GDR-C Standards for Jason-1

Preliminary results and tests for the choice of the final configuration

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Summary of GDR-C Standards 1/6 - Gravity

	GDR-B	GDR-C
Static field	EIGEN-03C0	EIGEN-GL04S (GRGS)
Time varying gravity	Drift only, on zonal harmonics up to degree 4	Drift+Annual+Semiannual 50x50 from EIGEN-GL04S-ANNUAL (GRGS)
Atmospheric contribution to the gravity field	None	NCEP derived 20x20 field provided by AGRA service (GSFC)
Ocean pole tide	None	Desai model as from IERS 2003 standards

Summary of GDR-C Standards 2/6 - Gravity

- Gravity field : small differences between different options
  - EIGEN 04C Vs 04S_ANNUAL: Results over cycles 100-127 are slightly in favor of 04S_ANNUAL (see overlaps, Xovers and SLR residuals in backups slides)
  - Impact of periodic terms in EIGENGL04S_ANNUAL : < 3 mm radial RMS
- Atmospheric contribution to the TVG field
  - Small but systematic improvement (see backup slides)

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Summary of GDR-C Standards 3/6 – Surface forces

- **Updates in Jason-1 macromodel :**
  - **Updated optical coefficients for the +/-Y and +X sides of the main body**
    - obtained in order to minimize the difference wrt to the acceleration provided by the UCL SRP model in fixed yaw regime
  - **Updated value for the satellite thermal emissivity in the body-fixed X direction**

- **Removal of systematic signatures in the adjusted empirical forces during fixed yaw, no significant impact on the orbit** (see backups)

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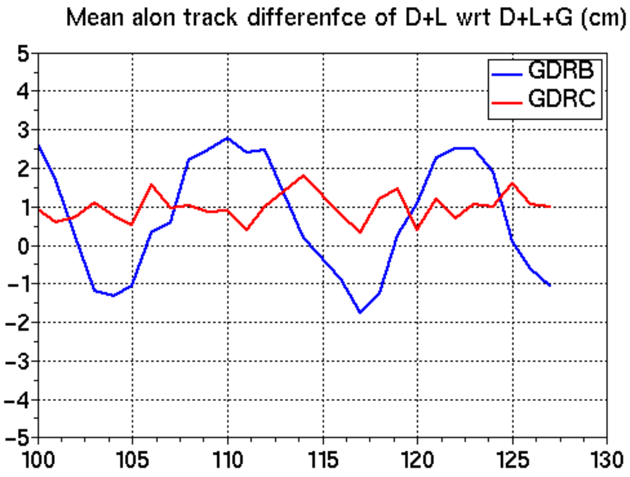
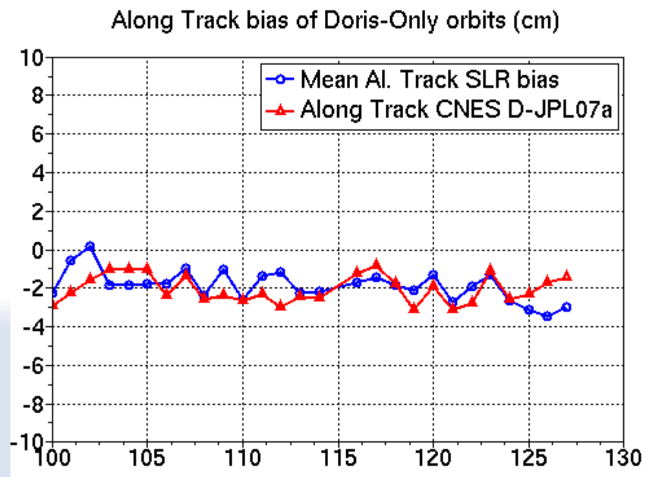
Summary of GDR-C Standards 4/6 – Measurements

	GDR-B	GDR-C
Reference	ITRF2000 (Doris DPOD2000, SLR ITRF2000 with some updates, GPS const. JPL IGS00)	ITRF2005 (Doris DPOD2005, SLR ILRS2005 with updates, GPS const. JPL IGS05)
Displacement of reference points	Solid earth tides applied to SLR and DORIS – Ocean loading and pole tide applied to SLR only	Ocean loading and pole tide applied to both SLR and DORIS stations
GPS Phase maps (JPL)	Receiver only	Emitter + Receiver (updated)
DORIS SAA model	Applied only before instrument change	Applied over the entire series
SLR tropospheric correction	Marini-Murray	Mendes-Pavlis
SLR range correction	Constant 5 cm correction	Elevation dependent range correction

Summary of GDR-C Standards 5/6 – Measurements

- GPS Phase maps significantly reduced along track 120-days along track error of CNES GPS orbits
- Doris time bias after the instrument change will be reviewed (currently identical to that of the first instrument, 6μs)
  - Doris only orbits with SAA model between cycles 100→127 exhibit ~2 cm (~2.8 μs) along-track bias relative to SLR and GPS
- SLR stations weights and solved-for biases have been reviewed after analysis on the residuals





Summary of GDR-C Standards 6/6 - Methods

- D+L+G orbits: amplitude of 1/rev forces (Along Track / Cross Track) adjusted every 12 hr, as for the GDR-B orbit
  - Xover differences and SLR residuals show that 12 hr 1/rev give systematically better results (see Backups) wrt 24 hr 1/rev
- D+L dynamic and reduced dynamic orbits will be produced together the standard D+L+G solution
  - D+L reduced dynamic show similar radial performance when compared to D+L+G
- D+L weight wrt GPS in D+L+G solution might be increased
  - Ensure more continuity after GPS failure
  - D+L is currently very underweighted wrt to GPS
  - A test obtained by increasing relative weight of D+L wrt to GPS by a factor 10 has shown some degradation before cycle 90 and no degradation after cycle 100 (see backups)

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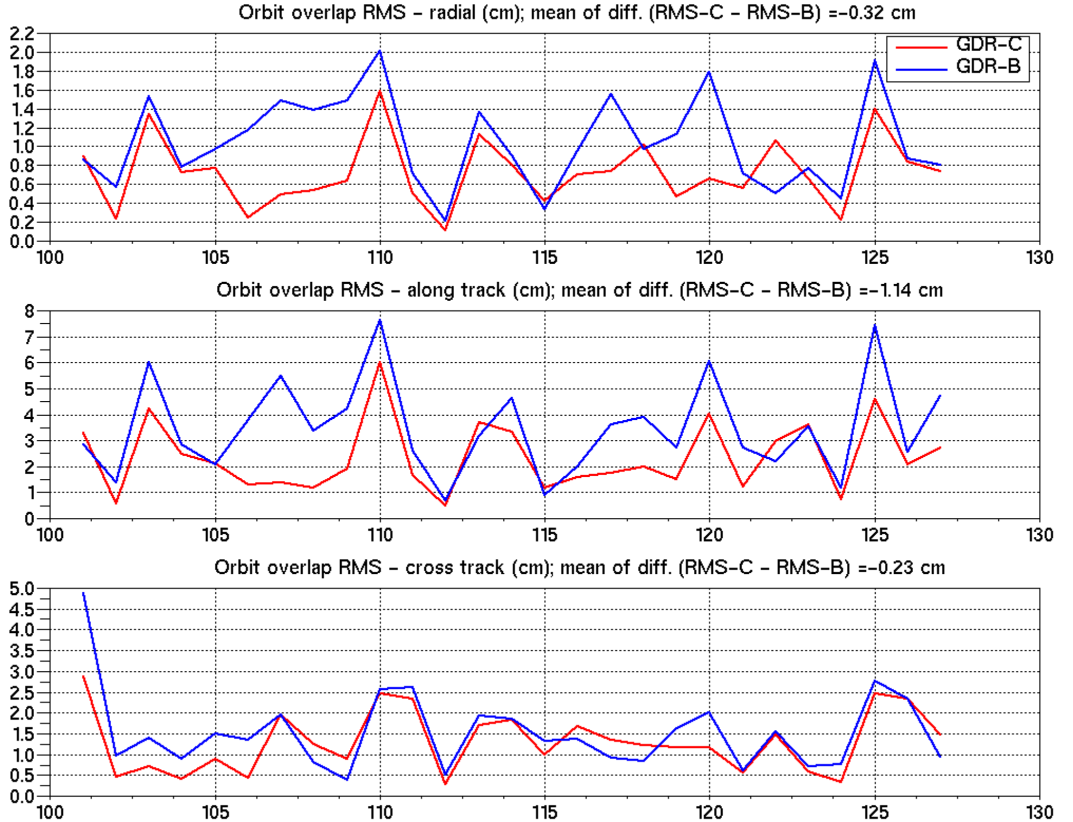
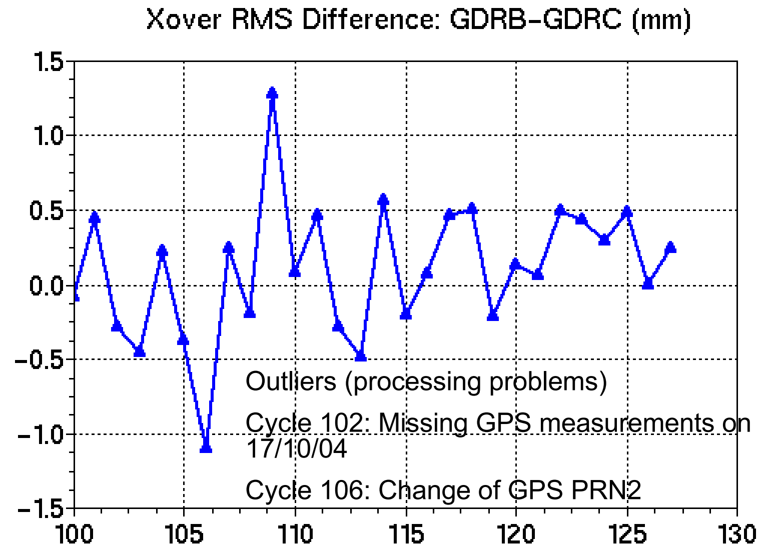
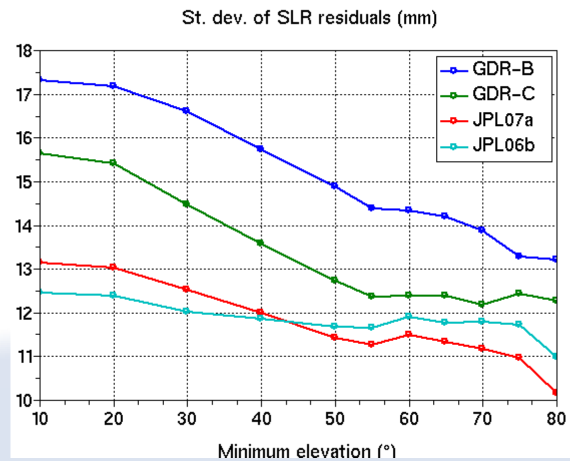
GDR-C orbit 1/2



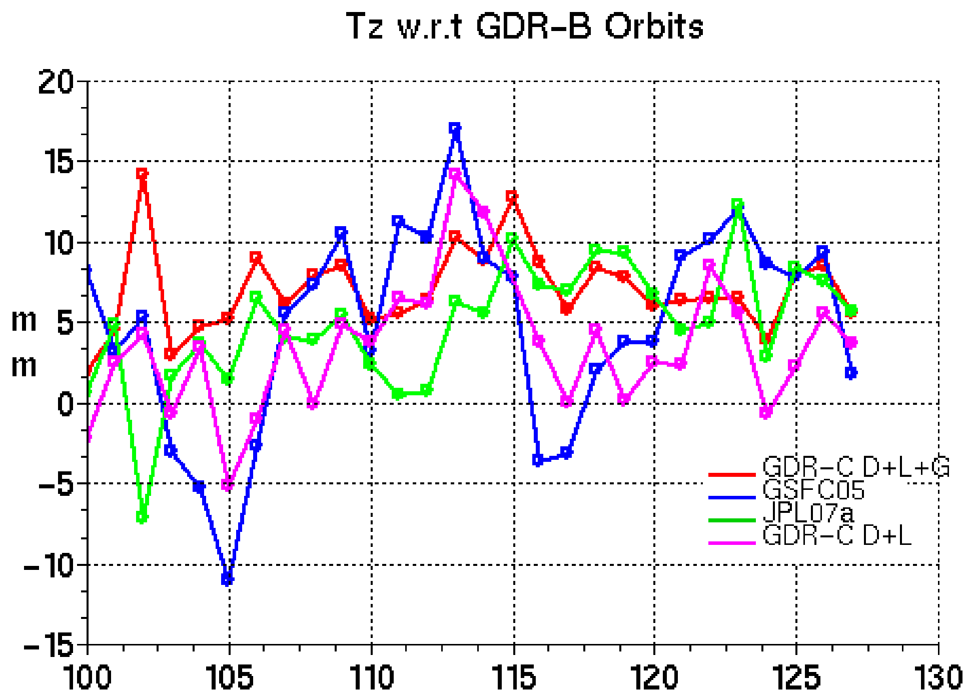




- Radial improvement wrt to GDR-B in the order of 1 mm in the radial direction

GDR-C orbit 2/2

- Z-Centering
- GDRC orbits use a preliminary DPOD solution, ILRS05 coordinates, and IGS05 GPS ephemeris (before GPS week 1400 the IGS00 ephemeris have been aligned to IGS05 by JPL, clocks are unchanged)
- ITRF2005 orbits from different groups have consistent mean Z shift (North/South) relative to GDR-B
- ~5 mm Z shift, not enough cycles to see any drift



Conclusion

- The accuracy of GDRC orbits with respect to GDRB will be slightly improved (~ 1 mm)
- Most interesting aspects concern the long term behavior of the orbit (Z drift, geographically correlated radial rates, …) noticeable once the series will be complete
- Most open issues have been closed and many systematic errors removed
  - Confirm the choice of D+L weight relative to GPS
- The same upgrades will be applied to Envisat reprocessing and Jason-2
  - Surface force models still need need to be confirmed

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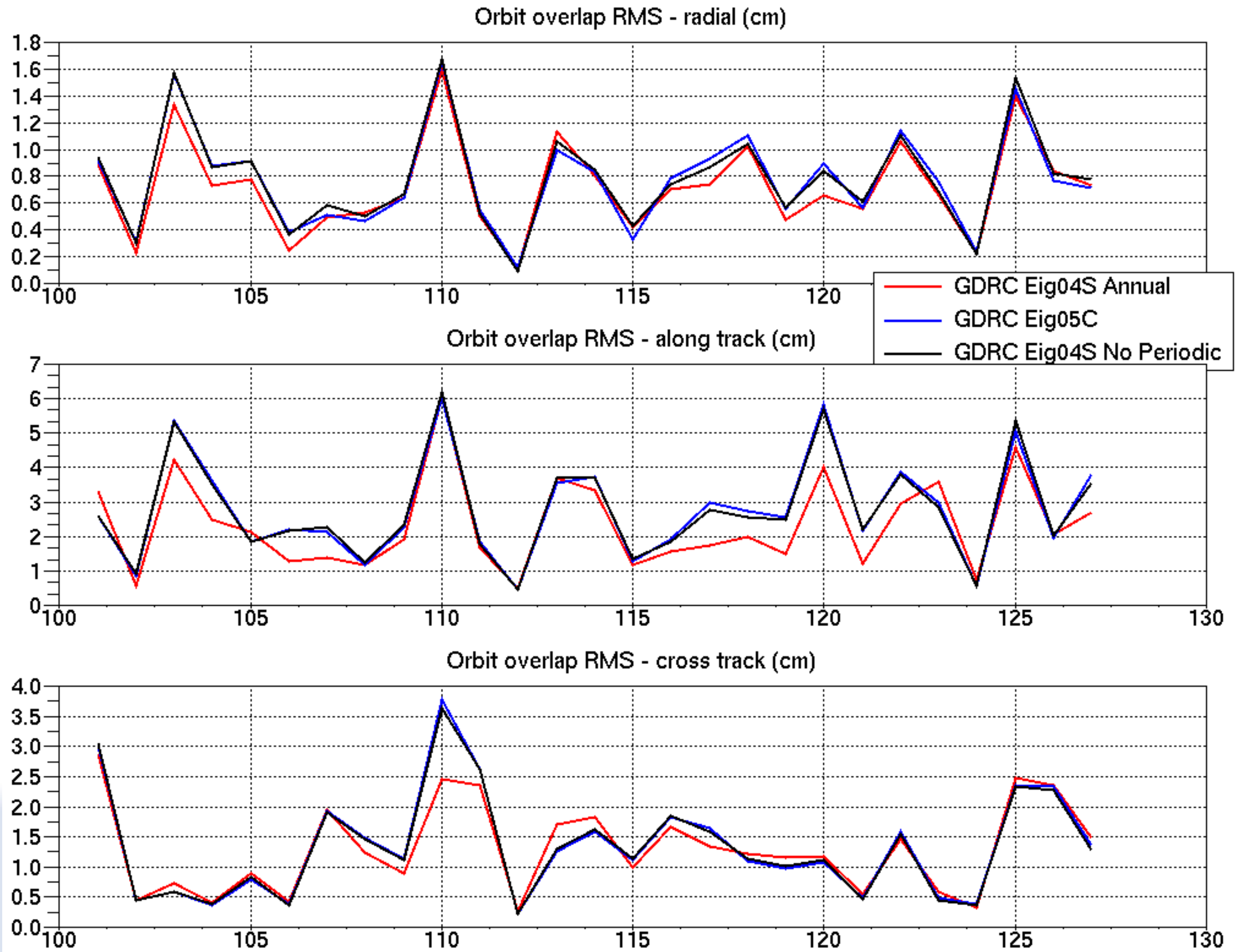
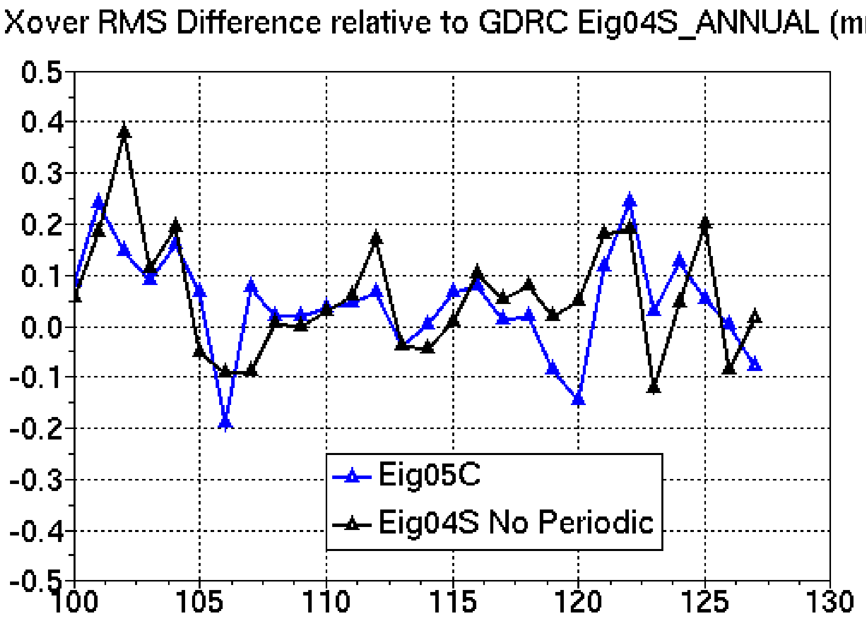
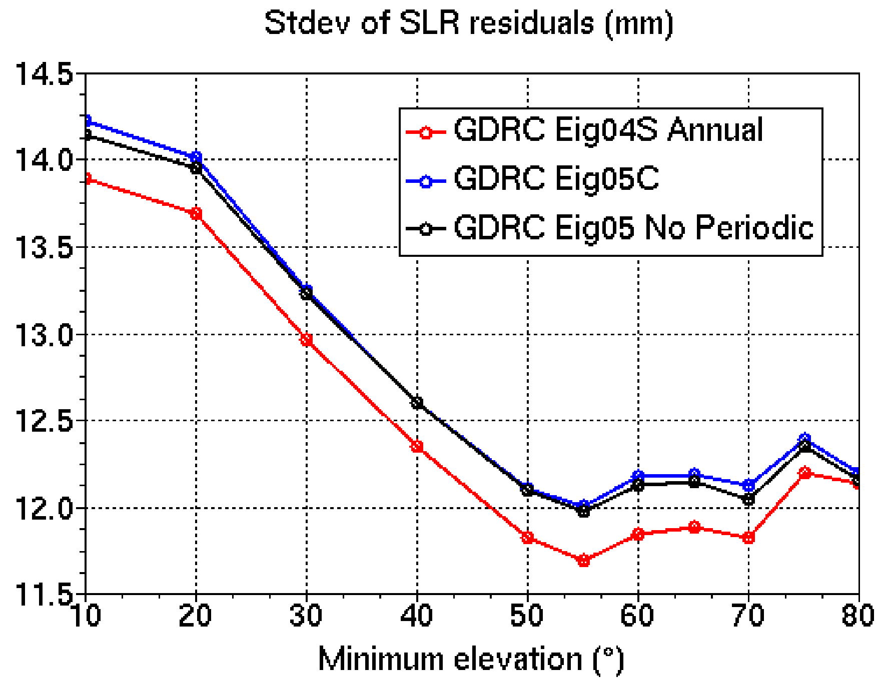
Backups…

EIGENGL04S-ANNUAL Vs EIGENGL04C – 1/2



EIGENGL04S-ANNUAL Vs EIGENGL04C – 2/2





Station	*Nr*	*RMS (mm)*		
YARR_7090	*12879*	**11,9**	**12,3**	**12,2**
WASH_7105	*3407*	**11,9**	**12,4**	**12,3**
MONU_7110	*3711*	**14,1**	**14,6**	**14,4**
GRAZ_7839	*8616*	**14,3**	**14,5**	**14,4**
FORT_7080	*1310*	**15,9**	**16,5**	**16,3**
HERS_7840	*6462*	**14,1**	**14,4**	**14,3**
WETZ_8834	*6225*	**16,9**	**17,4**	**17,4**

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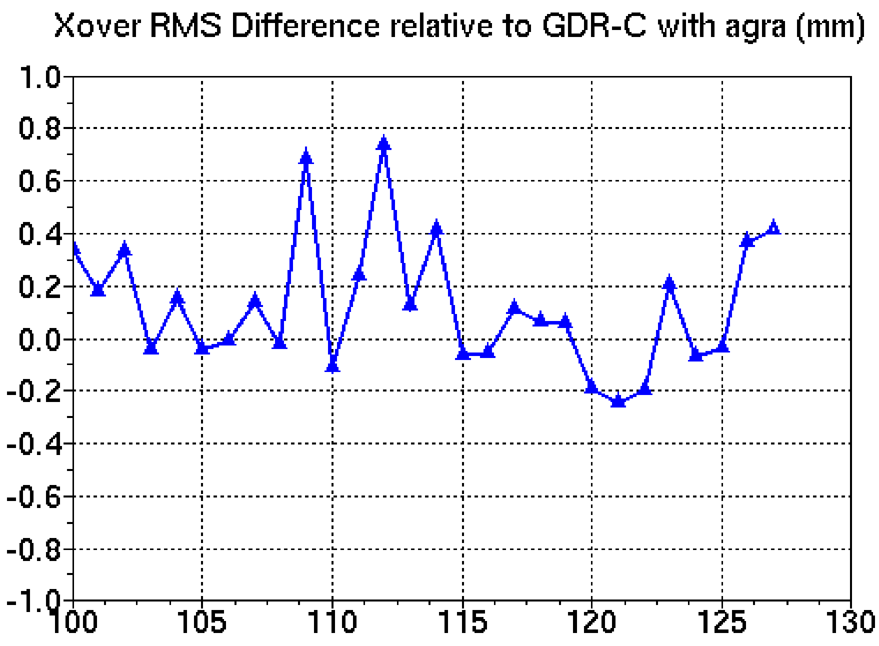
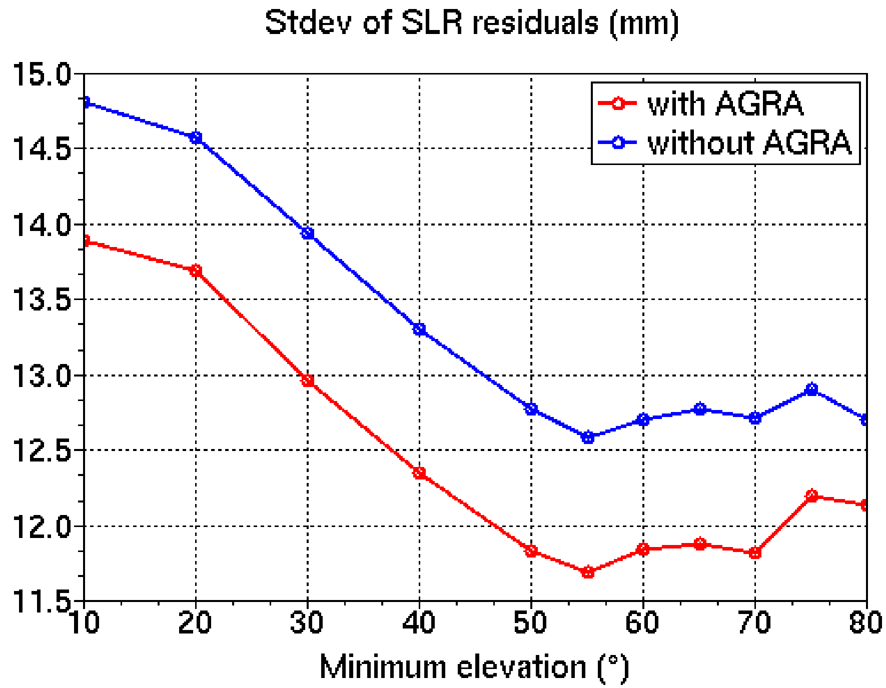
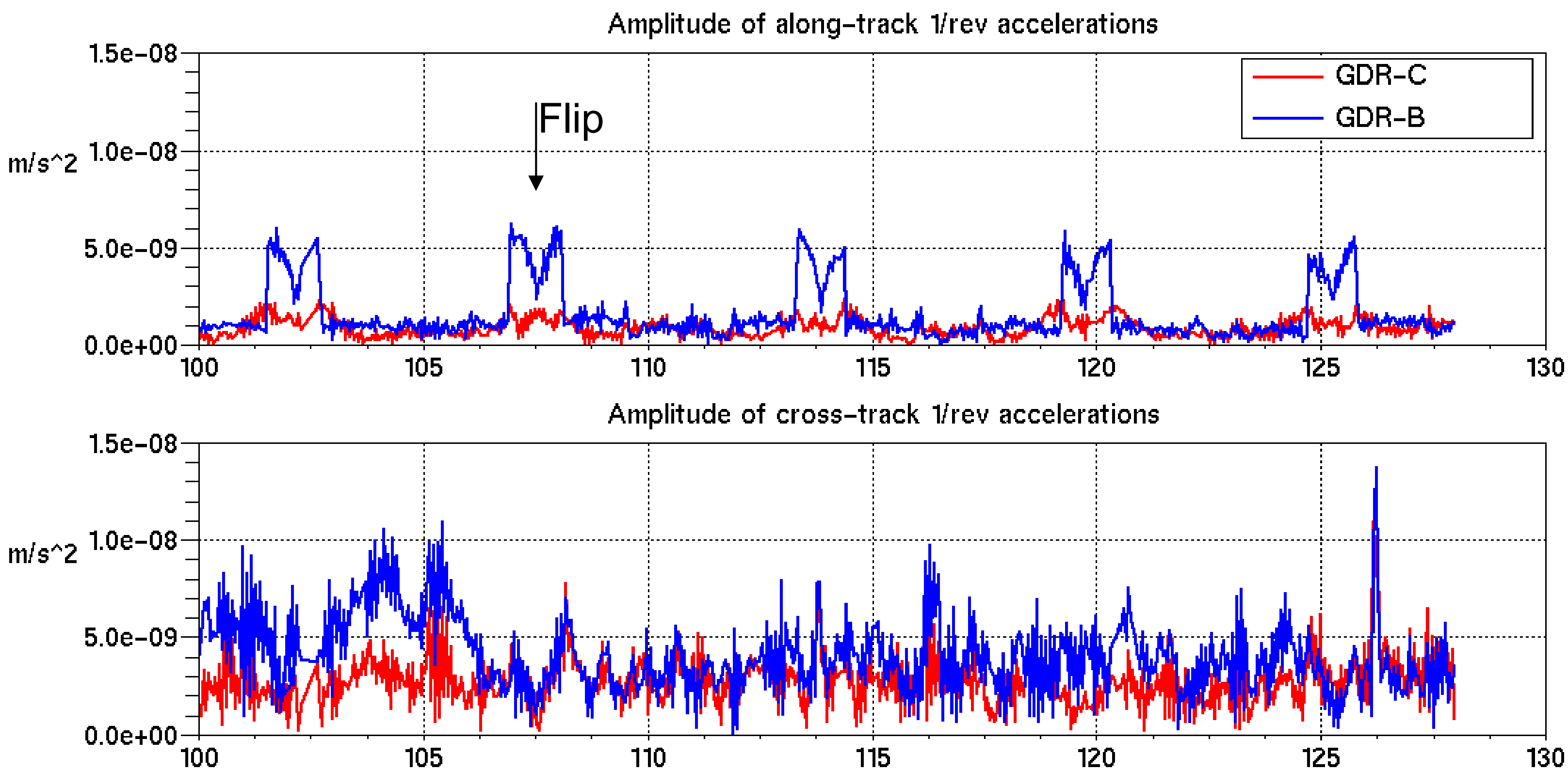
Atmospheric contribution to the gravity field



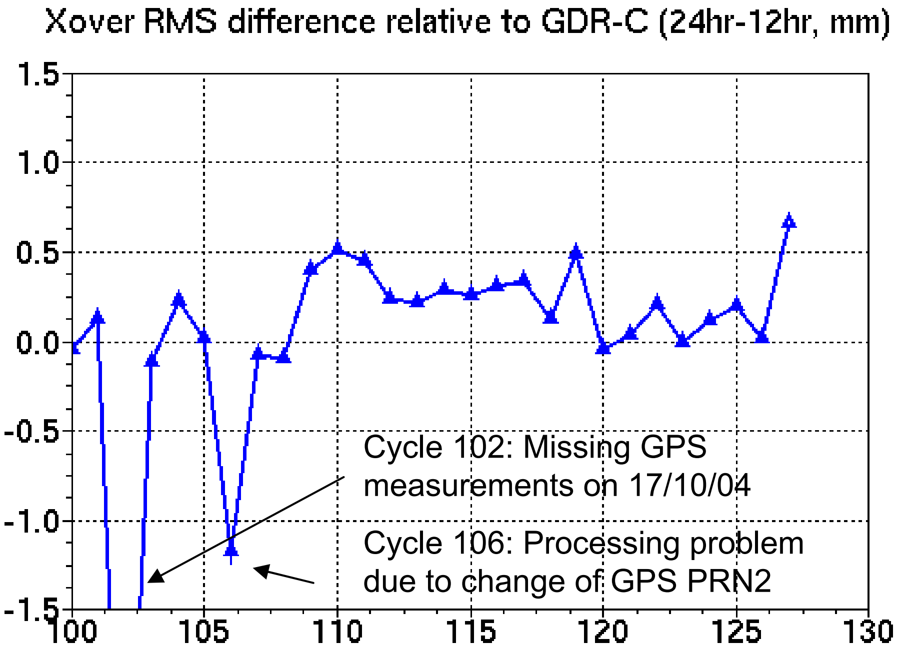


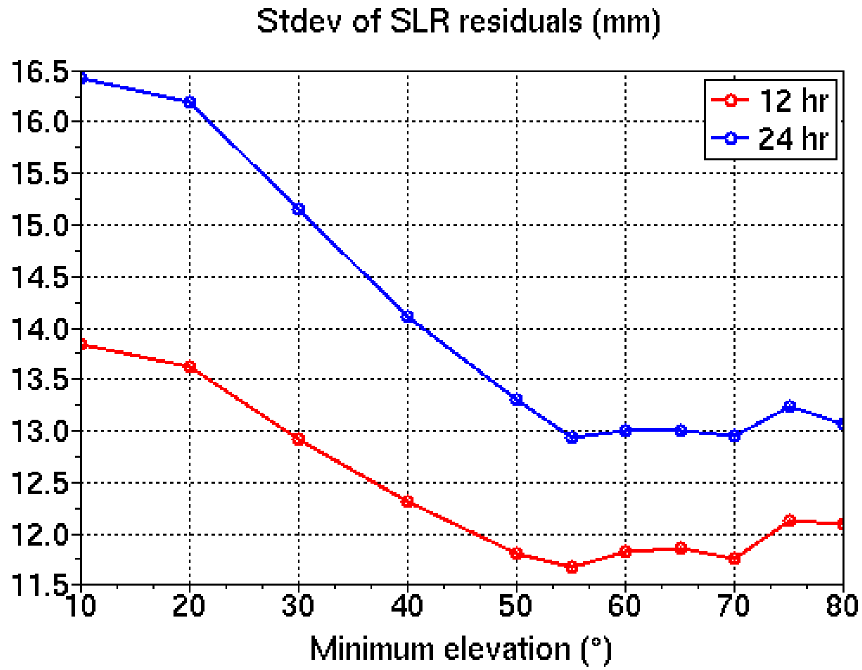
Station	*Nr*	*RMS (mm)*	
YARR_7090	***12879***	**11,9**	**12,9**
WASH_7105	***3407***	**11,9**	**12,5**
MONU_7110	***3711***	**14,1**	**14,6**
GRAZ_7839	***8615***	**14,3**	**15,3**
FORT_7080	***1310***	**15,9**	**16,4**
HERS_7840	***6462***	**14,1**	**15,3**
WETZ_8834	***6225***	**16,9**	**17,9**

Updates in Jason-1 macromodel 1/2



12 hr Vs 24 hr 1/rev forces





Station	*Nr*	*RMS (mm)*	
YARR_7090	*13346*	**11,8**	**15,5**
WASH_7105	*3443*	**11,9**	**15,6**
MONU_7110	*3796*	**14,0**	**17,1**
GRAZ_7839	*8641*	**14,3**	**16,2**
FORT_7080	*1377*	**15,9**	**19,8**
HERS_7840	*6582*	**14,0**	**14,4**
WETZ_8834	*6370*	**17,0**	**20,0**

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Increasing the weight of D+L wrt to GPS

- **Increasing relative weight of D+L wrt to GPS measurements by a factor 10**
- **More significant degradation before cycle 90 (probably due to SAA effect)**