



Reprocessing for ITRF2020 by CNES/CLS IDS Analysis Center

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Models/Standards update

☐ Models and standards recommended by IERS

Models/Standards		OLD	NEW
Earth rotation	Mean pole	IERS2010	Linear mean pole from updated IERS conventions
	Subdaily pole model	Previous IERS convention	Desai & Sibois from updated IERS conventions
Gravity model	Time variable gravity field	EIGEN-GRGS.RL03	EIGEN-GRGS.RL04
	Oceanic/Atmospheric gravity Dealiasing Products	No	AOD 1B RL06 (GFZ)
Ocean tides	Station displacements (ocean loading)	FES2012	FES2014b
	Gravitational attraction	FES2012	FES2014b
Phase Law		Alcatel, STAREC-B/C	New Alcatel, STAREC-B/C

Processing strategy update

❑ Processing strategy (GINS/DYNAMO software)

Theme	OLD	NEW
Attitude modelling (Spacecraft + Solar array)	Attitude model for all satellites	Quaternions for Jason-1, Jason-2 and Jason-3
Coefficient Solar Radiation pressure Cr	Satellite dependent estimated and fixed	Satellite and time dependent Adjusted per arc (Not yet, planned ?)
Estimated measurement parameters	One frequency bias per pass	One frequency bias and drift for SAA stations per pass (for Jason-1, Jason-2 and Jason-3)
Elevation cut-off and data downweighting	Cut-off 12° downweighting: $\text{elev}^2/400$ for $\text{elev} < 20^\circ$	Cut-off 10° CNES downweighting law (Not yet, planned?)
Integration Step Size	60 sec	30 sec
SAA mitigation	Corrected data for Jason-1 and SPOT-5 Using SAA data from the most affected satellites only for POD (only for Jason-1)	Corrected data for Jason-1 and SPOT-5 Using SAA data from the most affected satellites only for POD (for Jason-1, Jason-2&3, Sentienl-3A&B)

Processing strategy update

❑ SAA stations per satellite

List for Jason satellites:

- Ascension (ASDB, ASEB)
- Tristan da Cunha (TRIA, TRIB, TRJB)
- St Helen (HELA, HELB, HEMB)
- Libreville (LIBA, LIBB, LICB)
- Sal (SALB)
- Cachoeira (CACB, CADB)
- Easter Island (EASA, EASB)
- Santiago (SANA, SAOB, SANB)
- Galapagos (GALA)
- Santa Cruz (SCRB)
- Arequipa (AREA, AREB, ARFB)
- Le lamentein (LAOB)
- Kourou (KRUA, KRUB, KRVB, KRWB)

POD results

□ DORIS RMS of fit and OPR Acceleration Amplitude / Radiation pressure coefficient

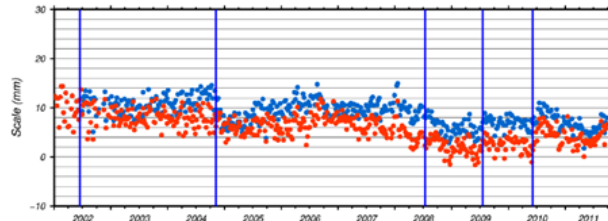
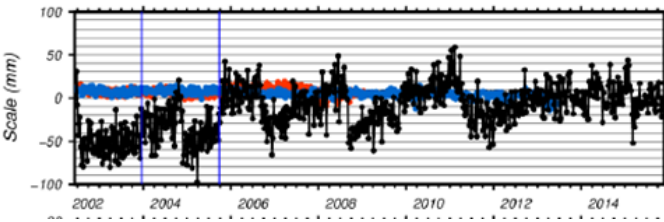
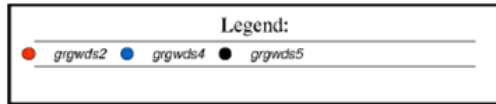
SATELLITE	DORIS RMS (mm/s)	OPR amplitude average (10^{-9} m/s ²)		Solar radiation coefficient Cr
		Along-track	Cross-track	
SPOT-2	0.42	1.8	3.6	1.07
SPOT-3	0.44	1.1	3.4	1.07
SPOT-4	0.42	1.4	2.9	1.16
TOPEX	0.46	1.5	5.8	1.03
JASON-1	0.32	2.1	2.9	0.94
SPOT-5	0.34	1.6	1.8	1.05
ENVISAT	0.39	1.0	2.0	1.05
JASON-2	0.32	4.0	2.1	0.97
CRYOSAT-2	0.35	2.9	2.6	1.0
HY2A	0.34	0.5	3.1	0.86
SARAL	0.34	1.4	2.4	1.0
JASON-3	0.36	0.9	2.2	0.99
SENTINEL-3A	0.37	2.3	1.4	1.0
SENTINEL-3B	0.38	1.4	1.5	1.0

■ *For the two directions, Along-track and Cross-track, the mean amplitudes are lower than 4×10^{-9} m/s², reflecting a satisfying level in the modeling of the satellite macromodels and the attitude law*

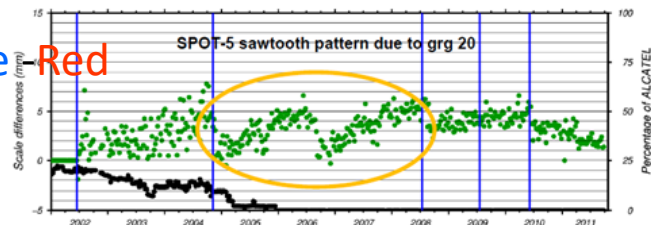
Processing strategy update (during ITRF reprocessing)

❑ Impact on the multisatellite solution when SPOT-5 does not contribute to the scale

SPOT-5 Scale (black curve)

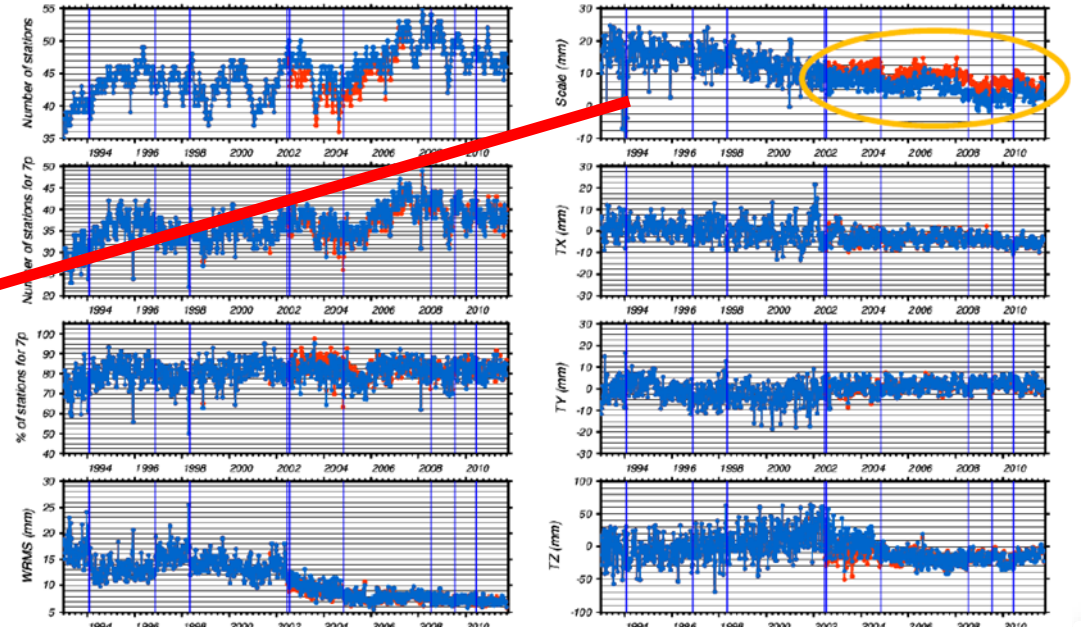
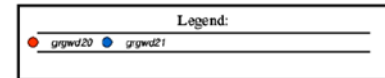


Green=Blue=Red



Multisatellite solution when SPOT-5 does not contribute to the scale

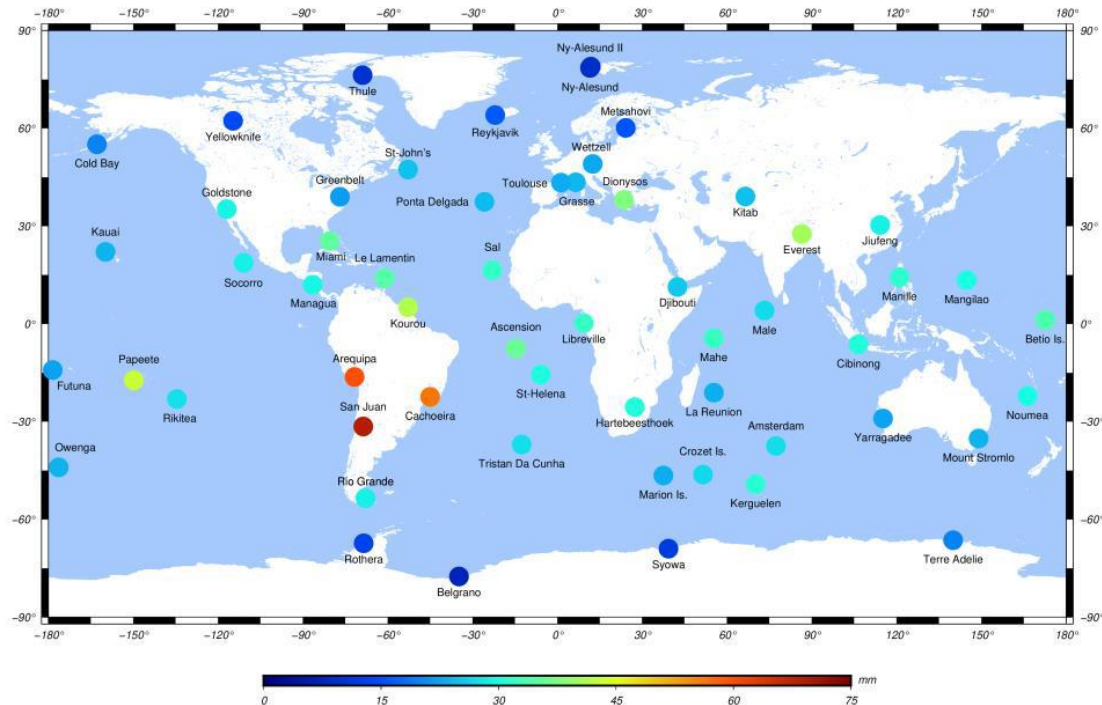
Reference: ITRF2014



Processing strategy update (during ITRF reprocessing)

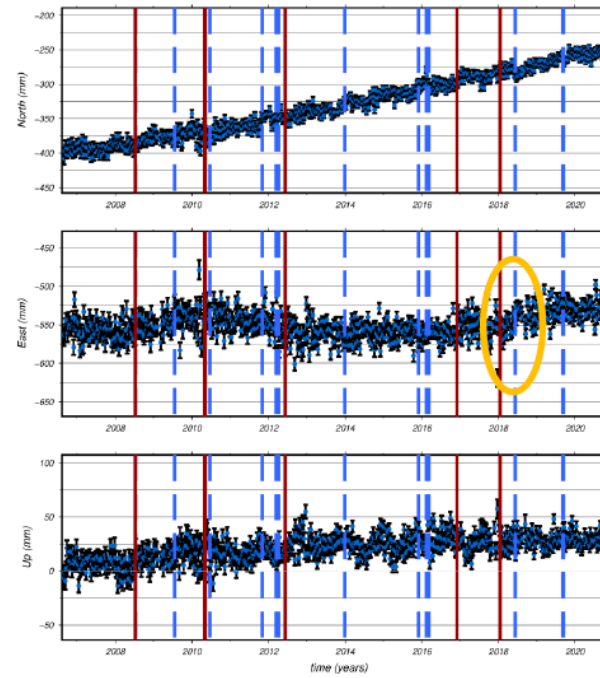
❑ SAA strategy is also applied for Sentinels Satellites

*Single satellites solutions differences: Sentinel-3-B - Saral
WRMS of weekly differences on East component*

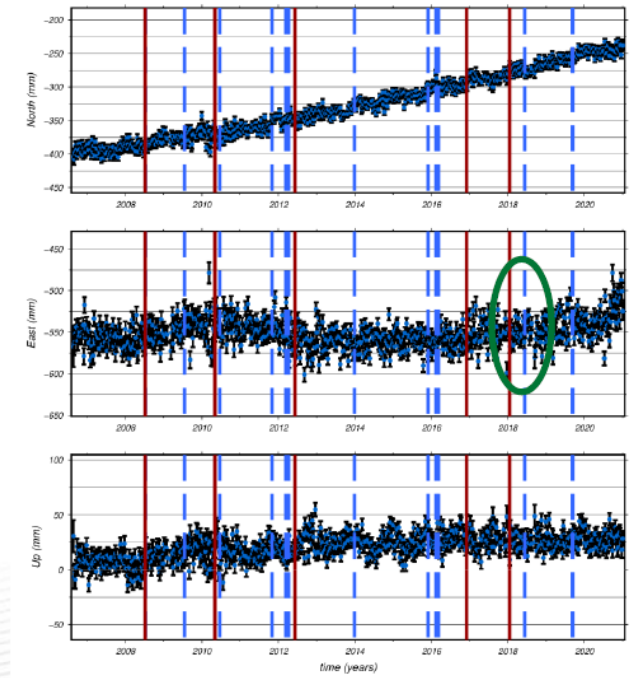


*Multisatellite solution when SAA strategy is applied for Sentinel-3A&B
Impact on Arequipa station*

grg20wd30 - ARFB (Arequipa)



grg20wd32 - ARFB (Arequipa)



On going and future work

□ On going work

- *Continue discussions with other ACs to improve the IDS solutions (comparison of single satellite solutions)*
- *Implement HY-2C and Sentinel-6 our processing chain*

□ Future work

- *Evaluate GRG orbits:*
 - by comparisons to orbits internal with GNSS*
 - by comparison to external orbits*
 - by Independent SLR RMS of fit*
 - by Altimeter crossover Cycles*
- *Write a paper on the ITRF2020 reprocessing*
- *Use quaternions for Sentinel and Cryosat-2*
- *Improve macromodel*
- *...*