CNES-CLS IGS Analysis Center Activities

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SUMMARY

The joined CNES and CLS space geodesy teams have submitted in April 2007 their candidacy to become an Analysis Centre of the International GNSS Service (IGS). We process on a routine basis GPS data from a worldwide network of 120 IGS permanent stations. Our solutions are being submitted to the International Earth Rotation Service (IERS) since January 2004 and to the IGS since September 2007.

We use the CNES/GRGS GINS POD software to generate the following products:

- GPS constellation orbit and clock "final" products (900s sampling)
- 30s sampling clocks
- SINEX solutions including station coordinates and EOPs
- SVN35 and 36 Satellite Laser Ranging (SLR) residuals

Their evaluation by the IGS Analysis Center Coordinator indicates that:

- Orbit consistency is at the level of 3.2 cm WRMS3D but still needs to be improved
- A systematic scale factor of 1 ppb exists between the GRG GPS orbit solution and the IGS final solution
- Station coordinates and EOP solutions are at the level of the other Analysis Centers

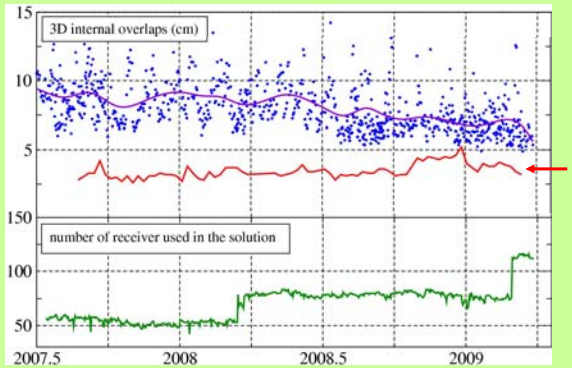
Future plans include :

- zero-difference GPS phase ambiguity fixing
- GLONASS data processing

More details on our processing strategy are given on our web site:

www.igsac-cnes.cls.fr

ORBIT Solution

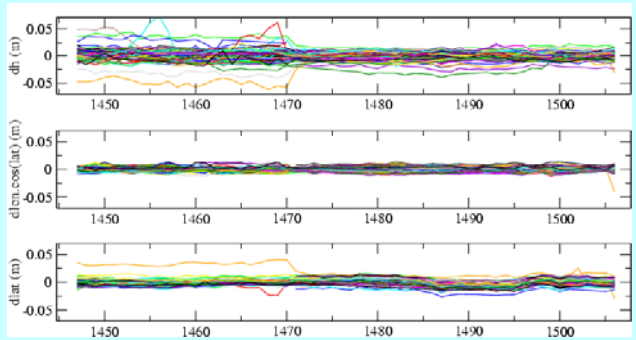


3.2 cm WRMS 3D

- ❑ Blue dots: Time series of "internal orbit overlaps" since September 2007 (3D UNWEIGHTED RMS).
- ❑ Red plot: Comparison to IGS final orbits computed by IGS-AC Coordinator (3D WEIGHTED RMS)
- ❑ Green curve: Number of IGS permanent stations included in the processing

- The internal overlaps consistency has been improved by around 30%.
- No improvement appears from the comparison to IGS solutions.

Station Coordinates Solution



Weekly stations coordinates comparison to ITRF05

North = 0 +/- 2.5 mm
East = 0 +/- 1 mm
Up = 0 +/- 6 mm

Earth Orientation Parameters Solution

Diff.	EOP	rms	bias
GRGS - C04	X (µas)	34	-5
	Y (µas)	43	40
	LOD(µs)	20	-3
GRGS -IGS	X (µas)	27	2
	Y (µas)	38	-24
	LOD(µs)	30	0
IGS - C04*	X (µas)	23	-9
	Y (µas)	21	63
	LOD(µs)	5	-2

Série	x/A	x/A0	y/A	y/A0	Lod/A	Lod/A0	x/A	x/A0	y/A	y/A0	Lod/A
GRGS 2-5 days	0.70	0.75	0.68	0.73	0.29	0.31	43	41	36	39	4
C04 2-5 days	**0.74**	**0.79**	**0.69**	**0.75**	**0.69**	**0.73**	54	60	46	53	45
IGS 2-5 days	0.73	**0.79**	**0.69**	**0.75**	0.68	0.72	51	57	45	52	44
GRGS 5-20 days	**0.80**	**0.91**	**0.81**	**0.90**	0.75	0.80	64	82	64	81	56
C04 5-20 days	**0.80**	**0.91**	**0.81**	**0.90**	0.75	**0.83**	64	82	64	81	56
IGS 5-20 days	**0.80**	**0.91**	**0.81**	**0.90**	**0.77**	**0.83**	64	82	64	81	59
GRGS >20 days	**0.65**	**0.84**	**0.81**	**0.92**	**0.99**	**0.99**	34	70	65	85	98
C04 >20 days	**0.65**	**0.84**	**0.81**	**0.92**	**0.99**	**0.99**	33	69	65	84	97
IGS >20 days	**0.65**	**0.84**	**0.81**	**0.92**	**0.99**	**0.99**	34	70	65	85	97

- ❑ Pole coordinates :
  - Pair variance analysis of the offsets between C04, IGS and GRGS pole coordinates series
  - offsets GRGS - C04/IGS (rms >= 30 micro-as) are slightly larger than those between C04 and IGS (final values) (rms <= 25 micro-as)
  - The C04 pole coordinates results mostly from the combination of IGS
- ❑ LOD : After MJD=54550(03/2008) LOD present a RMS with respect to IGS/C04 >= 20 micro-s, at least 4 times larger than RMS C04 - IGS.

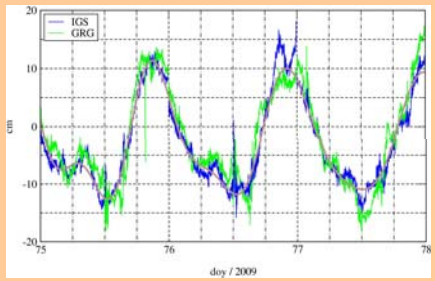
- ❑ Atmospheric and oceanic excitation can be also taken as a gauge for the quality of those series, especially for frequencies lower than 5 days.

Agreement between geodetic excitation functions (GRGS/C04/IGS) and fluid layer excitation, that is:

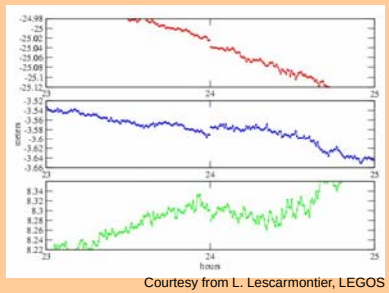
- (A) : Atmospheric from NCEP, IB case
- (AO) : Atmospheric (NCEP IB) + Oceanic excitation (from ECCO model)

- ❑ LOD is compared with A/AO excitation (after MJD 54550). It appears that GRGS equatorial excitation matches the A/AO excitation as well as C04 and IGS from 5 days
- ❑ If we trust in AO excitations (NCEP + ECCO), for periods in the vicinity of 2-5 days, GRGS solution is probably no as good as IGS and C04 solution.

PPP Solution



- ❑ Solid tide vertical displacement for ALGO station :
  - In grey: Model
  - In blue: 30s PPP using IGS final orbit and clock products
  - In green: 30s PPP using GRG final orbit and clock products
- ❑ The two solutions are very comparable in term of high frequency noise and in term of capability to reproduce the tidal motion



Courtesy from L. Lescarmontier, LEGOS

- ❑ Mertz Antarctica glacier XYZ displacement (B. Legresy, CRACICE LEGOS Project):
  - 30s PPP solution using GRG final orbit and clock products
  - Floating ambiguity (but continuous at midnight)

- ➢ In both studies, a "jump" in the series of coordinate appears at Oh TU
- ➢ Amplitude around 3cm
- ➢ May come from the discontinuities of IGS orbit and clock products

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