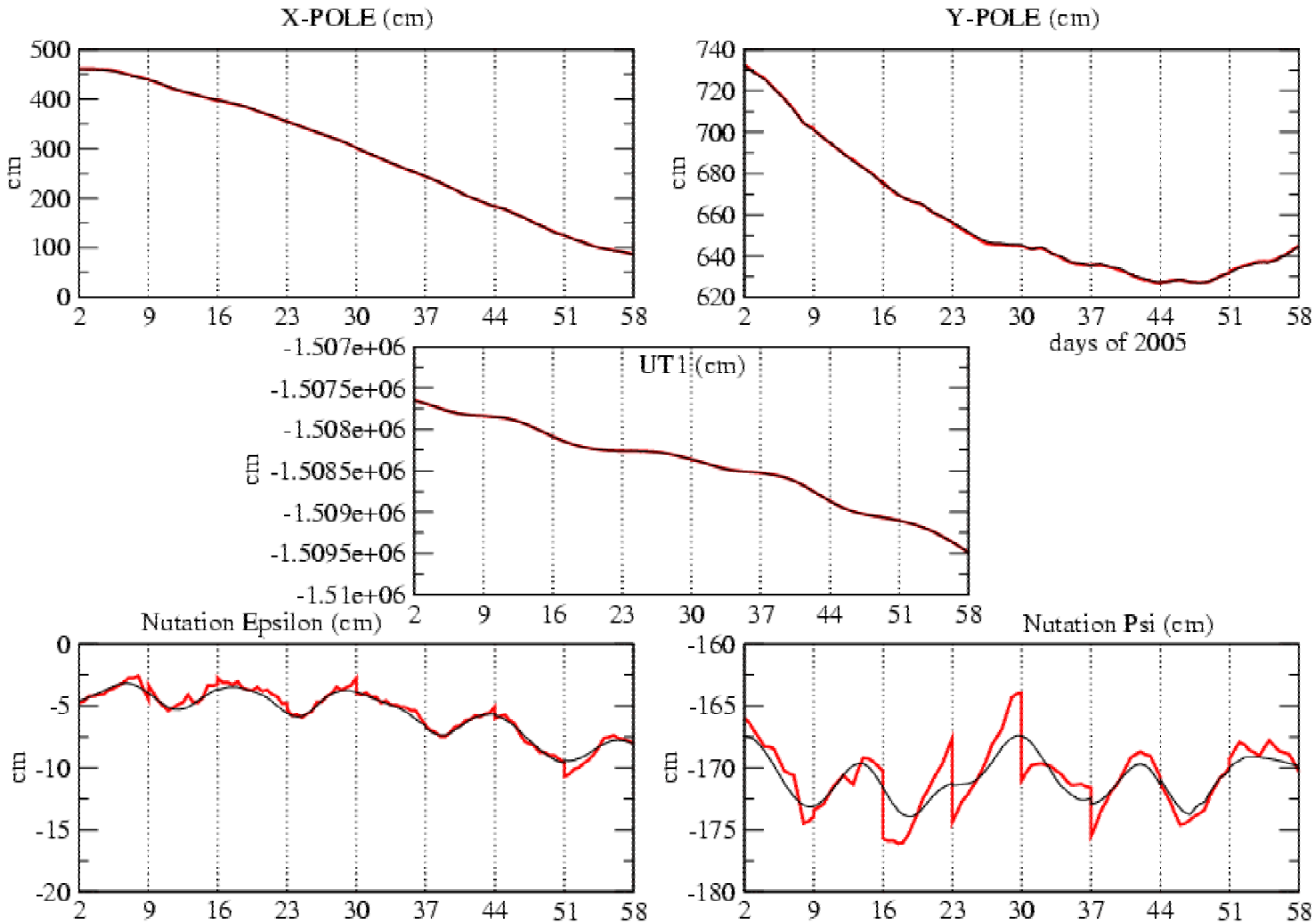
Participating techniques :

- ✓ GPS : all GPS satellites, stations subset (approx. 50 stations)
- ✓ SLR : Lageos & Lageos2, all stations (approx. 15 stations)
- ✓ DORIS : all satellites except Jason1, all stations (approx. 44 stations)
- ✓ VLBI : approx. 9 stations
- ✓ LLR : 2 stations (Grasse & Mc Donald)

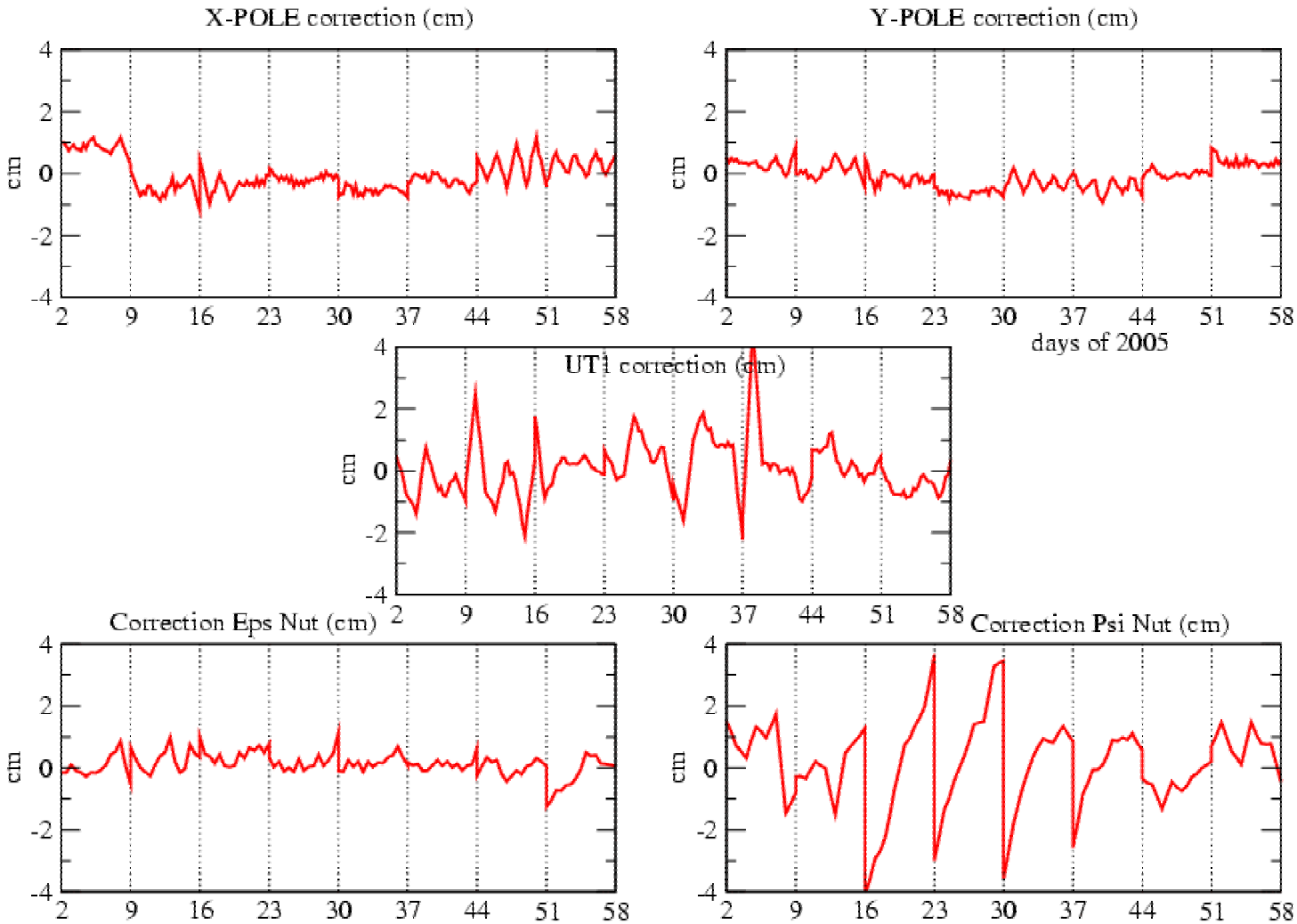
- **Relative weighting**

	Mean measurement residuals	*Weighting (expressed in measurement units)*
GPS	***0.57 cm***	***0.86 cm***
SLR	***0.99 cm***	***1.34 cm***
DORIS	***0.391 mm/s***	***0.273 mm/s***
VLBI	***4.1 cm***	***1.0 cm***
LLR	***19. cm***	***46. cm***

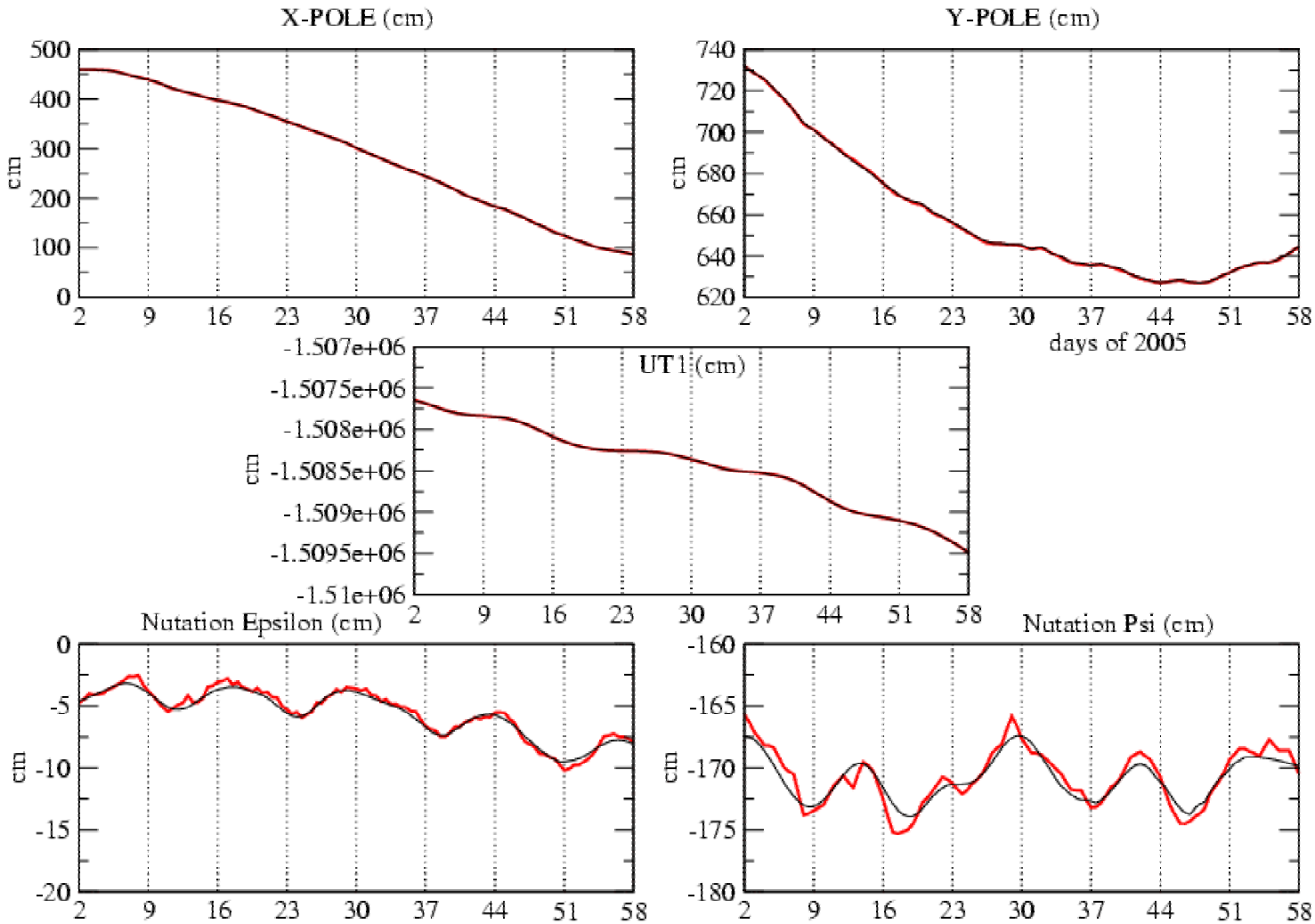
- **Earth orientation parameters : 6 h value solution**



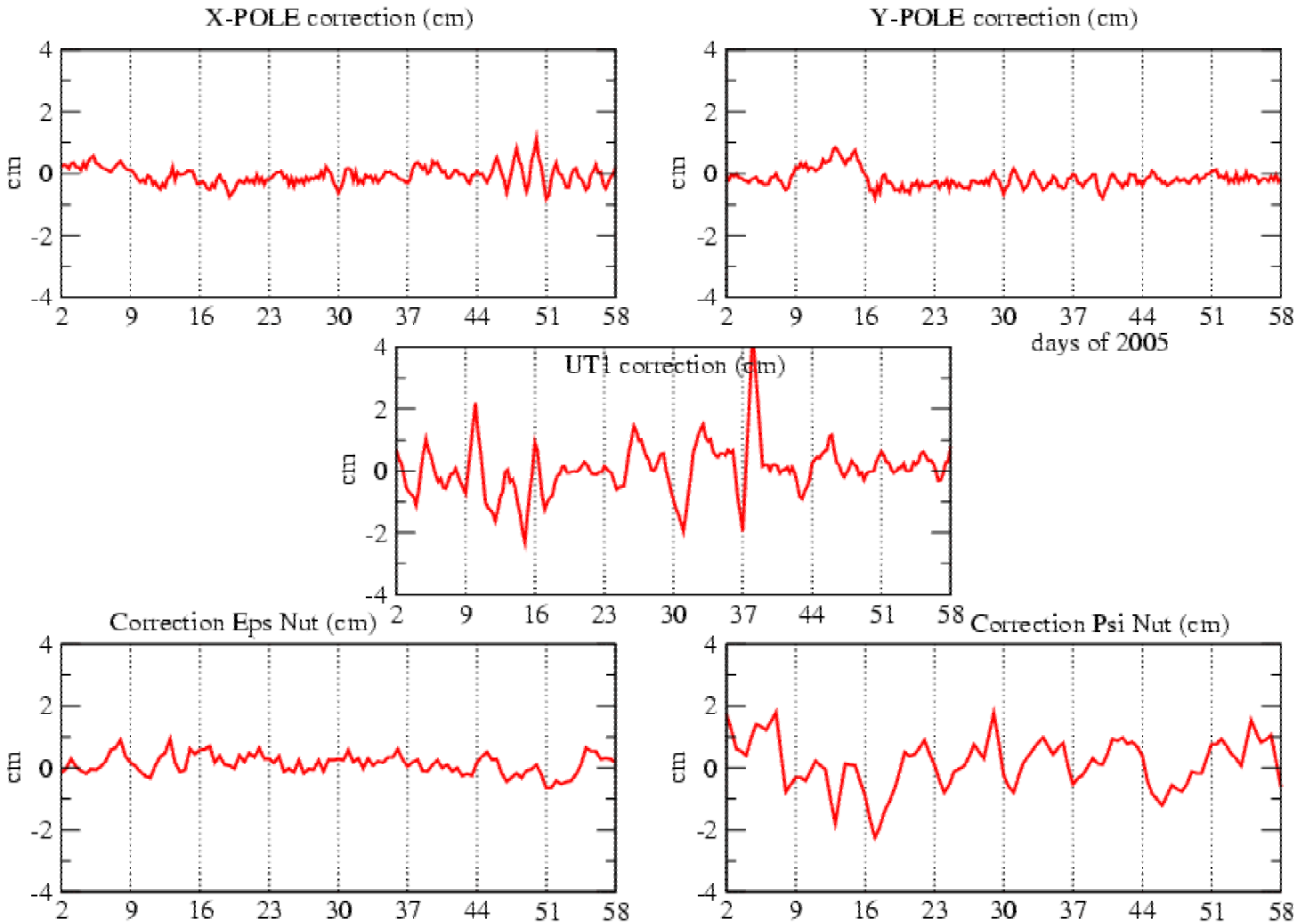
- **Earth orientation parameters : 6 h values (diff. to EOPC04)**



- **Earth orientation parameters : 6 h continuous solution (Jan.-Feb. 2005)**



- **Earth orientation parameters : 6 h continuous solution (Jan.–Feb. 2005)**



• Earth orientation parameters : STATISTICS

✓ No constraints are applied on the Earth orientation parameters, except for a linearity constraint on the 6-h values, when they are solved-for.

	RMS of differences to EOPC04	*RMS of jumps between weeks*
Pole-X	*0.49 cm (0.15 mas)*	*0.6 cm (0.19 mas)*
Pole-Y	*0.40 cm (0.13 mas)*	*0.6 cm (0.19 mas)*
UT1	*0.92 cm (20. μs)*	*0.7 cm (15. μs)*
Nutation ε	*0.33 cm (0.11 mas)*	*0.8 cm (0.25 mas)*
Nutation ψ	*1.15 cm (0.37 mas)*	*3.6 cm (1.16 mas)*

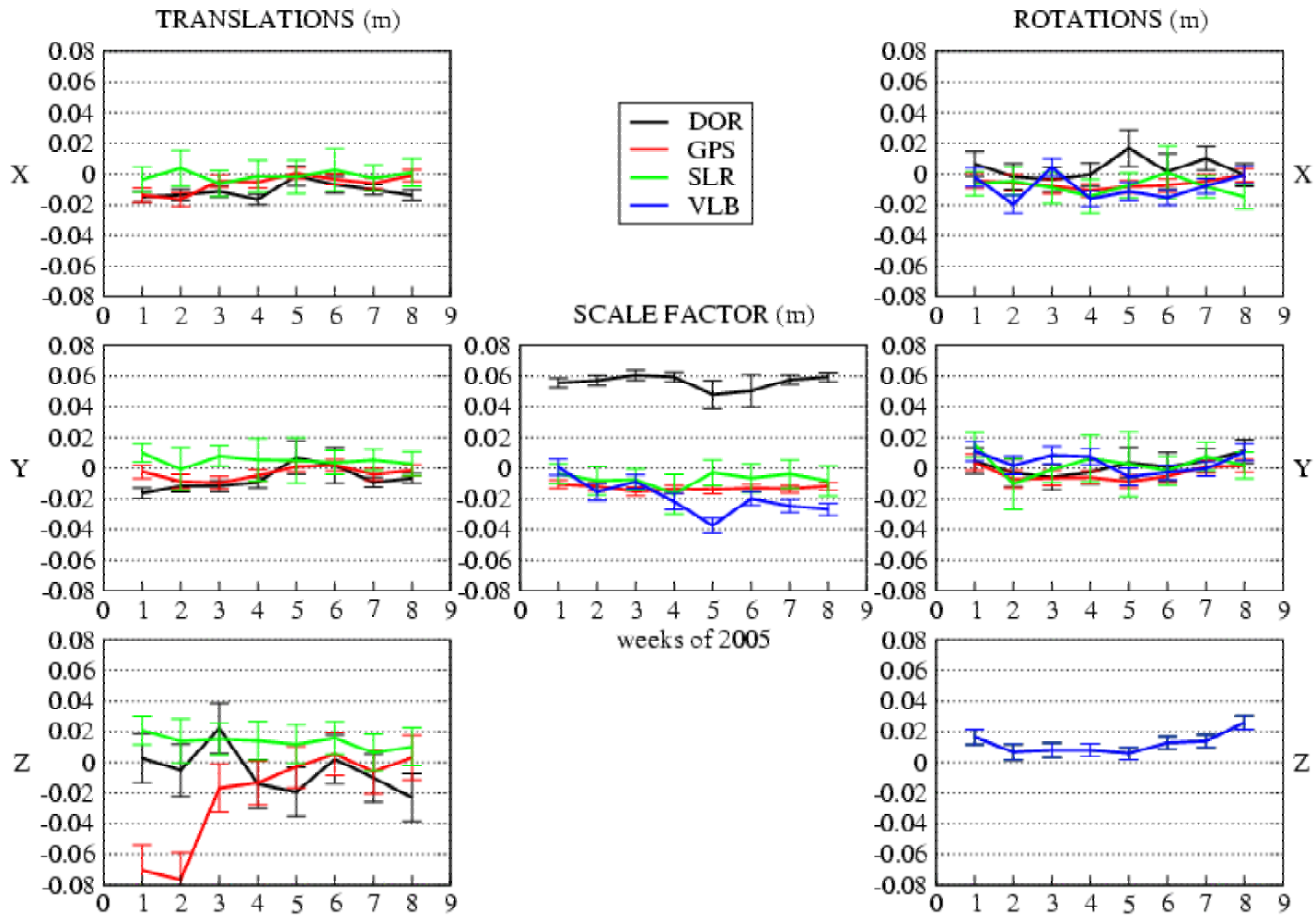
•Reference frame solution : weekly station coordinates

No constraints were applied on the weekly station coordinates solutions apart from either:

✓ a minimal-constraint on each different measurement type to remedy for its known deficiency: translations in X, Y, Z for the VLBI ; rotation in Z for the satellite techniques GPS, SLR and DORIS ;

✓ or the inclusion of a file of ties between markers (“ITRF2000_tie”), which suppresses the need for the minimal-constraints.

•Reference frame solution : 7-parameter transform / ITRF2000



MAIN FEATURES:

✓ **DORIS:**
mean scale factor +6 cm

✓ **SLR:**
translation in Z +1.7 cm ± 0.3 cm

✓ **GPS:**
first 2 weeks : translation in Z -7 cm

•**Reference frame solution : weekly station coordinates**

COMPARISON to ITRF2000	*GPS*	*SLR*	*DOR*
Mean RMS of discrepancies BEFORE 7-parameter tranform	*1.7 cm*	*1.6 cm*	*5.2 cm*
Mean RMS of discrepancies AFTER 7-parameter tranform	*1.15 cm*	*1.1 cm*	*2.8 cm*
STABILITY of the weekly solutions (from week to week)	*GPS*	*SLR*	*DOR*
Mean RMS of discrepancies BEFORE 7-parameter tranform	*0.7 cm*	*1.3 cm*	*2.0 cm*
Mean RMS of discrepancies AFTER 7-parameter tranform	*0.4 cm*	*1.0 cm*	*1.6 cm*

- **On going work**

✓ Improvement of combinations : introduction of systematic transform parameters and of local ties as well between techniques ;

✓ Start of integer ambiguities adjustment in GPS double difference processing ;

✓ Use of JASON DORIS data taking care of SAA correction ;

✓ Evaluation of VLBI processing (from the Fall) ; comparison with MODEST software ;

✓ Homogenization of tropospheric corrections per site using dry and wet delays derived from ECMWF data ;

✓ Reduction of delivery delay to less than 8 weeks.