Long Term Monitoring of Geophysical Parameters using SLR

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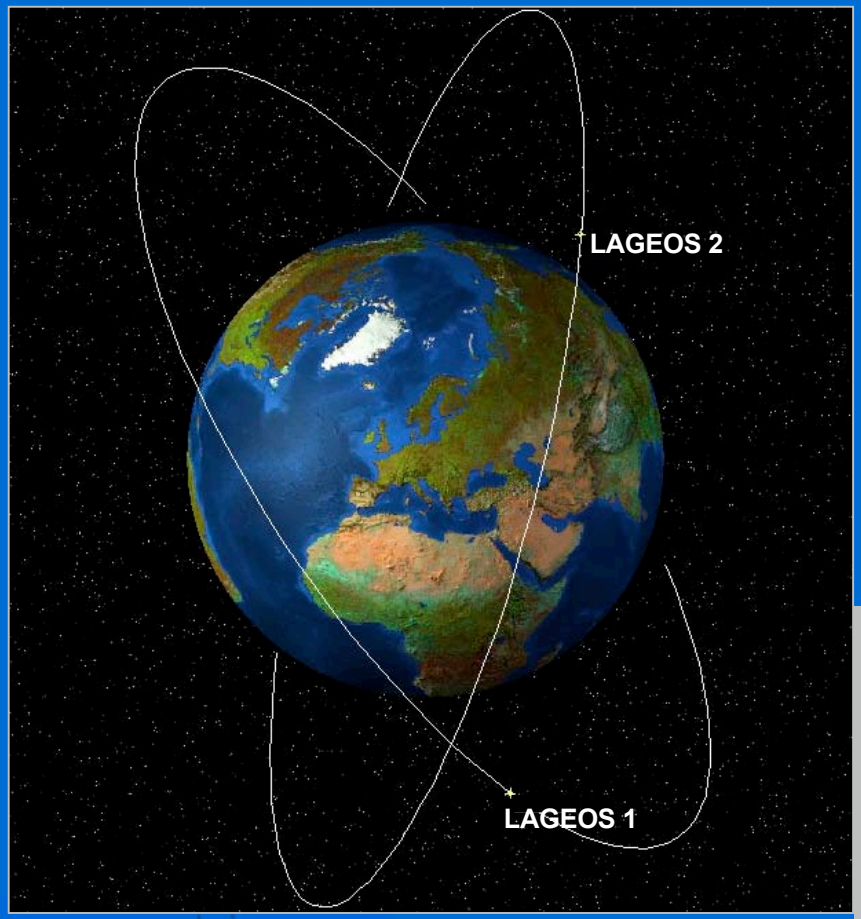
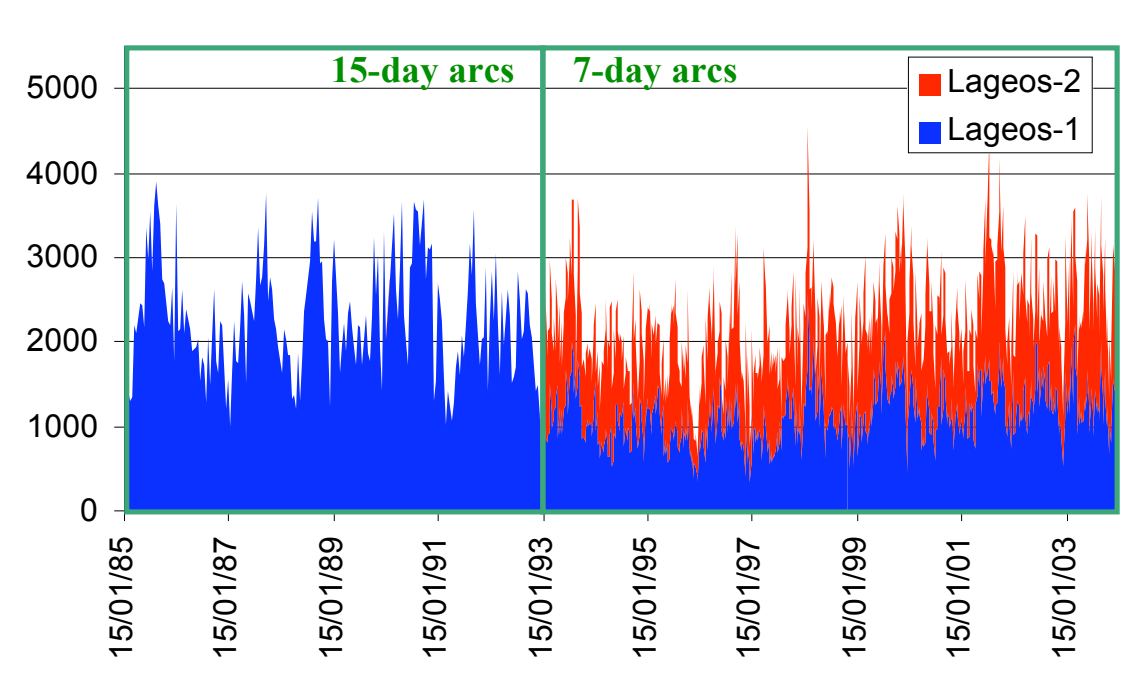
Data set


LAGEOS 2
LAGEOS 1


15-day arcs
7-day arcs
Lageos-2
Lageos-1
5000
4000
3000
2000
1000
0
15/01/85
15/01/87
15/01/89
15/01/91
15/01/93
15/01/95
15/01/97
15/01/99
15/01/01
15/01/03

Arc definition & Processing

Fortnightly and weekly arcs are reduced using iterated bayesian least squares (Geodyn). Then inverted (Solve) in:

LONG ARC SOLUTION

A unique solution (1985-2003) from the combination of all the arc normal matrices, constrained

Estimated Parameters

GLOBAL

- **station coordinates & velocities**
- **3-day/daily EOP and LOD**
- **$C_{1,0}$ $C_{1,1}$ $S_{1,1}$**

ARC

- **arc range biases**
- **state vectors & sat. accel.**

&

SHORT ARC SOLUTIONS

Time series of solutions, one for each arc from the combination of Lageos 1 and 2, loose constraints

Estimated Parameters

GLOBAL

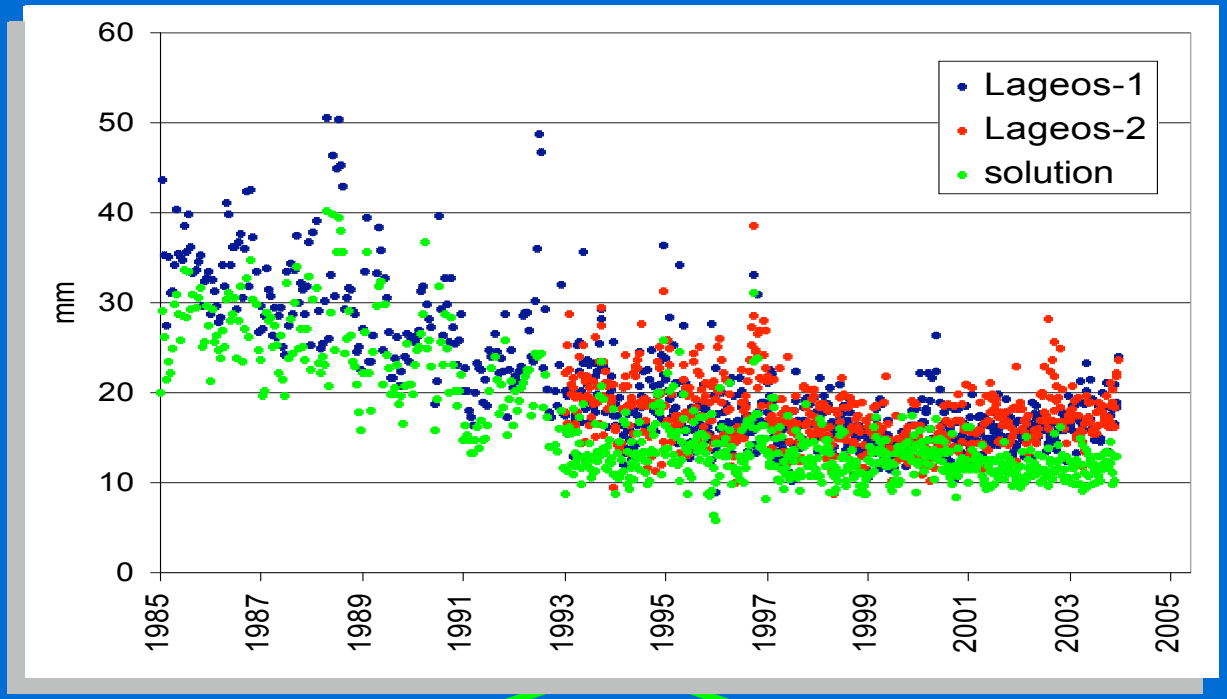
- **station coordinates**
- **3-day/daily EOP and LOD**

ARC

- **arc range biases**
- **state vectors & sat. accel.**

ARC Residual WRMS

ARCS



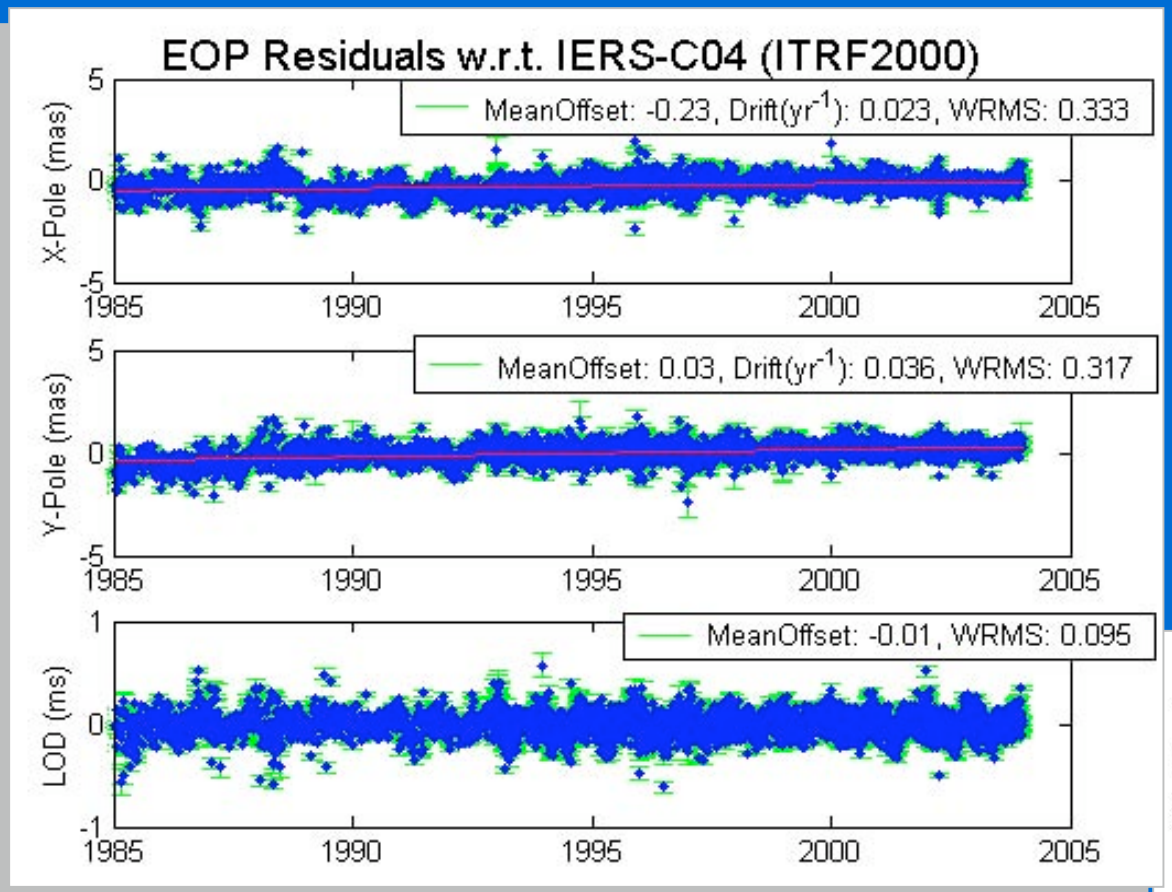
LONG ARC SOLUTION

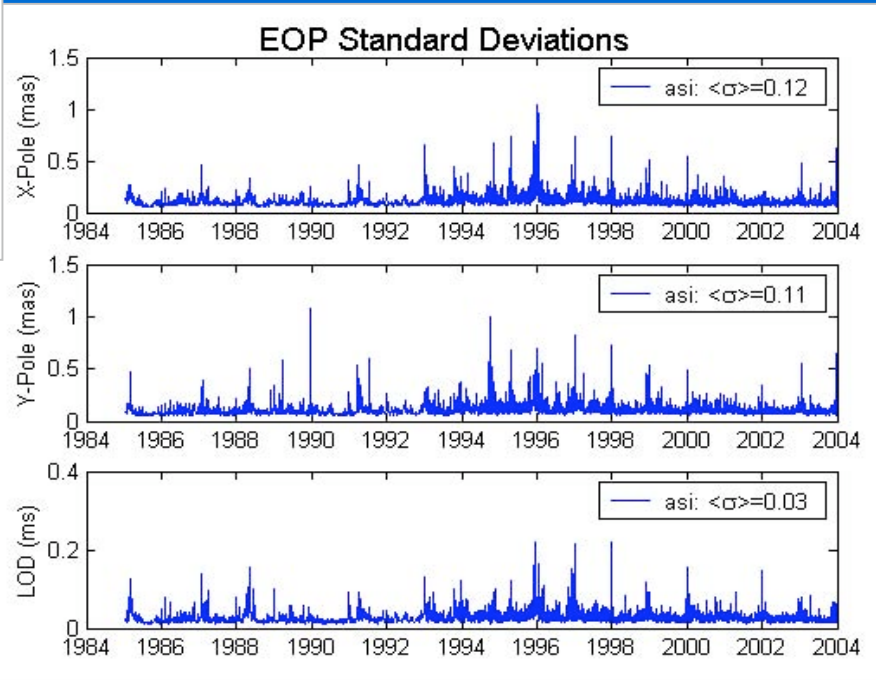
˜23000 global parameters
˜30000 arc parameters
wrms= 18 mm

SHORT ARC SOLUTIONS

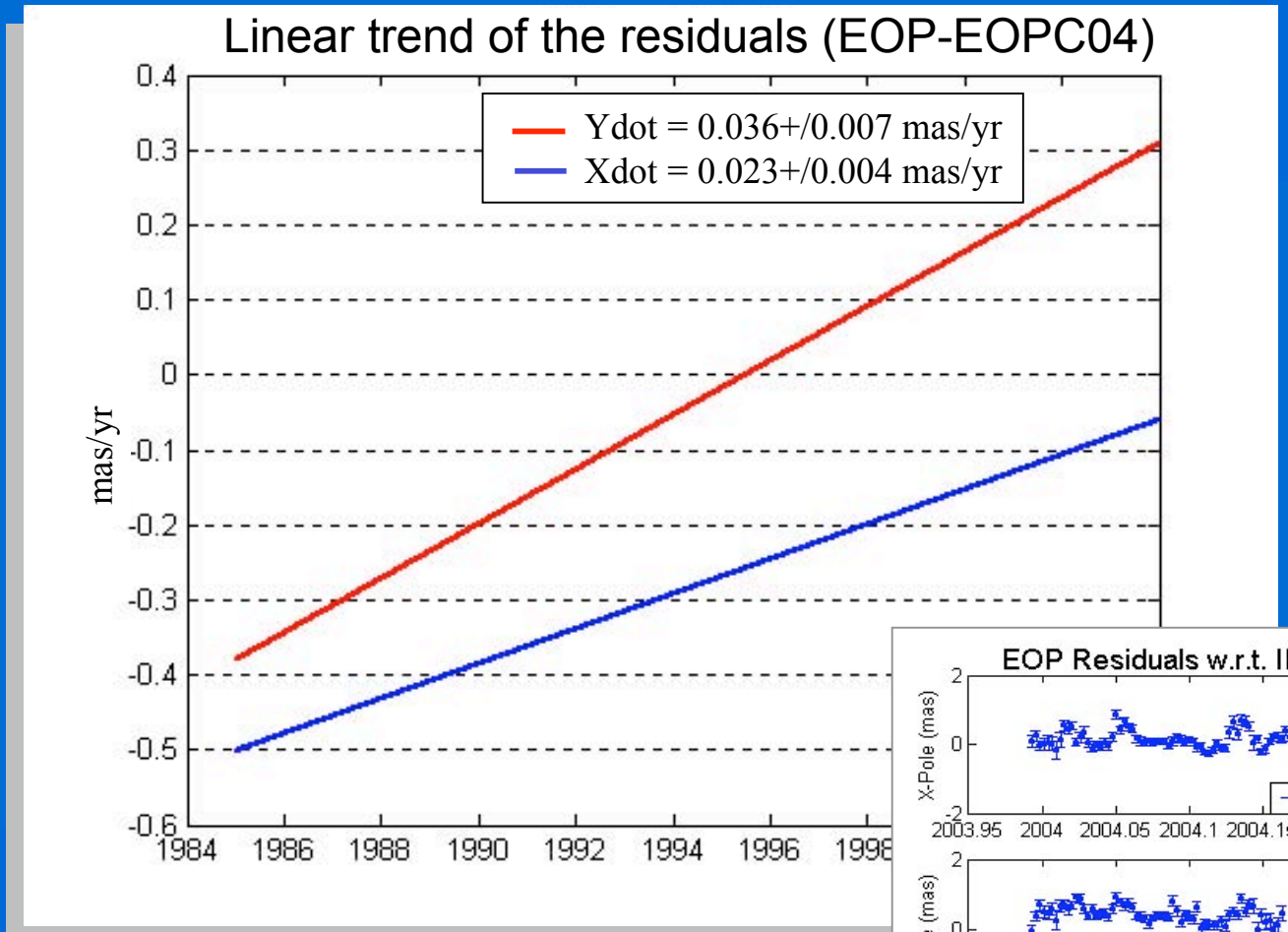
˜800 arc solutions
˜100 global parameters
˜10 arc parameters

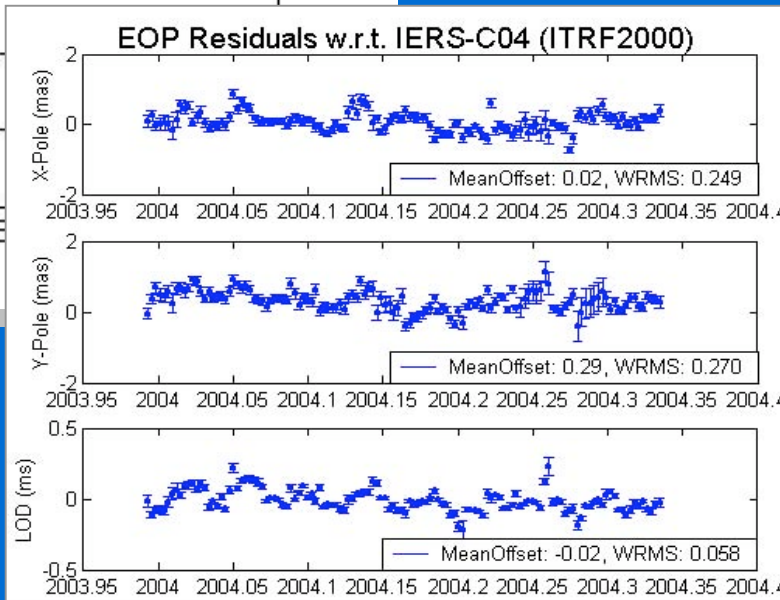
Polar motion and LOD (long-arc sol.)





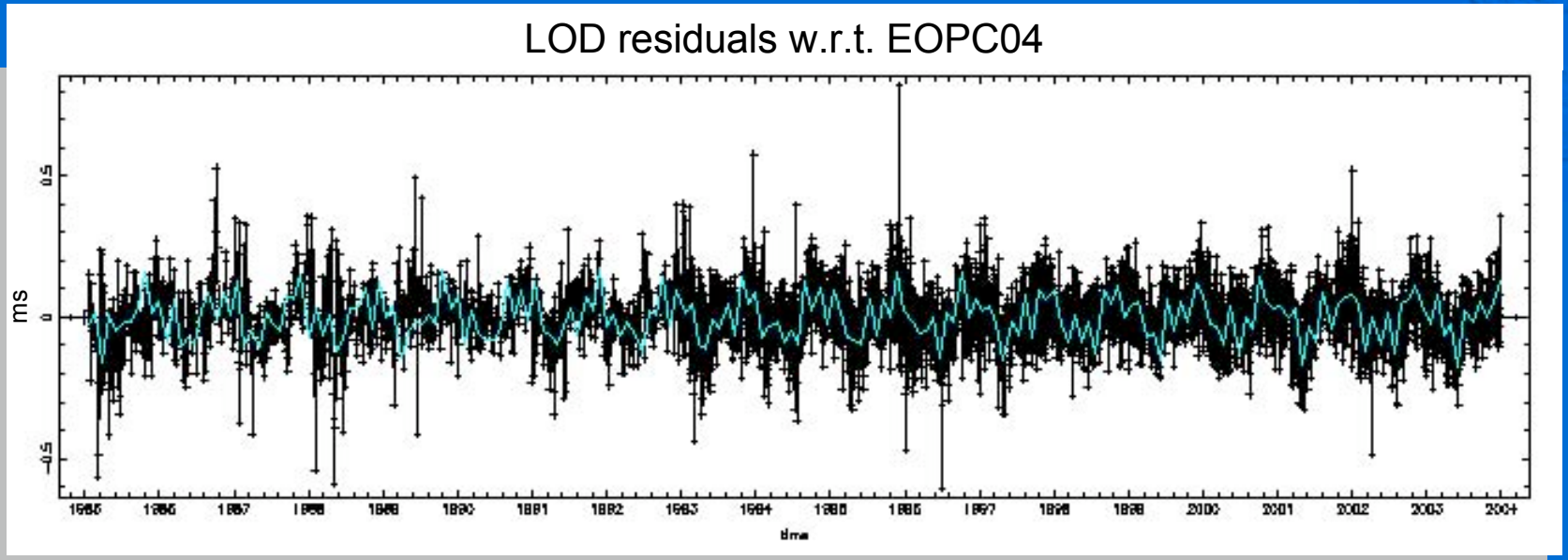
EOPC04 inconsistency





Weekly combined solution

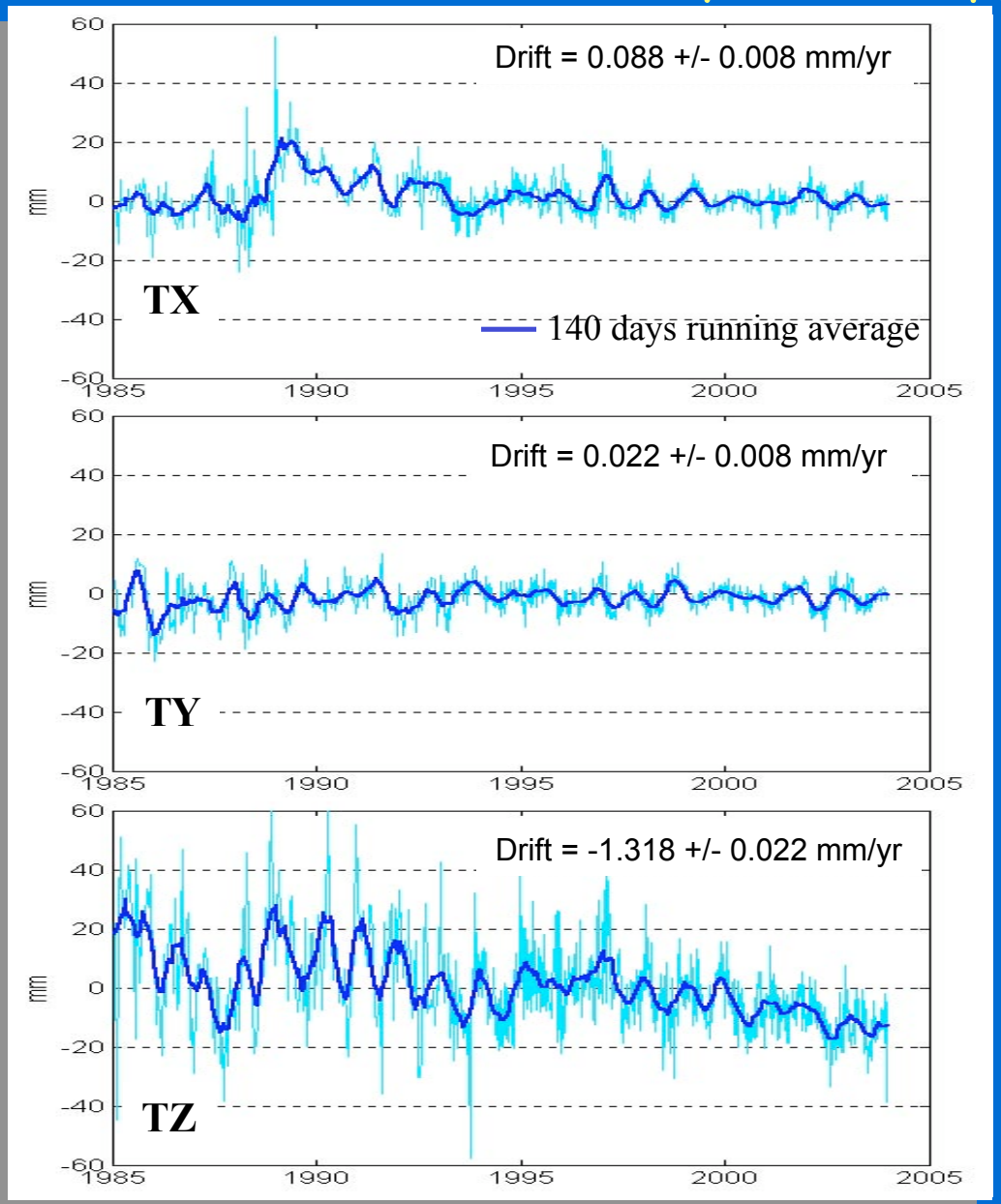
LOD (long-arc sol.)

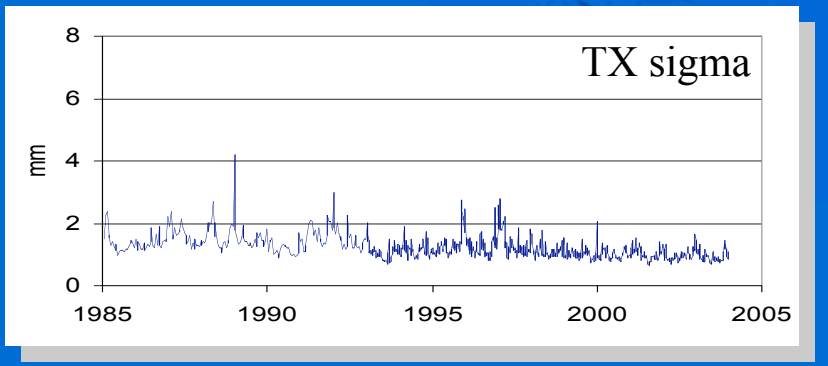


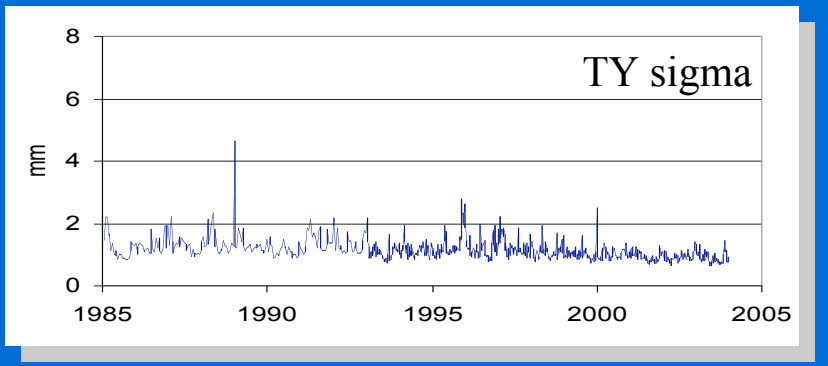
FREQ (cpy)	AMPL
25.739 +/- 0.001	0.0679 +/- 0.0025
2.474 +/- 0.002	0.0712 +/- 0.0026
0.999 +/- 0.001	0.0450 +/- 0.0026

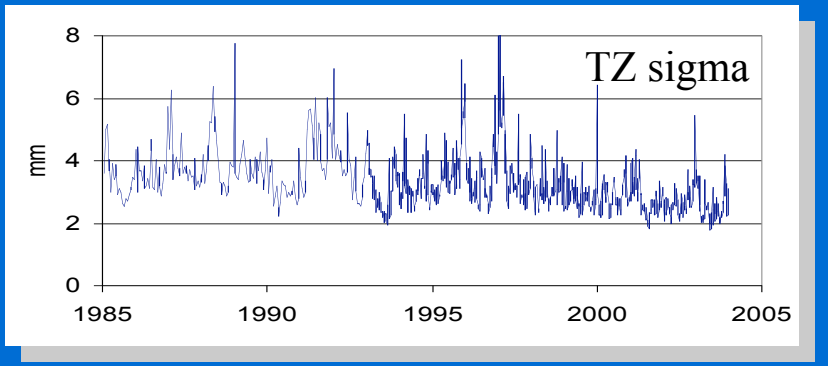
The "Geocenter motion"

(dynamical approach)



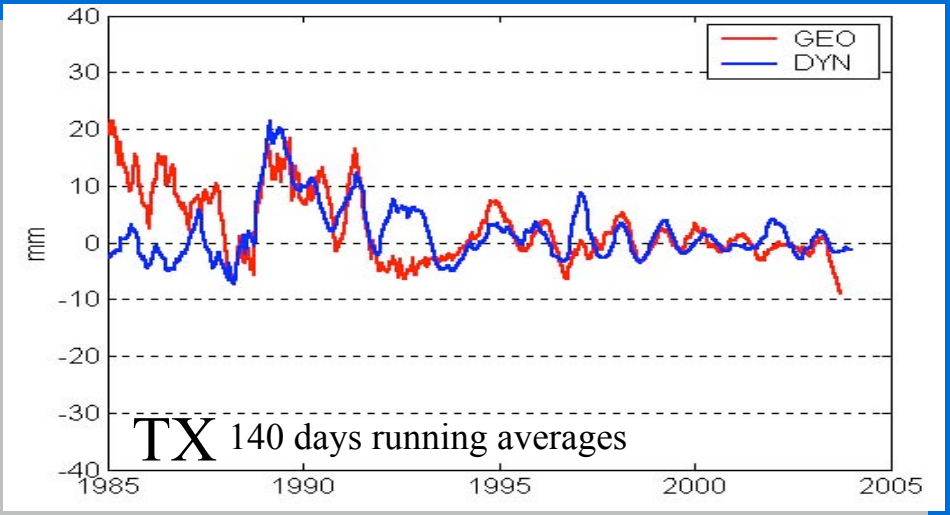


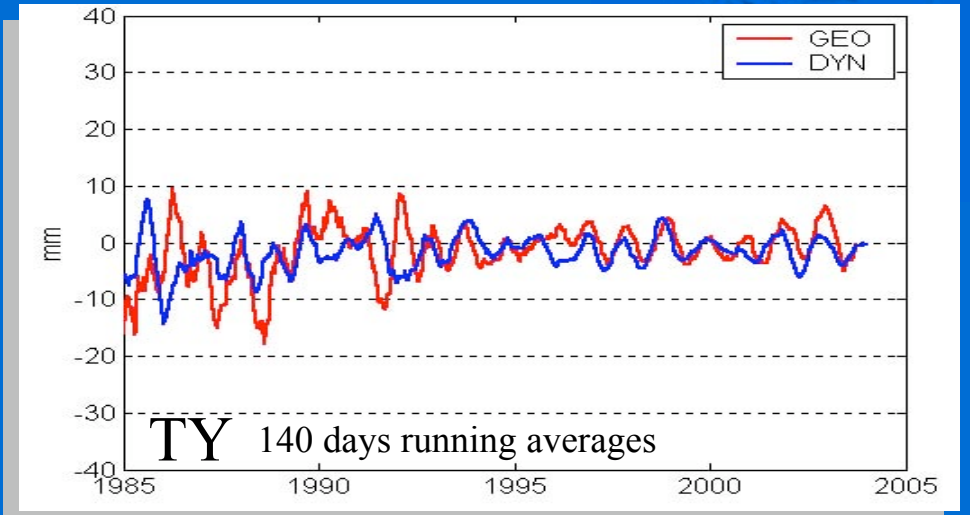


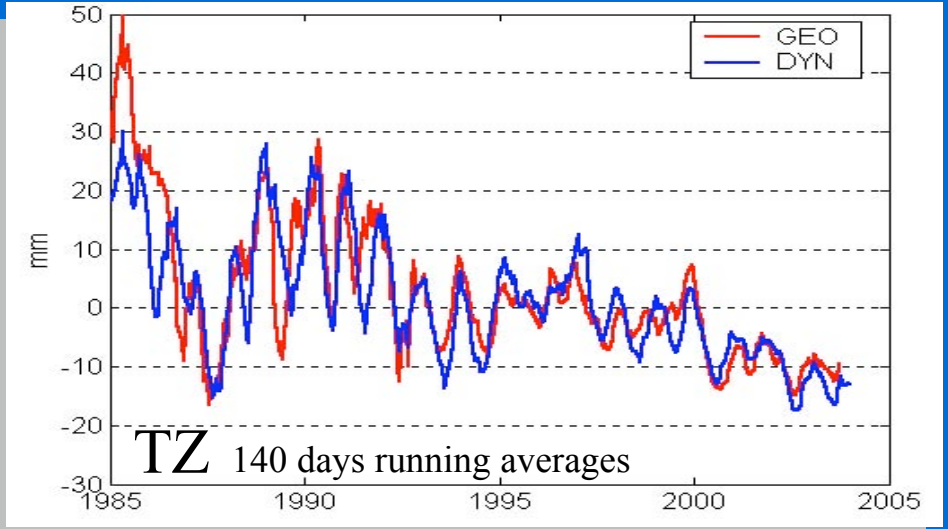


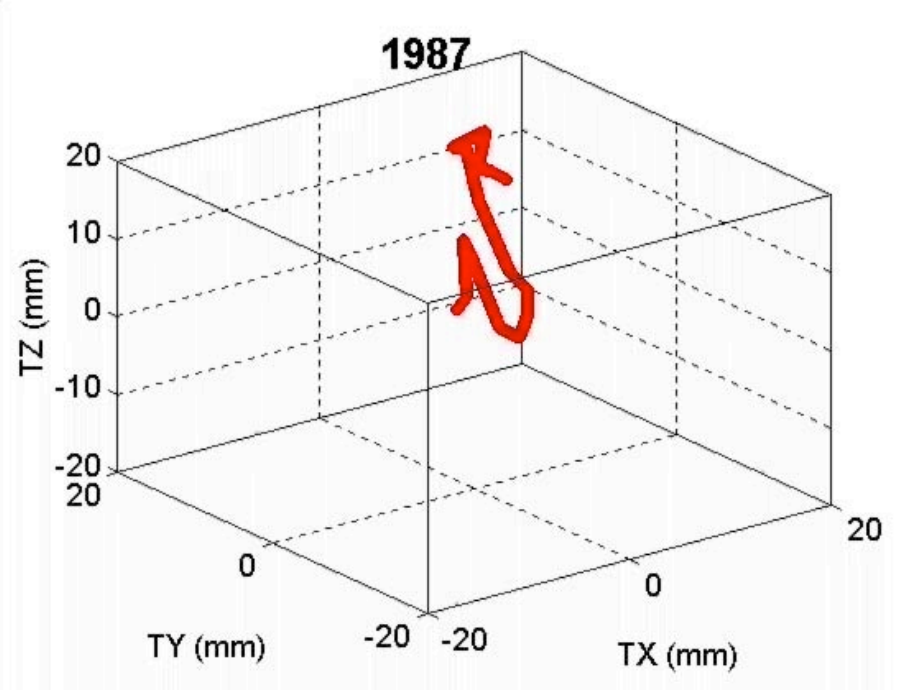
The "Geocenter motion"

geometrical and dynamical estimates

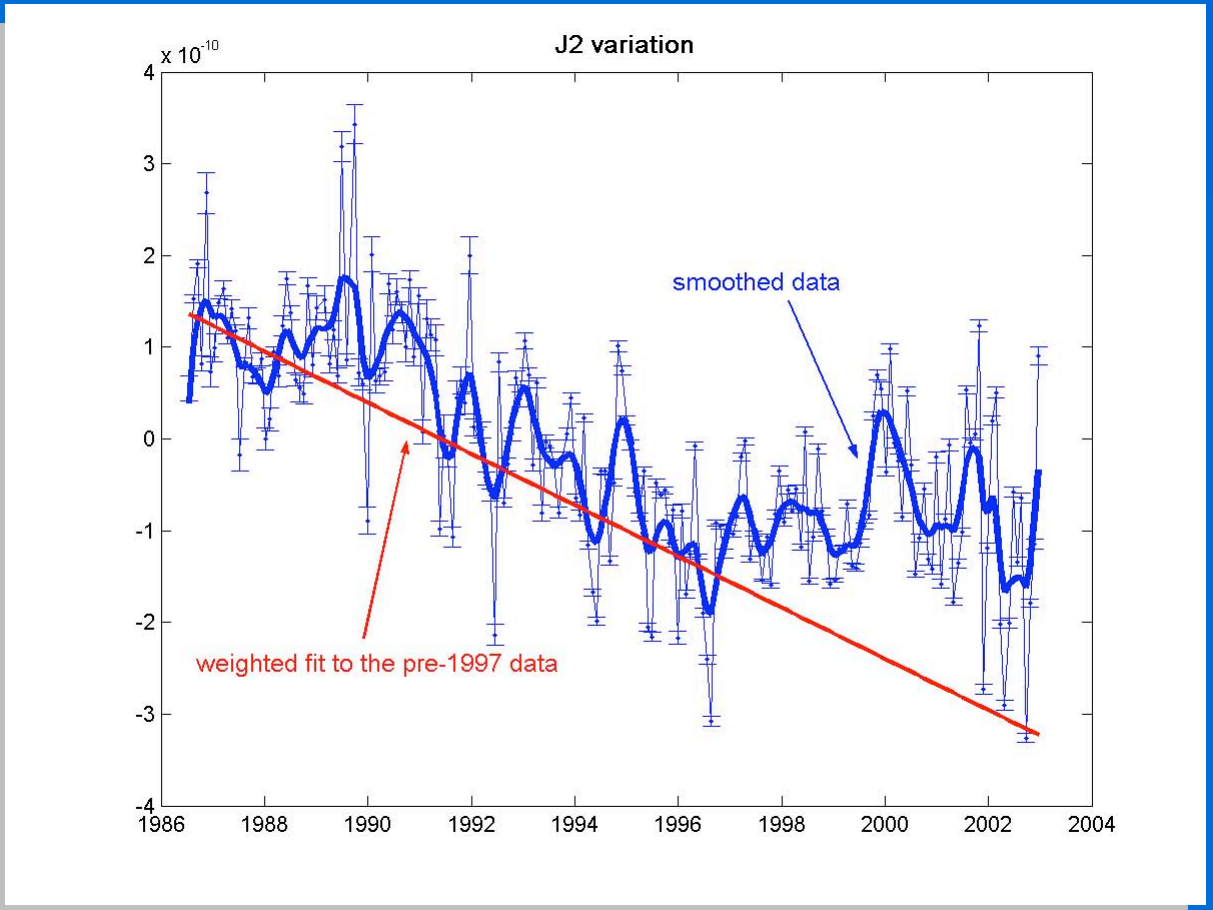






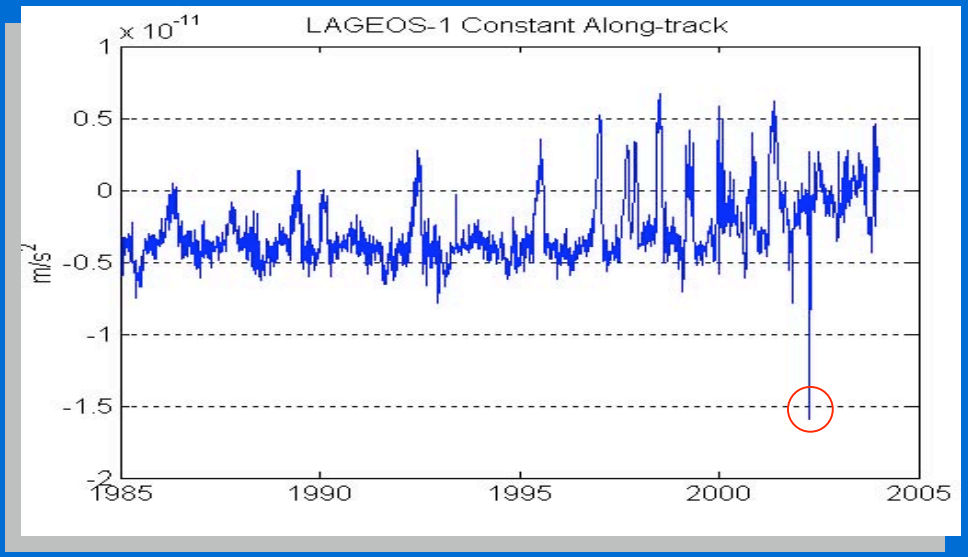


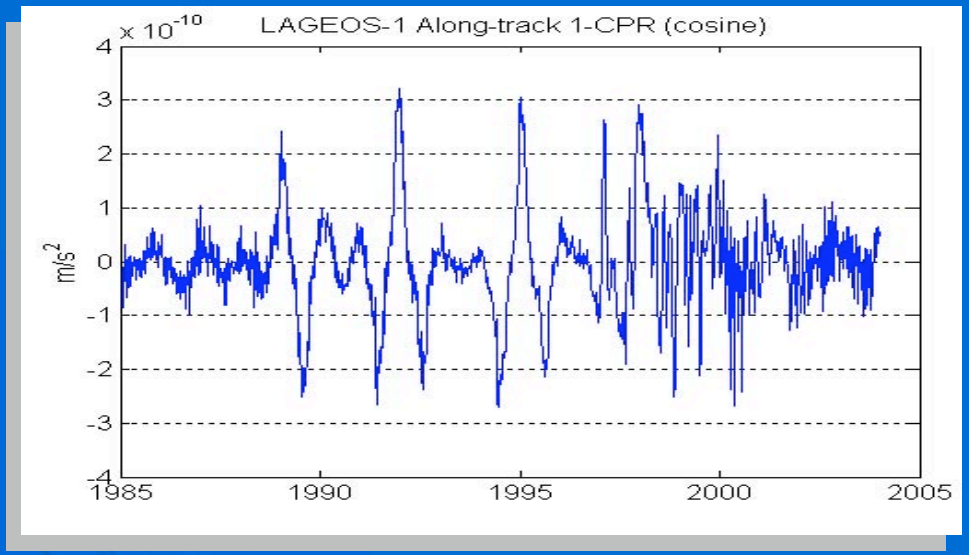
The J2 time series

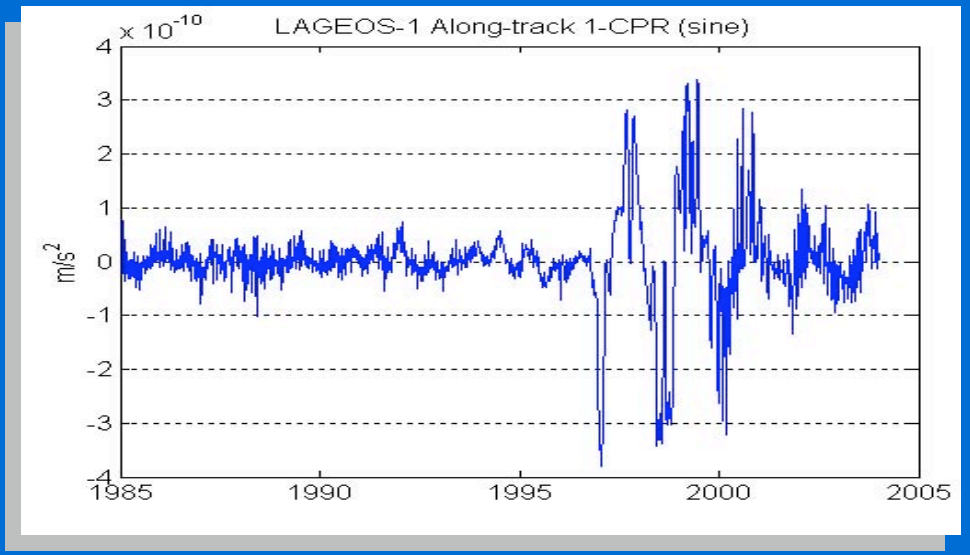


J2 variation from satellites Lageos-1, Lageos-2, Starlette and Stella, a seasonal filter applied.

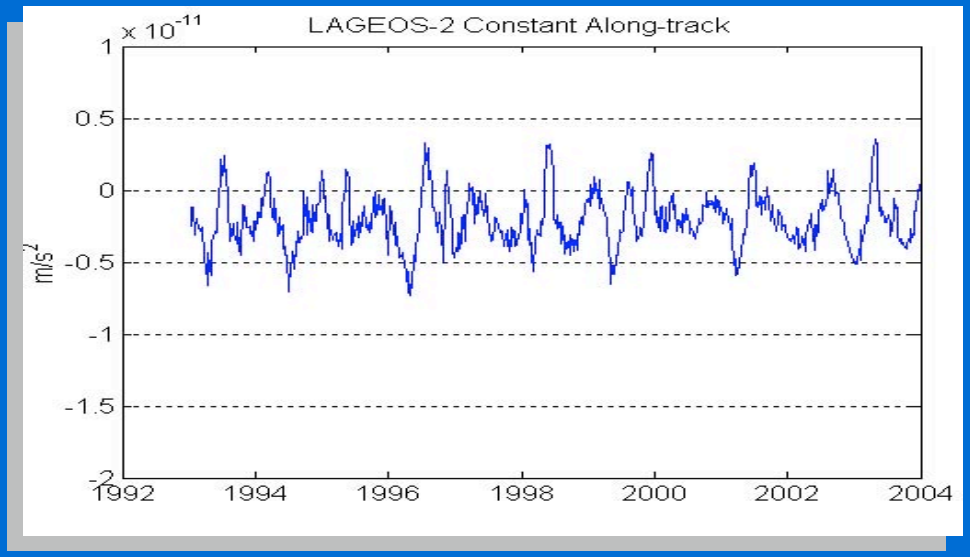
LAGEOS-1 empirical accelerations

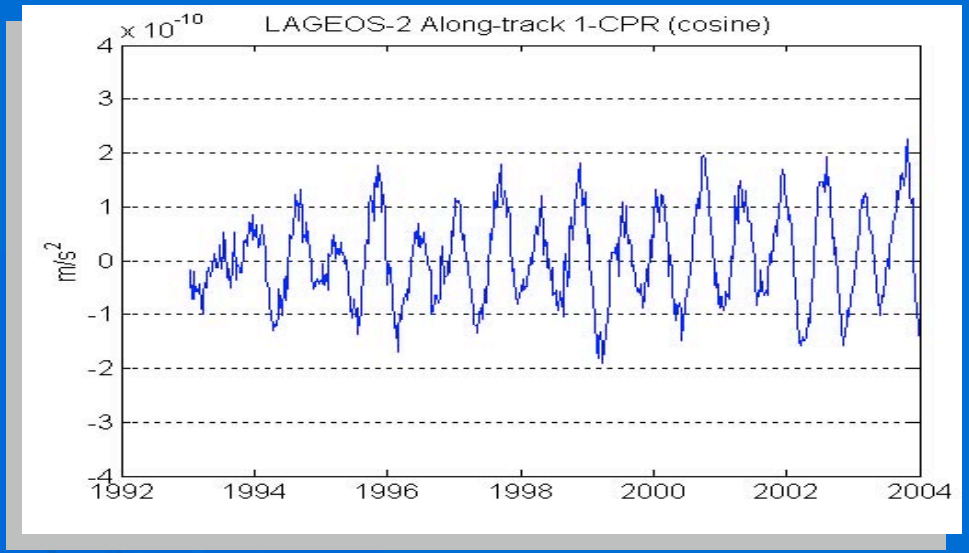


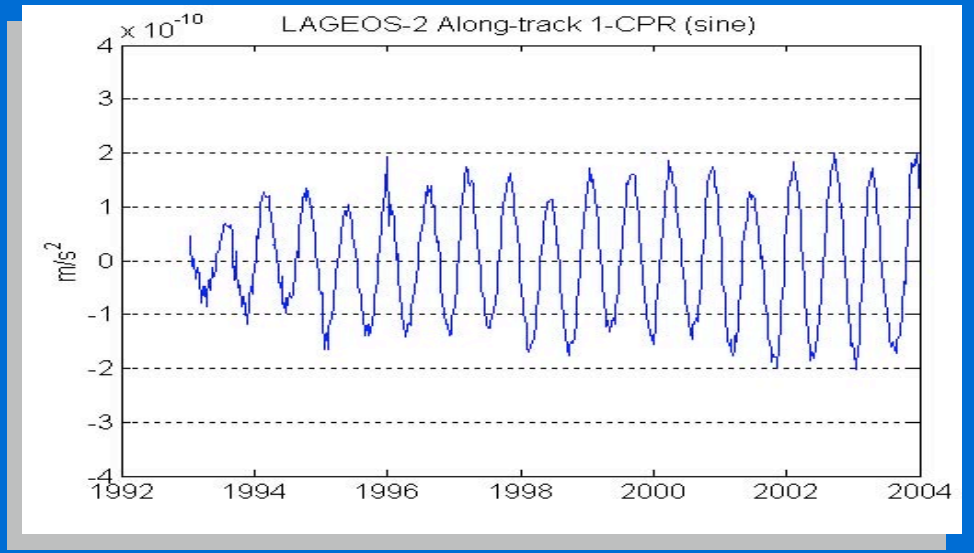




LAGEOS-2 empirical accelerations







Acknowledgments

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- Zuheir Altamimi (IGN) for his work on the “geometrical geocenter” from the time series of short-arc solutions
- Roberto Devoti (INGV) for his helpful contribution on the low degree gravity field recovery