# Model and analysis standards

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GINS/DYNAMO software (GRGS)

Since Jan. 2007, 1 processing for 2 objectives

- CRC/GRGS

  -Common standards for GPS, SLR and VLBI

  -Weekly combined NEQ (weekly station coordinates, 6h EOP, tropospheric bias per pass)

- IDS

  -Weekly combined solutions in free-network (weekly station coordinates, daily EOP)

# Models and corrections (1)

- Gravity field = EIGEN_GL04S_ANNUAL → EIGEN_GL04S, w/o annual and semi-annual terms?

- Tidal forces :
  - Solid earth: model of IERS2003 conventions
  - Ocean: FES2004 (with admittance)
  - Atmosphere: Biancale&Bode

- Atmospheric gravitational attraction: computed from 6h ECMWF 3D pressure grids over land, inverted barometer model over the ocean

- Atmospheric density = DTM94
- Solar radiation pressure:
  - albedo +IR pressure values interpolated from 6-hour grids from ECMWF

- Satellite Center of Mass – Antenna Phase Center: applied from CDDIS data files
- Satellite physical model = IDS → UCL models?

# Models and corrections (2)

- Station displacements:
  - atmospheric loading= from 6h ECMWF 3D pressure grids
  - ocean loading= Amplitudes and phases from FES2004
  - Solid earth : Wahr model (IERS Conventions 2003)
  - Pole tide : applied (IERS, 2003)

- Troposphere:
  - Dry and wet a priori ZTD interpolated from 6-hour grids derived from ECMWF meteorological model (available from 2002)

  → DORIS met data or GPT for data before 2002?
  - Mapping function: Guo & Langley

  → Horizontal gradients?

  → Estimated coefficients of the mapping function (study in progress)?

- EOP:  a priori IERSC04 polar motion

no polar rate, no UT1 rate

→estimate Polar rate? UT1 rate?

- Arc lengths: 3.5 days → 1 day ?

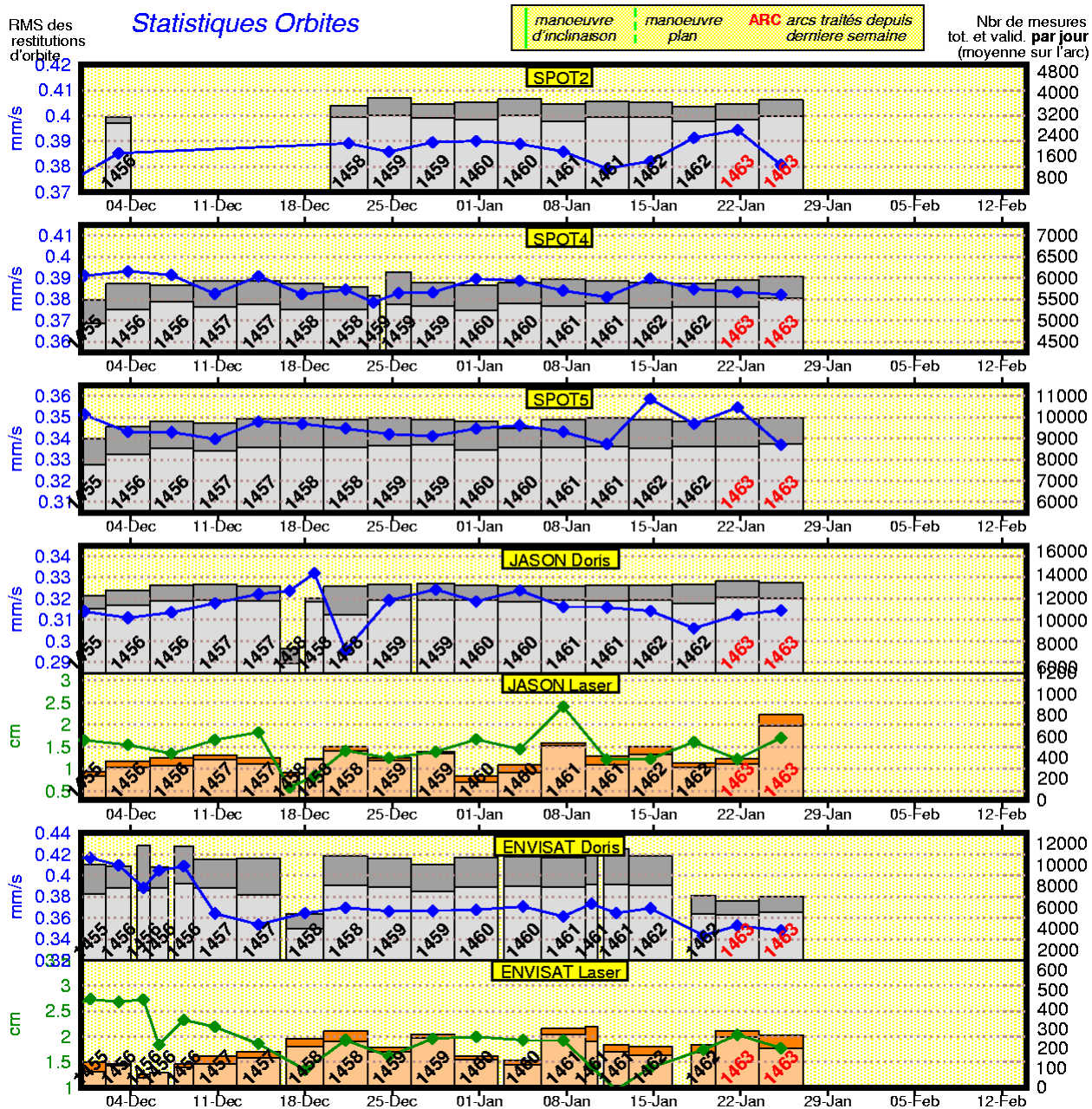
# History of the new processing configuration

Data: 2002 to current

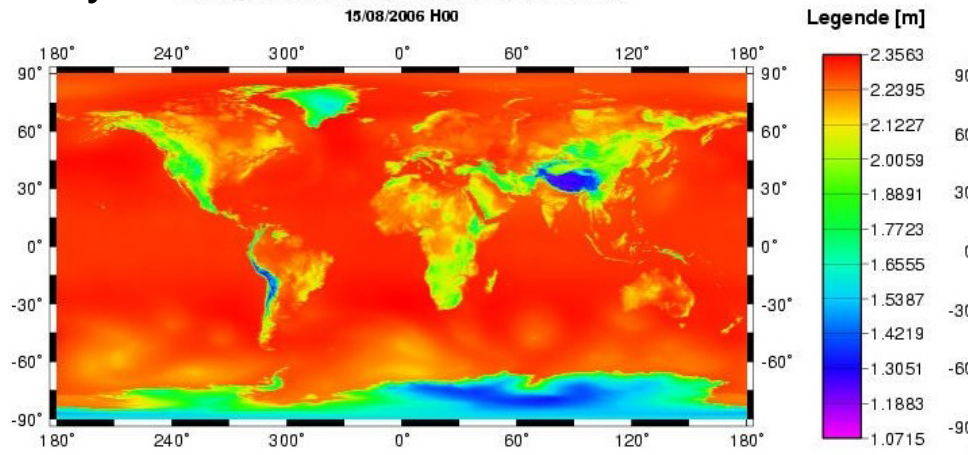
| period | start | end | # conf. | series | satellite | # GINS version | earth gravity model | oceanic response | atmospheric tide |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| 2 | 02/01/05 | 30/09/06 | conf3 | conf3 | Spot-2,-4,-5,Jas,Env | 7.1 | EIGEN-GL04S | MOG2D | Haurwitz & Cowley |
| 3 | 01/10/06 | 28/02/07 | conf4 | CRC07a | Spot-2,-4,-5 | 7.2 | EIGEN-GL04S_ANNUAL | | |
| | | | | CRC07A | Jas,Env | 7.2d1 | | | |
| 4 | 28/02/07 | 28/07/07 | conf5 | CRC07c | Spot-2,-4,-5,Jas,Env | 7.2d1 | | IB | |
| 5 | 29/07/07 | 08/12/07 | conf6 | CRC07d | Spot-2,-4,-5,Jas,Env | 7.2d1 | | | |
| 1 | 06/01/02 | 01/01/05 | conf6 | CRC07e | Spot-2,-4,-5,Jas,Topex | 7.2d1 | | | |
| | | | | CRC07E | Env | 7.2d2 | | | |
| 6 | 09/12/07 | … | conf7 | CRC07f | Spot-2,-4,-5,Jas,Env | 7.2d2 | | | Biancale & Bode |

- switch conf5/conf6: minor evolution (name of ocean loading file)
- CRC07e = CRC07d but w/o arc margins
- GINS 7.1 and 7.2d1: wrong version for Envisat attitude model

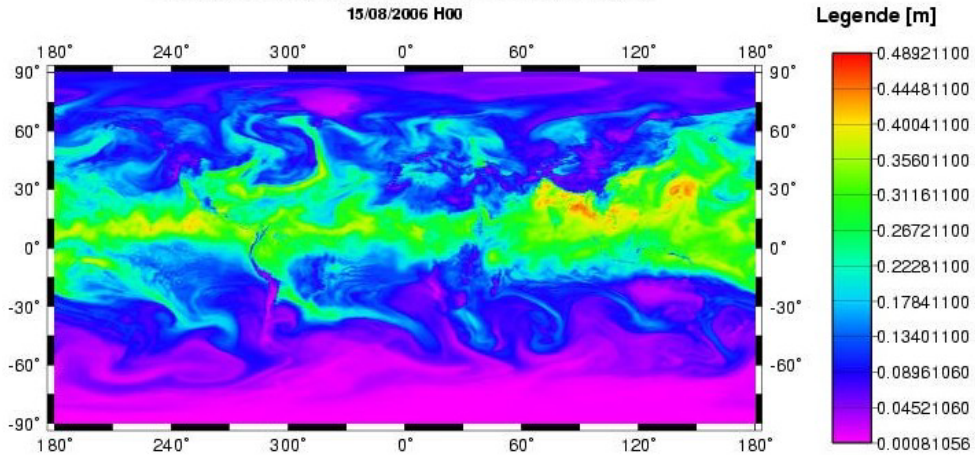
→Envisat 02/01/2005-08/12/2007 should be reprocessed with GINS 7.2d2


Statistiques Orbites
manoeuvre d'inclinaison
manoeuvre plan
ARC arcs traités depuis dernière semaine
RMS des restitutions d'orbite
Nbr de mesures tot. et valid. par jour (moyenne sur l'arc)
SPOT2
SPOT4
SPOT5
JASON Doris
JASON Laser
ENVISAT Doris
ENVISAT Laser
mm/s
cm
04-Dec
11-Dec
18-Dec
25-Dec
01-Jan
08-Jan
15-Jan
22-Jan
29-Jan
05-Feb
12-Feb

Dry




Wet

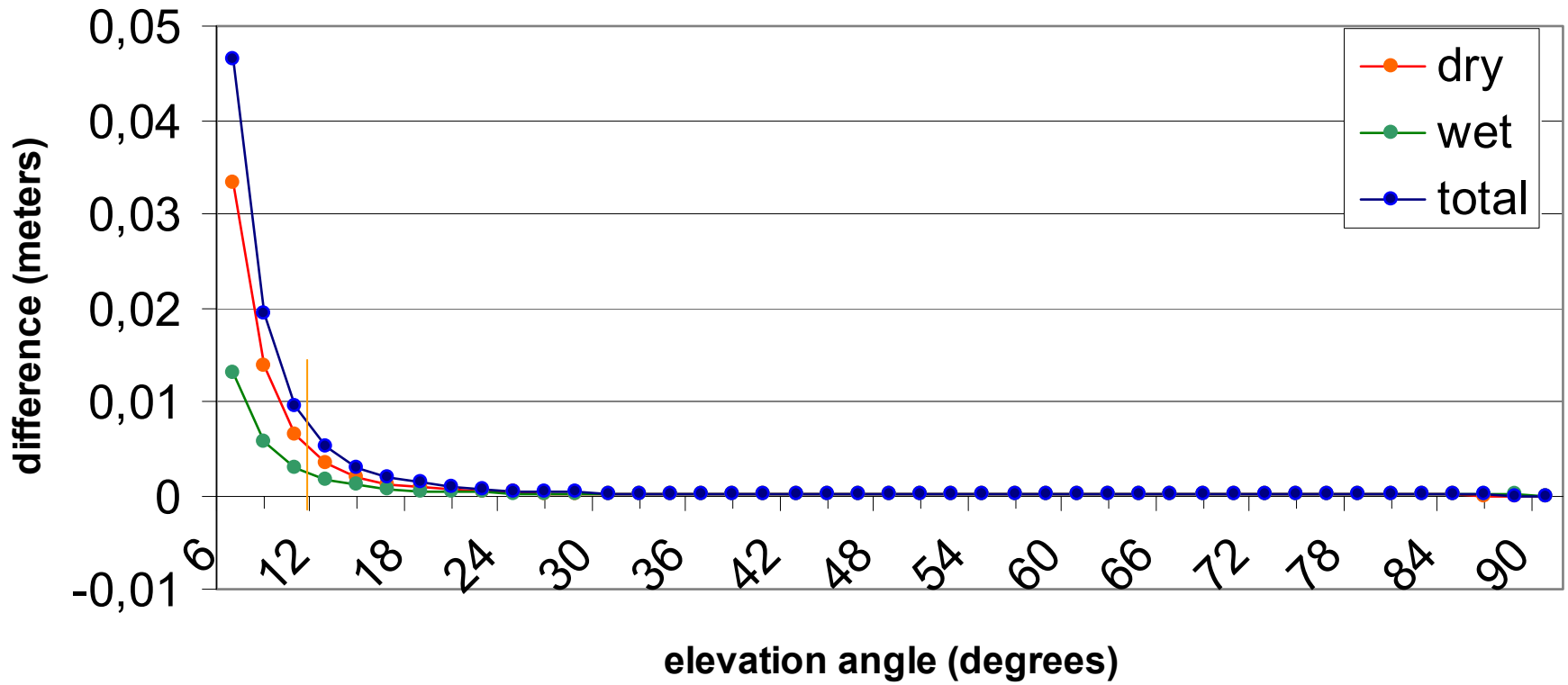



$$f(\Phi) = \frac{1 + \dfrac{a_1 + a_2 \cdot z + a_3 \cdot \cos(\varphi)}{1 + \dfrac{b}{1+c}}}{\sin(\Phi) + \dfrac{a_1 + a_2 \cdot z + a_3 \cdot \cos(\varphi)}{\sin(\Phi) + \dfrac{b}{\sin(\Phi) + c}}}$$

| Dry function | Wet function |
|---|---|
| a1=1.18972 | a1=0.61120 |
| a2=-0.026855 | a2=-0.035348 |
| a3=0.10664 | a3=0.01526 |
| b=0.0035716 | b=0.0018576 |
| c=0.082456 | c=0.062741 |

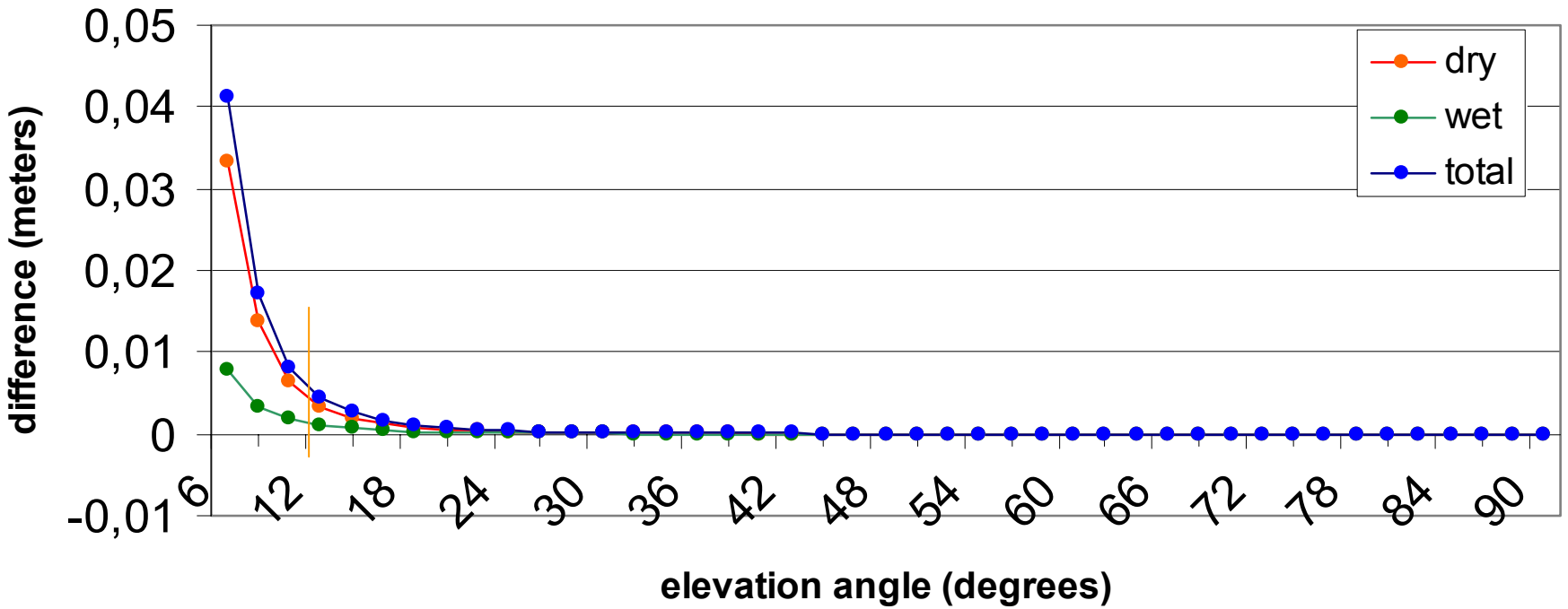
Guo. J. and R.B. Langley (2003), *A new tropospheric propagation delay mapping function for elevation angles down to 2°*.
Proceedings of ION GPS/GNSS 2003, 16th International Technical Meeting of the Satellite Division of the Institue of Navigation, Portland, OR, 9-12 September 2003; pp. 376-386
gauss.gge.unb.ca/papers.pdf/iongpsgnss2003.guo.pdf

## Tropospheric delay differences between GMF and Guo&Langley's mapping function




ZTD $\Delta L^z_d$ = 2.239 m $\Delta L^z_w$ = 0.448 m

# Tropospheric delay differences between GMF and Guo&Langley's mapping function




ZTD $\Delta L^z_d$ = 2.239 m $\Delta L^z_w$ = 0.267 m