ASI Analysis Center activities

V. Luceri, C. Sciarretta – e-GEOS S.p.A., ASI/CGS

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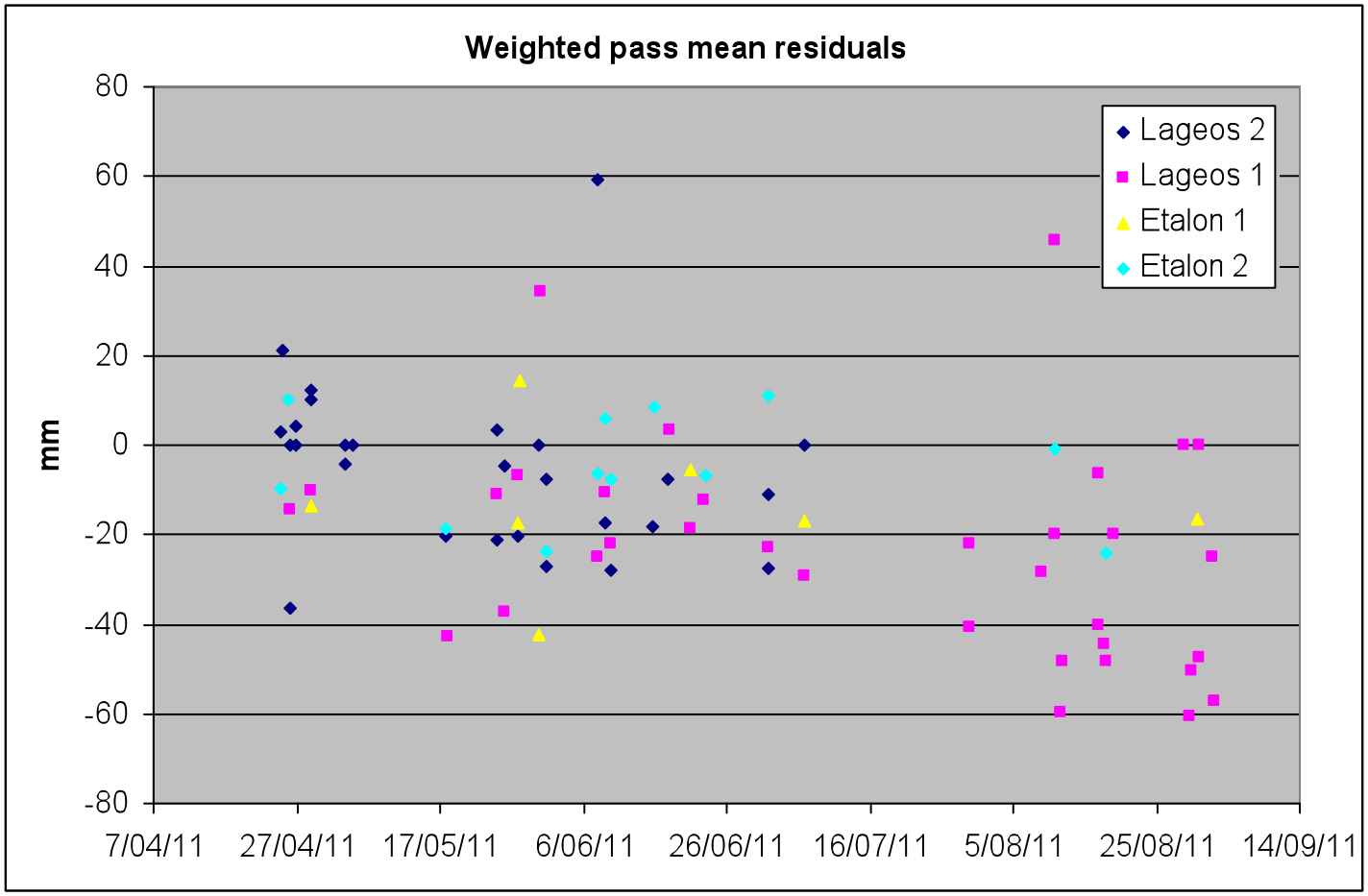
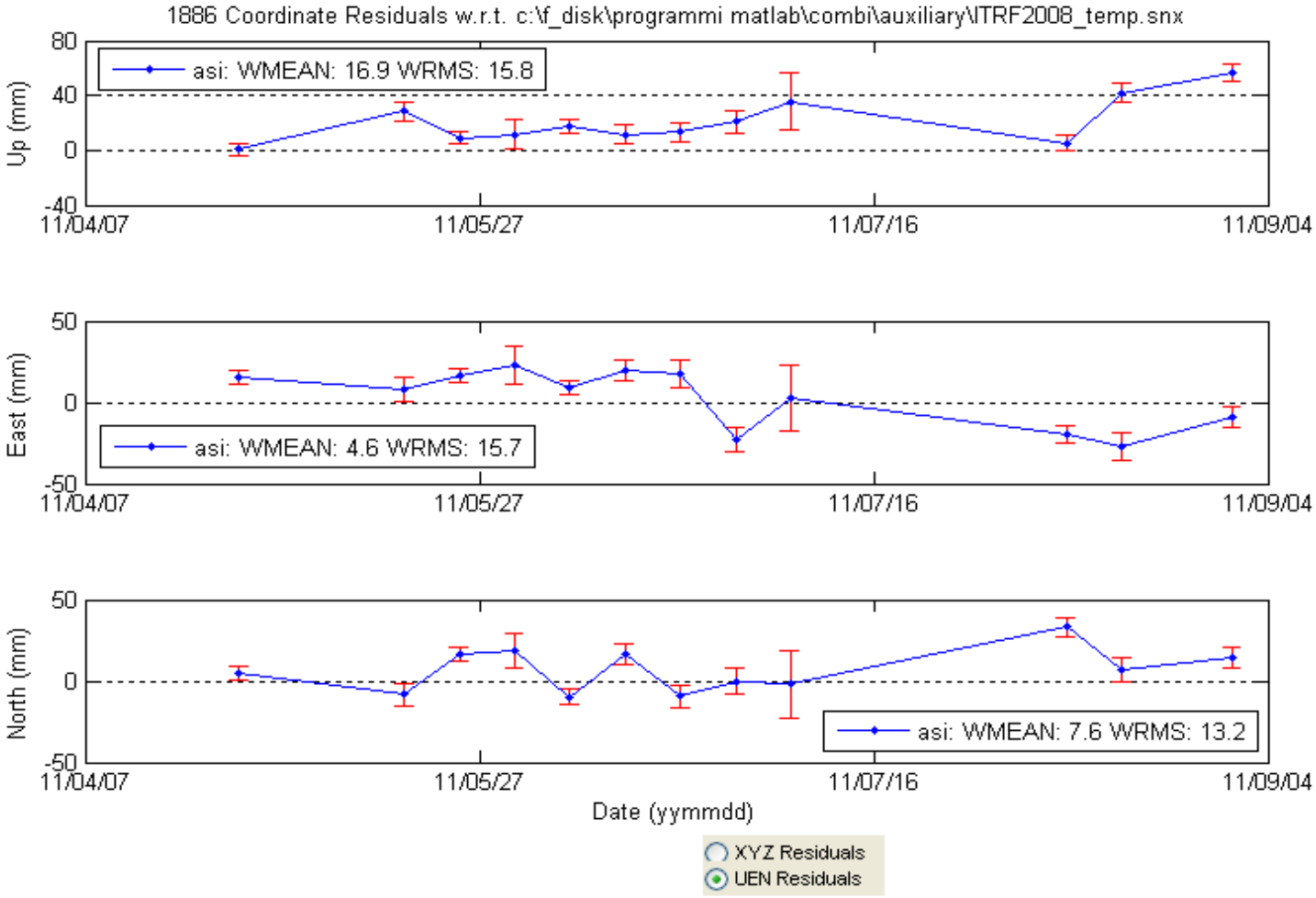
Main activities

- Routine production of daily and weekly solutions, both as AC and CC
- Station qualification
  - **Arkyz (1886)**
- CoM corrections from G. Appleby

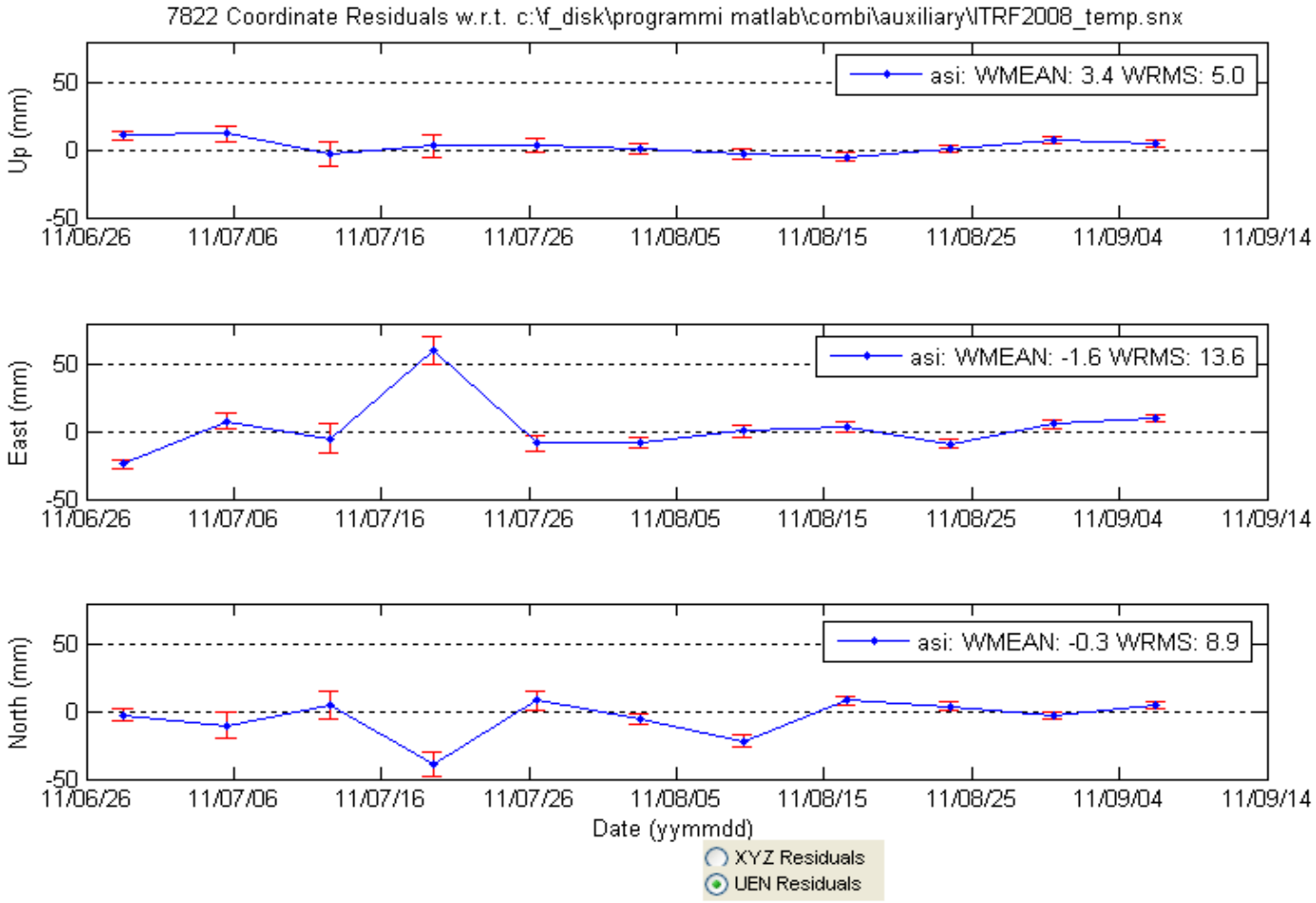
Arkhyz arc analysis



Arkhyz coordinate analysis



Tahiti-FTLRS (7822) coordinate analysis



Estimated coordinates

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1147 STAX   7822  A    1 11:230:00000 m    2 -.524641550400000E+07 0.12600E-01
1148 STAY   7822  A    1 11:230:00000 m    2 -.307727450600000E+07 0.76800E-02
1149 STAZ   7822  A    1 11:230:00000 m    2 -.191380755000000E+07 0.75900E-02
1150 VELX   7822  A    1 11:230:00000 m/y  2 -.423384604973457E-01 0.24068E-03
1151 VELY   7822  A    1 11:230:00000 m/y  2 0.510161086720802E-01 0.30401E-03
1152 VELZ   7822  A    1 11:230:00000 m/y  2 0.335788353087714E-01 0.25071E-03
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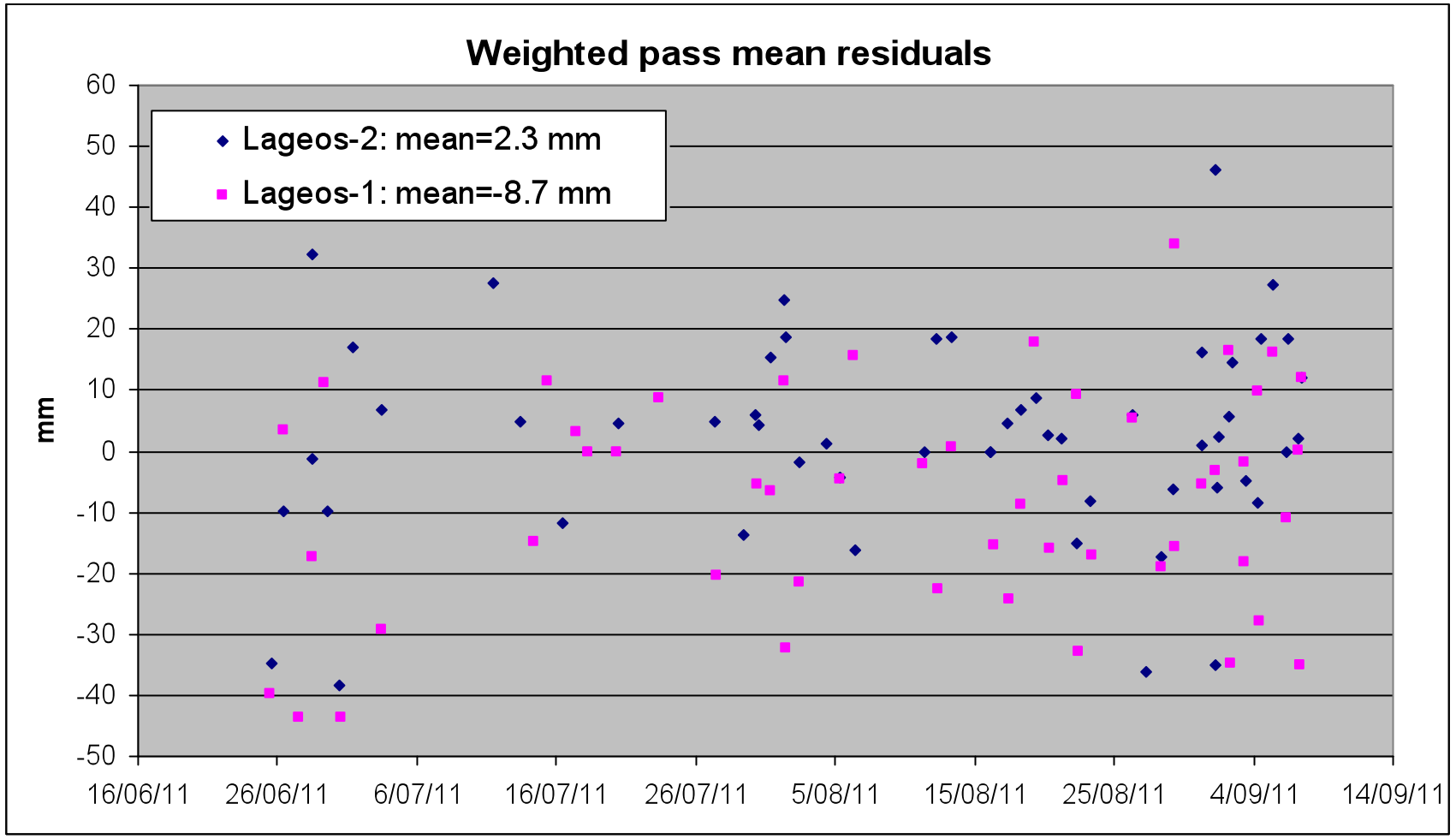
Tahiti-FTLRS (7822) arc analysis



ILRSA CC
Status of the SP3 files combination

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ILRS AWG Meeting, 15 September 2011, Zürich

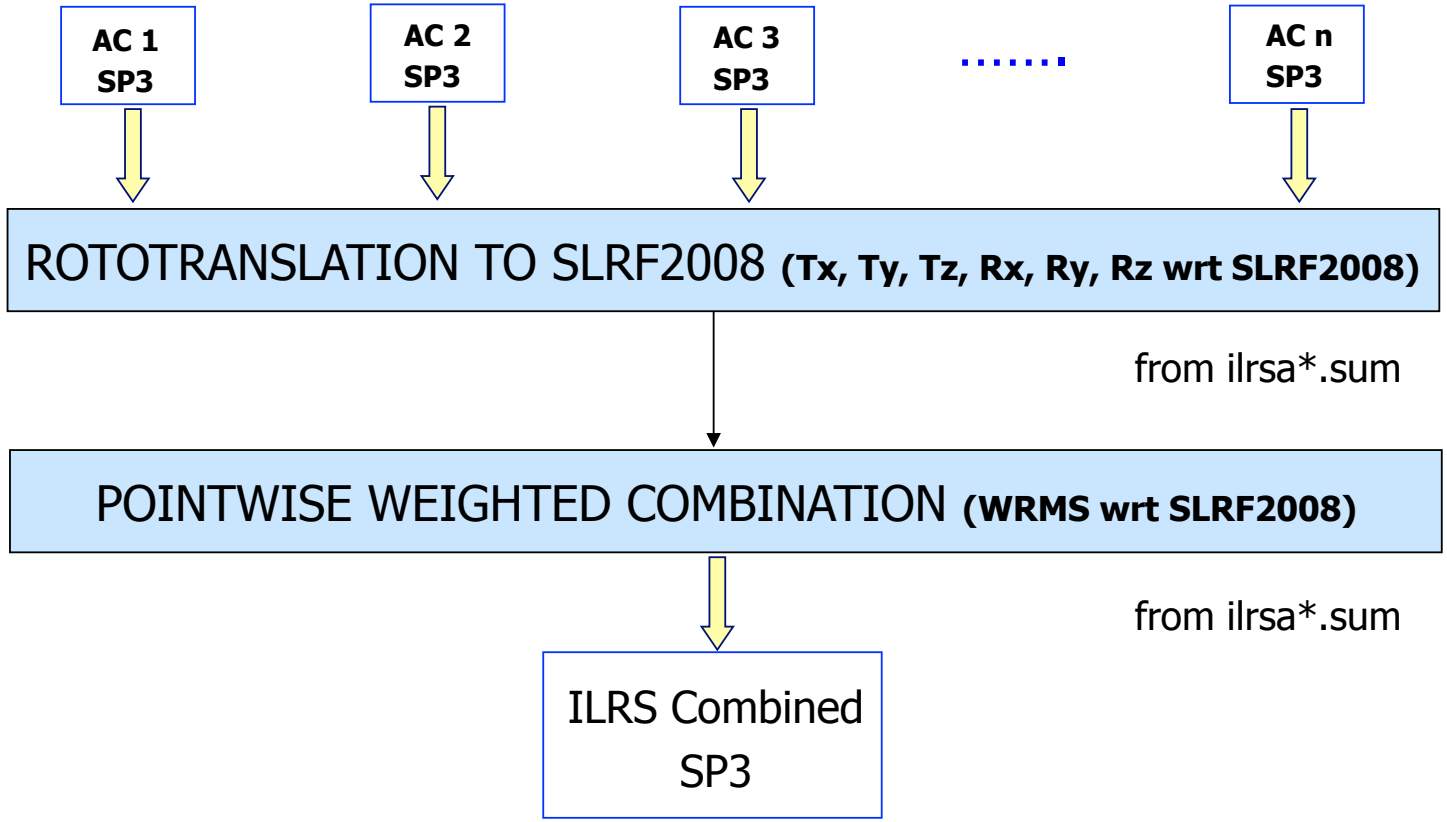
Contents

- Combination strategy outline
- Preliminary SP3 evaluation: description of the selected test SP3 data set and test strategy
- Actual SP3 data availability
- SP3 data evaluation
  - format and ILRS reqs adherence
  - consistency
- Recommendations for the next steps

Combination strategy outline

Assumption: each ILRS AC SP3 in AC weekly EF reference frame

For each satellite, for each week



SP3 test data set and strategy

- L51/L52/L53/L54 SP3 files from 110806 to 110827 (4 weeks) available at CDDIS and EDC
- Rototranslate each SP3 files to ITRF2008 (SLRF2008) and cross-evaluate their consistency

Assumptions

- EF frame as in the ACs weekly solution
- UTC
- SP3c format
- 2' POS/VEL L51/L52
- 15' POS/VEL L53/L54

SP3 availability and assumptions adherence

		0806	0813	0820	0827	Comments/notes
ASI	L51	x	x	x	X	OK
	L52	x	x	x	X	
	L53	x	x	x	X	
	L54	x	x	x	X	
BKG	L51	x	x	x	x	V31 selected (110806, 110813) 2' SV for L53, L54
	L52	x	x	x	X	
	L53	x	x	x	X	
	L54	x	x	x	X	
GA	L51	x	x	x	X	Sporadic sp3 format problems (oor epoch in the latest sv), corrected
	L52	x	x	x	X	
	L53	x	x	x	X	
	L54	x	x	x	X	
GFZ	L51	x	x	x	X	OK
	L52	x	x	x	X	
	L53	-	-	-	-	
	L54	-	-	-	-	
GRGS	L51	x	x	x	X	TAI -> not usable
	L52	x	x	x	X	
	L53	-	-	-	-	
	L54	-	-	-	-	

DGFI, ESA, JCET, NSGF not available up to now

SP3 evaluation: consistency

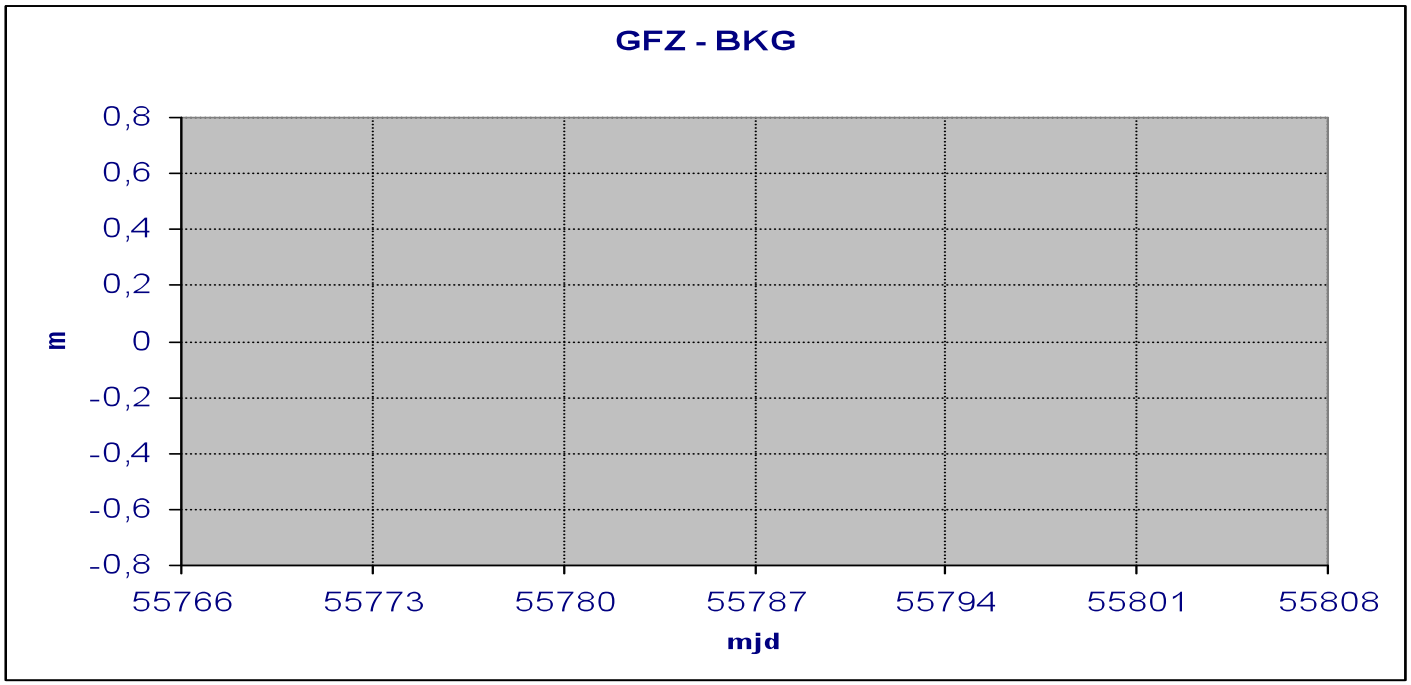
L51/L52/L53/L54 SP3 available and usable files have been

- rototranslated into SLRF2008 with Tx, Ty, Tz, Rx, Ry, Rz estimated in the SSC/EOP combined weekly solutions (as provided in the ilrsa*.sum files)
- cross-compared in XYZ and RAC

L51 – Overall statistics

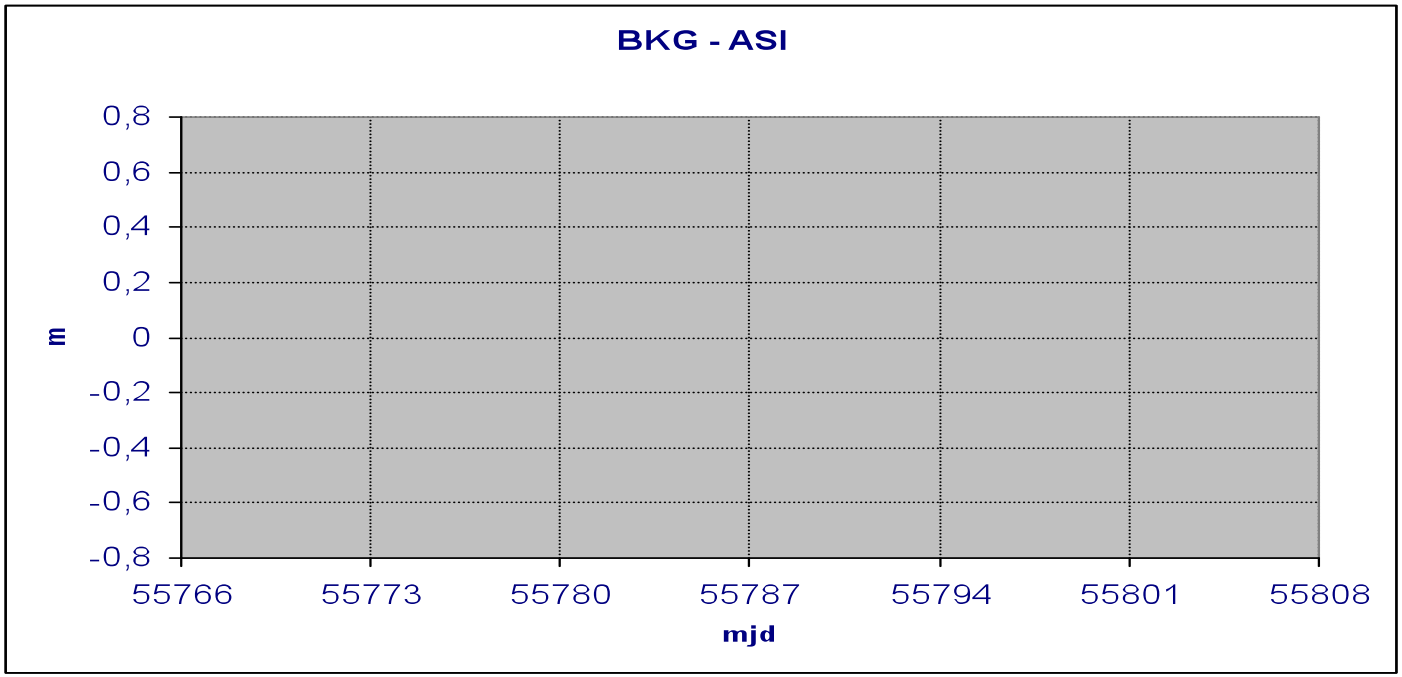
L51 Position differences (cm)		ASI	BKG	GA
BKG -	R	+0.06 ± 0.60		
	C	+0.09 ± 6.83		
	A	-0.73 ± 31.11		
GA -	R	+0.01 ± 1.20	-0.05 ± 1.14	
	C	-0.03 ± 13.65	-0.12 ± 14.89	
	A	-5.76 ± 23.54	-5.03 ± 17.52	
GFZ -	R	+0.08 ± 0.82	+0.02 ± 0.97	+0.09 ± 1.15
	C	+0.11 ± 6.21	+0.03 ± 4.10	+0.15 ± 13.38
	A	-0.28 ± 30.35	+0.46 ± 5.60	+2.45 ± 21.28

L51 GFZ - BKG



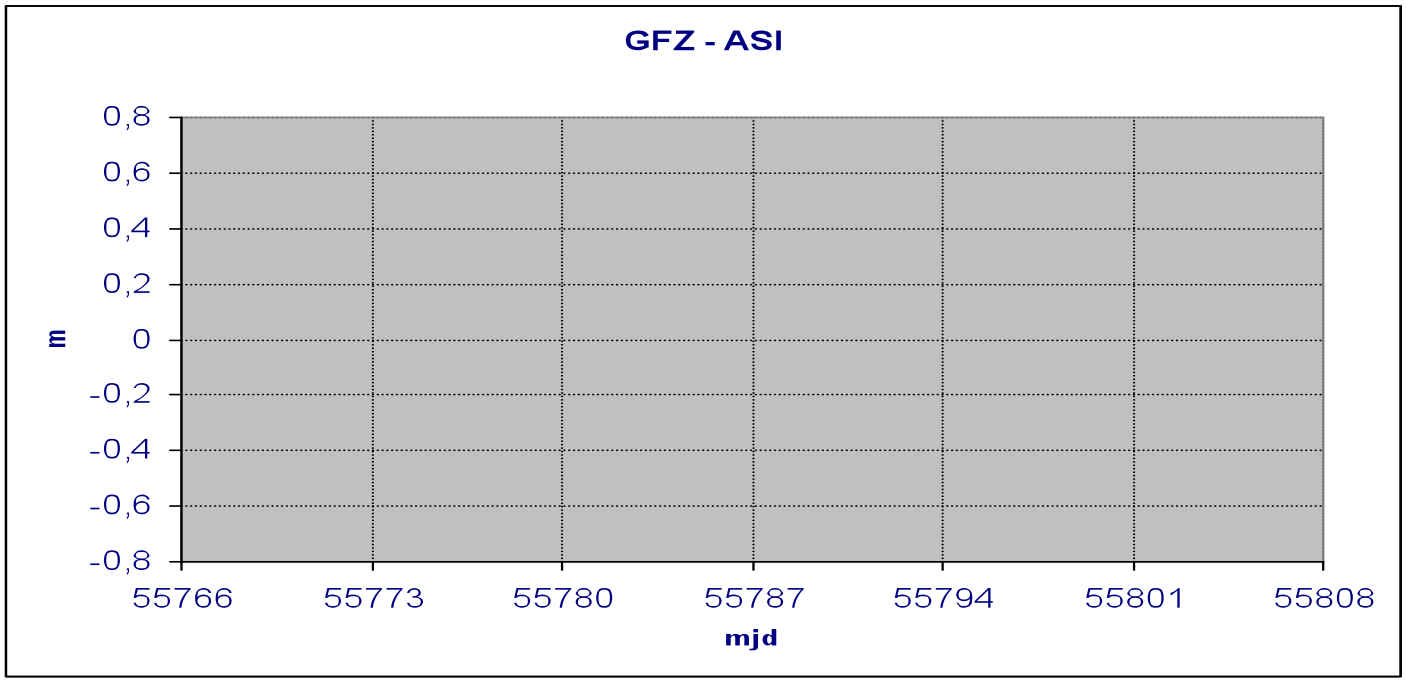
L51		110806	110813	110820	110827
GFZ – BKG cm	R	-0.1 ± 1.0	+0.1 ± 0.9	+0.0 ± 0.9	+0.1 ± 1.1
	C	-0.2 ± 5.5	+0.0 ± 3.0	+0.2 ± 3.6	+0.1 ± 3.9
	A	+0.9 ± 6.5	-0.9 ± 4.2	+1.0 ± 6.7	+0.9 ± 4.7

L51 BKG - ASI



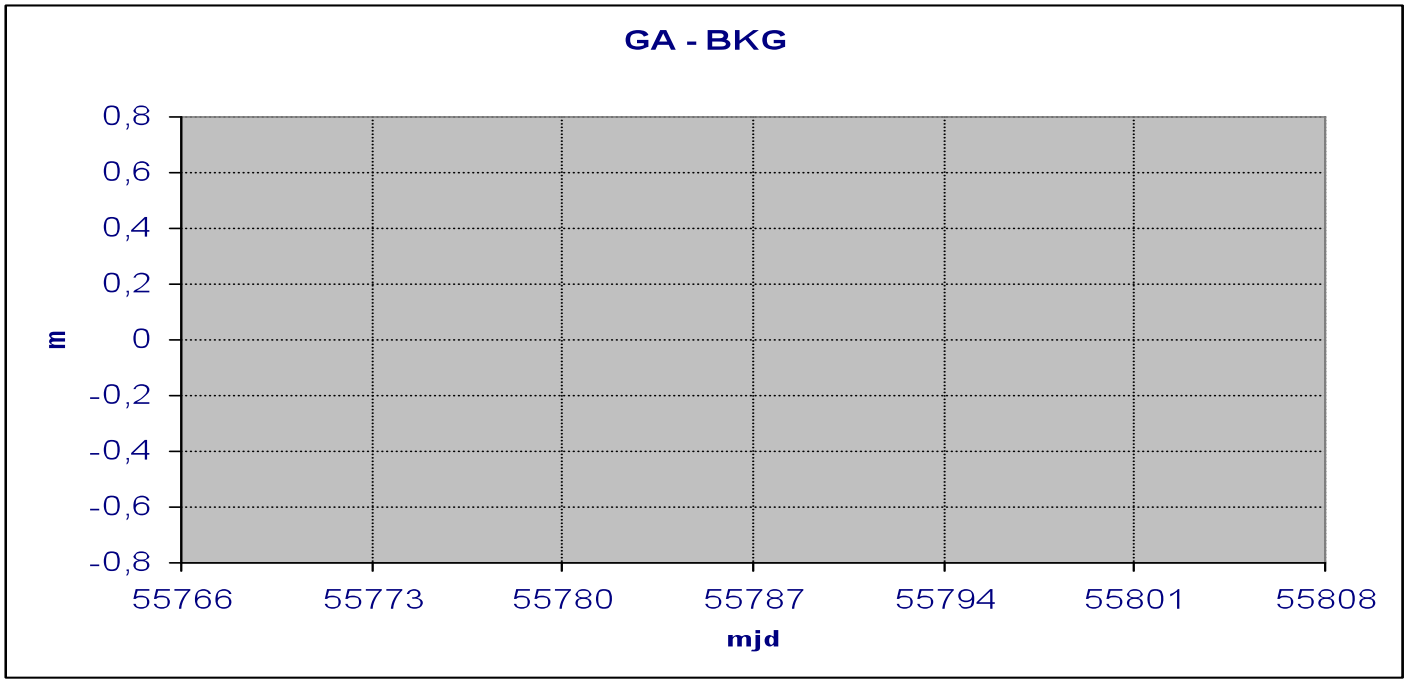
L51		110806	110813	110820	110827
BKG – ASI cm	R	+0.2 ± 0.6	-0.1 ± 0.7	-0.0 ± 0.6	+0.2 ± 0.5
	C	+0.2 ± 6.9	-0.1 ± 6.6	-0.1 ± 5.2	+0.2 ± 8.3
	A	-27.5 ± 32.7	+33.6 ± 38.6	+16.2 ± 20.4	-25.2 ± 30.0

L51 GFZ - ASI



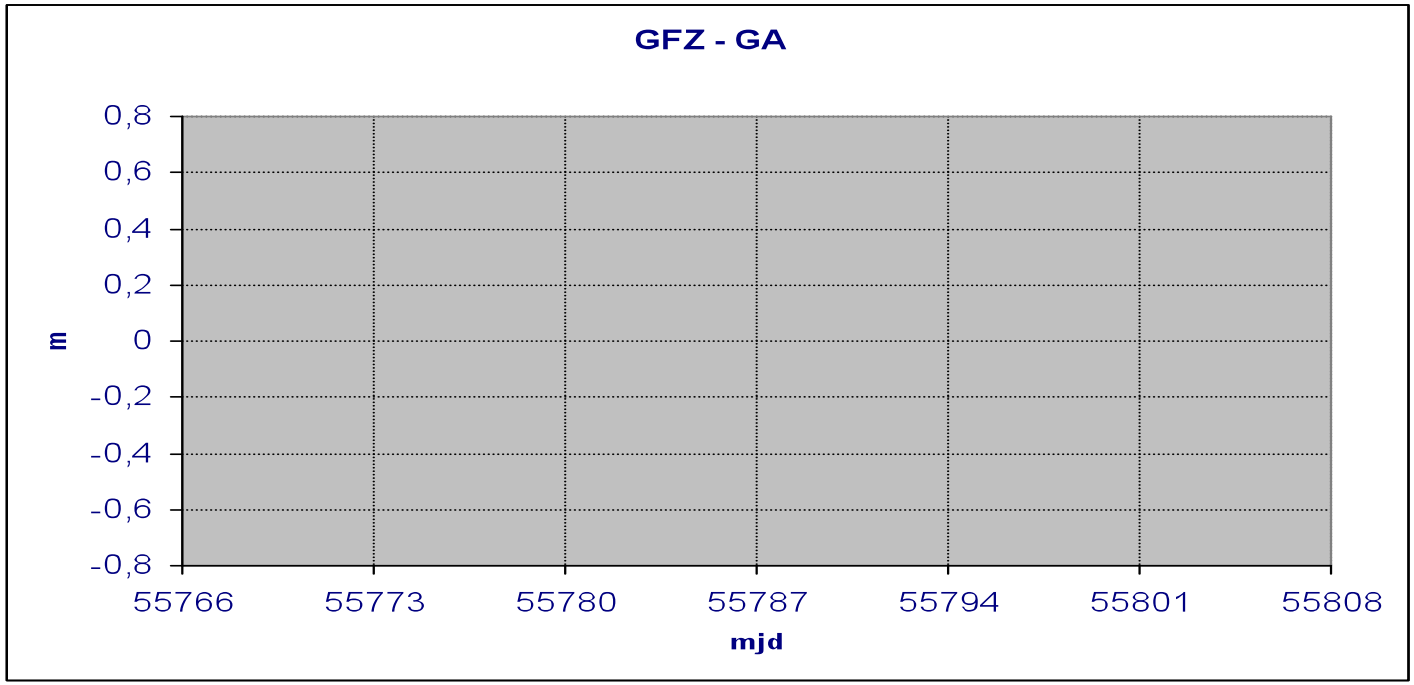
L51		110806	110813	110820	110827
GFZ – ASI cm	R	+0.2 ± 0.9	-0.1 ± 0.9	+0.0 ± 0.7	+0.2 ± 0.9
	C	+0.1 ± 6.9	+0.1 ± 9.1	+0.1 ± 8.3	+0.2 ± 7.5
	A	-26.6 ± 30.7	+32.7 ± 38.2	+17.3 ± 22.4	-24.3 ± 29.3

L51 GA - BKG



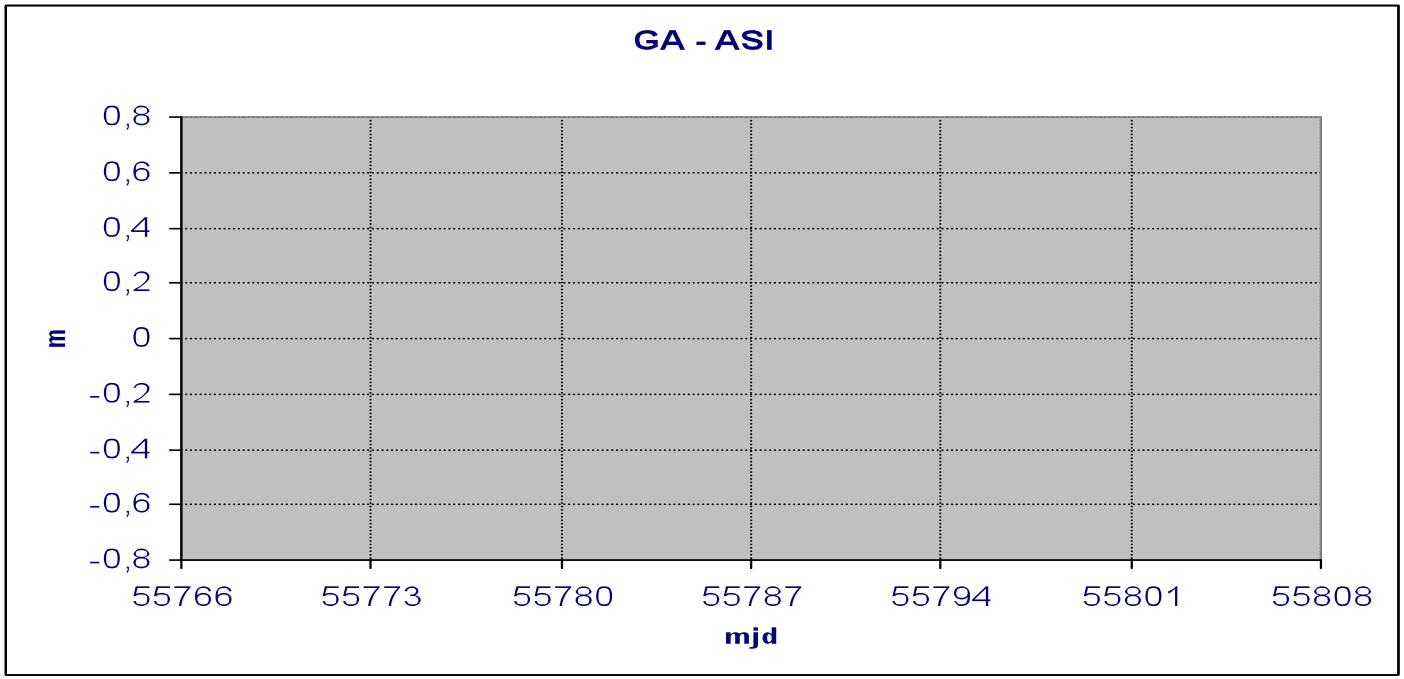
L51		110806	110813	110820	110827
GA – BKG cm	R	-0.1 ± 0.6	+0.0 ± 0.7	-0.0 ± 1.5	-0.1 ± 1.4
	C	-0.3 ± 19.4	-0.1 ± 14.0	+0.1 ± 9.9	-0.1 ± 14.7
	A	-5.2 ± 9.0	-24.8 ± 26.1	-3.3 ± 15.8	+13.1 ± 17.8

L51 GFZ - GA



L51		110806	110813	110820	110827
GFZ – GA cm	R	+0.1 ± 0.8	+0.0 ± 0.9	+0.1 ± 1.8	+0.2 ± 1.9
	C	+0.2 ± 19.0	+0.1 ± 14.5	+0.2 ± 10.5	+0.2 ± 15.0
	A	+6.1 ± 9.6	+23.9 ± 25.6	+4.2 ± 16.4	-12.2 ± 17.4

L51 GA - ASI

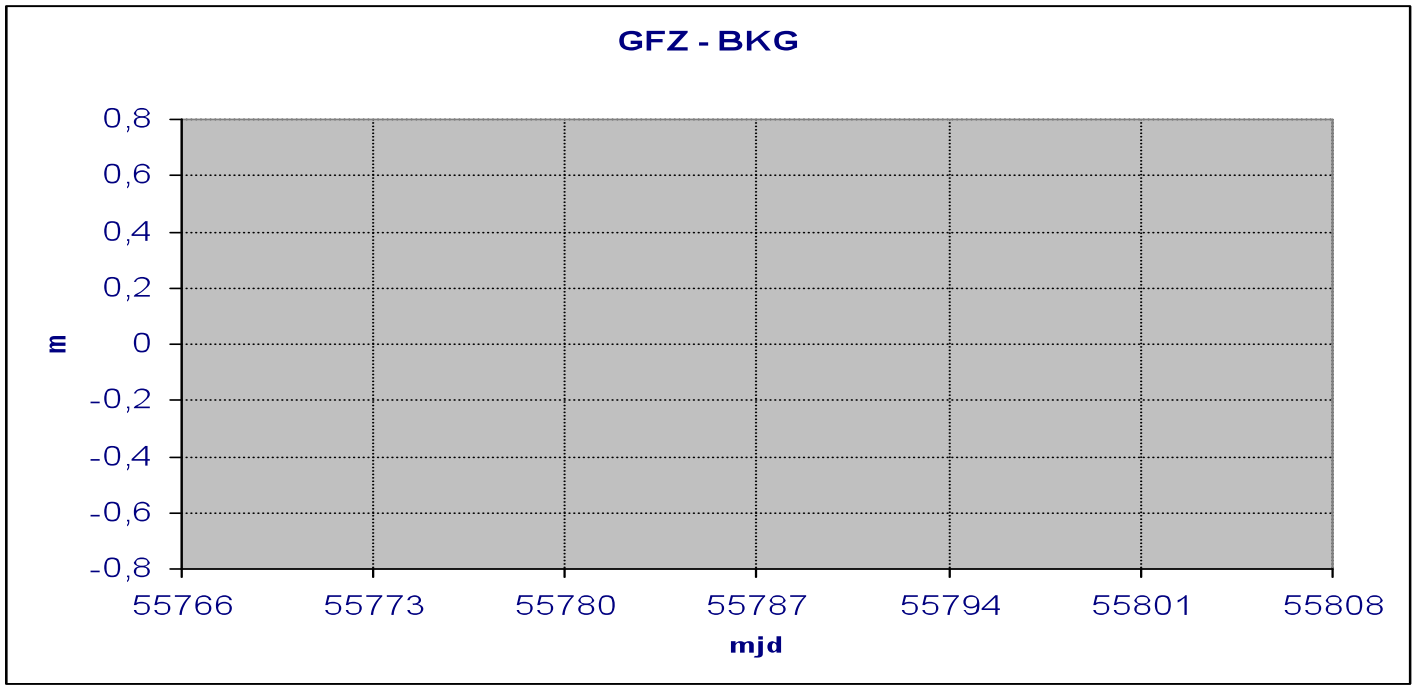


L51		110806	110813	110820	110827
GA – ASI cm	R	+0.1 ± 0.5	-0.1 ± 0.5	-0.1 ± 1.7	+0.0 ± 1.5
	C	-0.1 ± 16.7	-0.0 ± 15.8	-0.1 ± 12.5	+0.1 ± 12.6
	A	-32.7 ± 35.5	+8.8 ± 16.8	+13.0 ± 26.2	-12.1 ± 14.4

L52 – Overall statistics

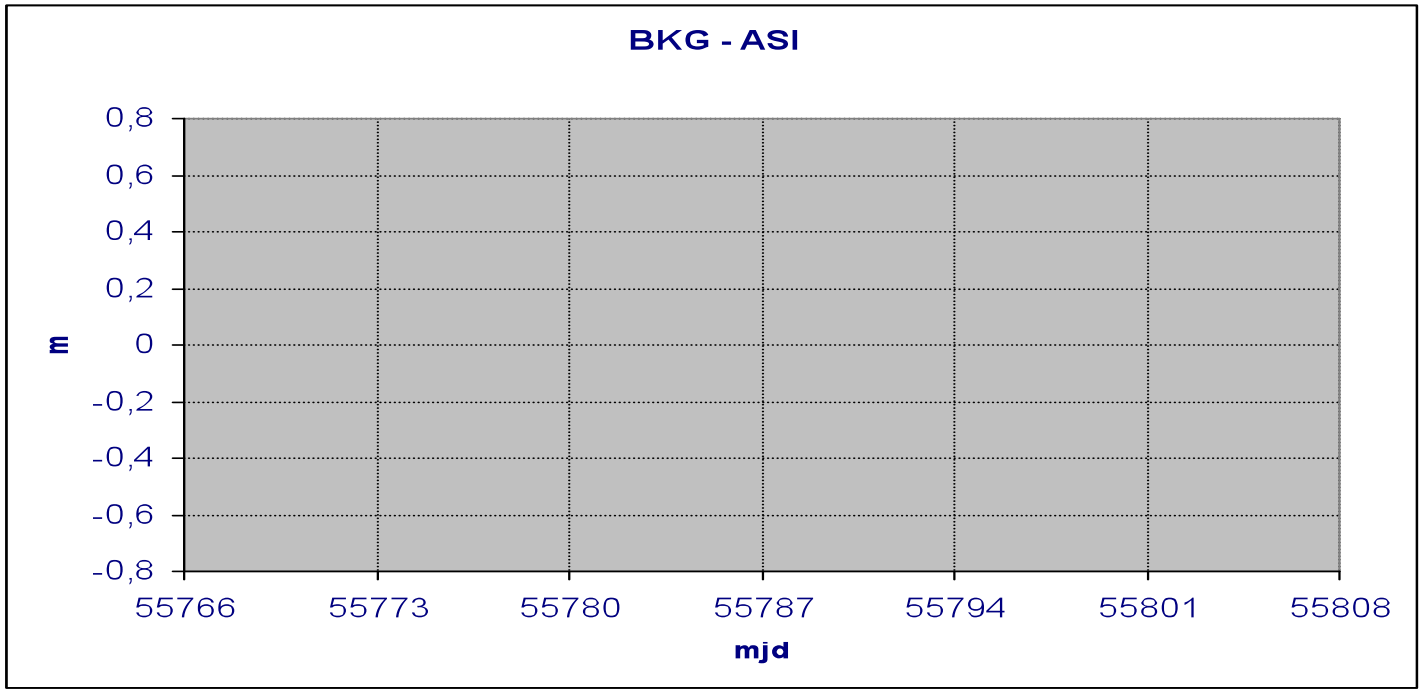
L52 Position differences (cm)		ASI	BKG	GA
BKG -	R	+0.03 ± 0.78		
	C	+0.27 ± 7.41		
	A	-3.55 ± 50.61		
GA -	R	-0.06 ± 1.13	-0.08 ± 1.07	
	C	-0.21 ± 13.27	-0.48 ± 14.98	
	A	+11.01 ± 18.24	+14.56 ± 33.87	
GFZ -	R	-0.03 ± 1.37	-0.06 ± 1.19	+0.03 ± 1.60
	C	+0.08 ± 8.09	-0.19 ± 4.39	+0.26 ± 13.72
	A	-2.94 ± 50.82	+0.62 ± 5.43	-14.59 ± 35.03

L52 GFZ - BKG



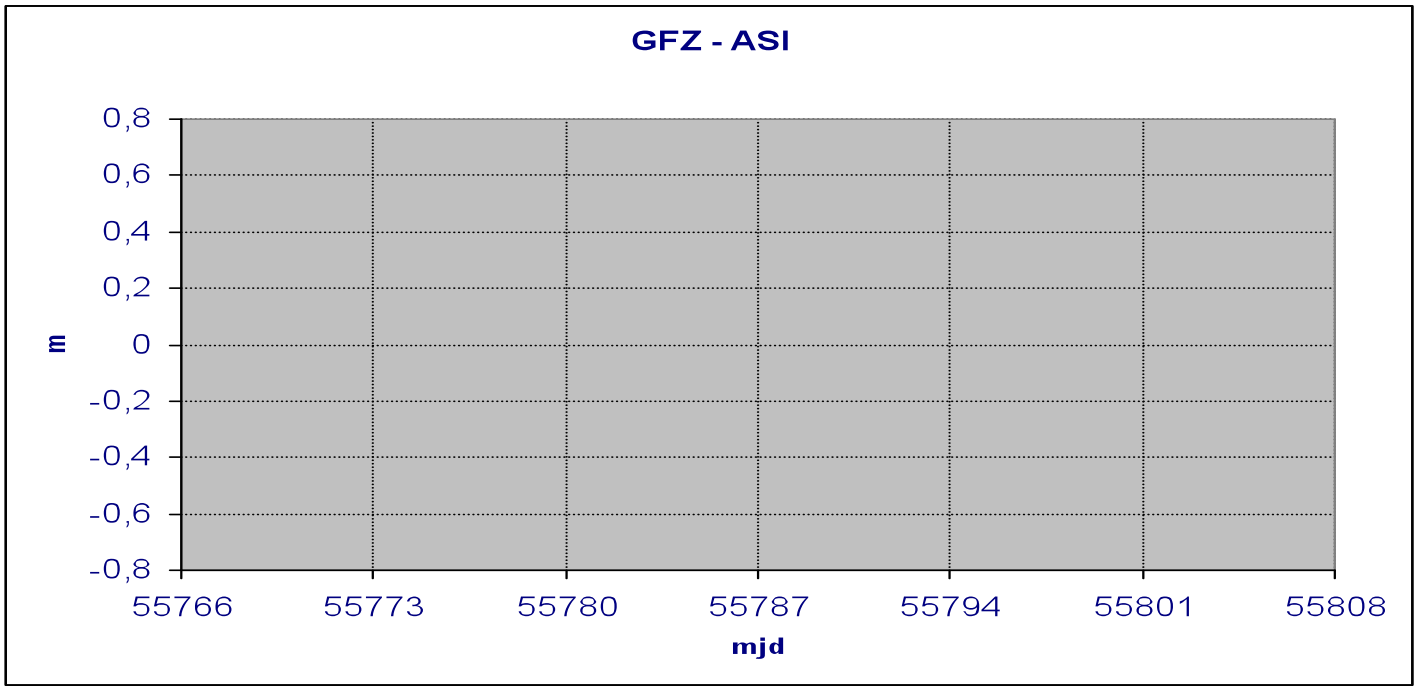
L52		110806	110813	110820	110827
GFZ – BKG cm	R	-0.1 ± 1.3	-0.1 ± 1.2	-0.0 ± 1.2	-0.0 ± 1.1
	C	+0.3 ± 4.4	-0.1 ± 3.9	-0.3 ± 4.6	-0.7 ± 4.6
	A	+2.1 ± 6.3	+1.1 ± 5.8	-0.7 ± 5.6	-0.1 ± 3.8

L52 BKG - ASI



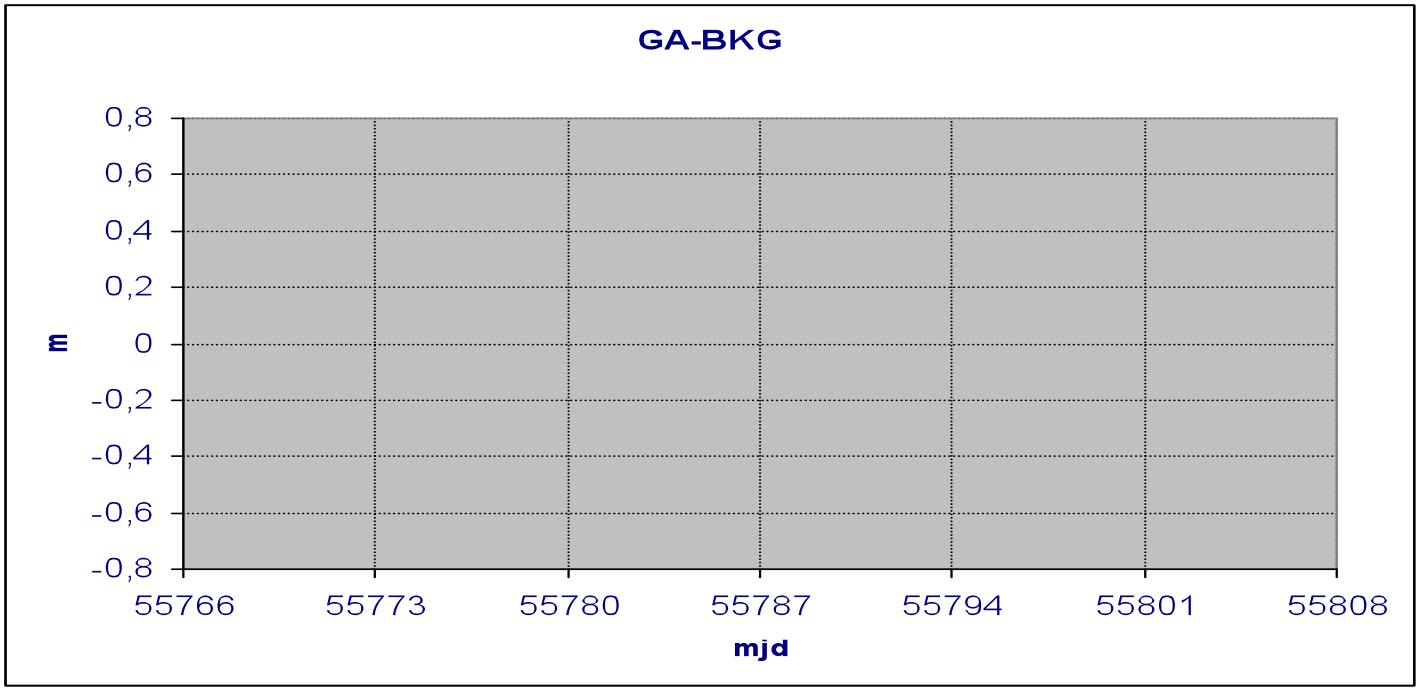
L52		110806	110813	110820	110827
BKG - ASI cm	R	+0.3 ± 0.8	-0.1 ± 0.8	-0.2 ± 0.8	+0.2 ± 0.7
	C	+0.2 ± 8.4	+0.5 ± 4.7	-0.1 ± 7.9	+0.5 ± 8.1
	A	-47.4 ± 53.1	+11.2 ± 16.9	+62.8 ± 71.6	-40.8 ± 45.5

L52 GFZ - ASI



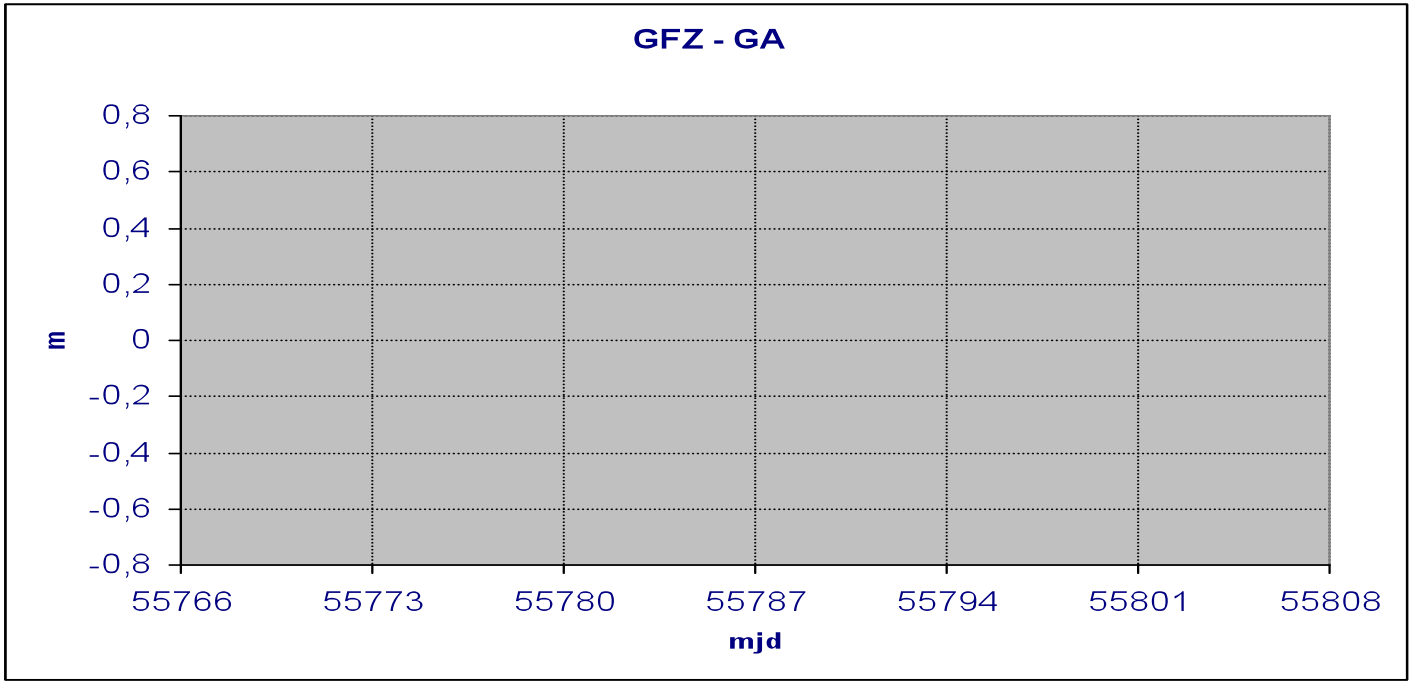
L52		110806	110813	110820	110827
GFZ – ASI cm	R	+0.2 ± 1.4	-0.2 ± 1.3	-0.2 ± 1.5	+0.1 ± 1.2
	C	+0.4 ± 9.7	+0.5 ± 9.1	-0.4 ± 9.2	-0.3 ± 10.3
	A	-45.3 ± 52.1	+12.3 ± 19.3	+62.1 ± 72.2	-40.9 ± 45.7

L52 GA - BKG



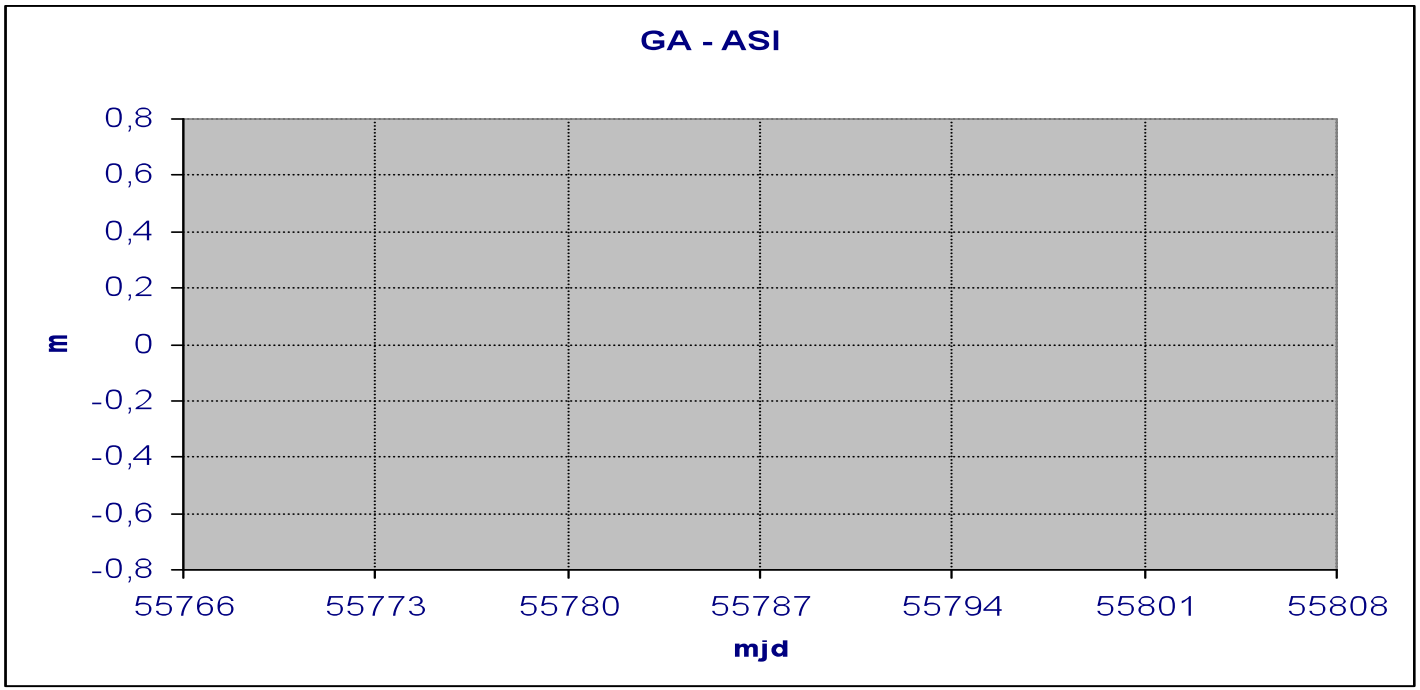
L52		110806	110813	110820	110827
GA - BKG cm	R	-0.2 ± 1.0	-0.0 ± 0.9	+0.0 ± 1.5	-0.1 ± 0.8
	C	-0.3 ± 20.2	-0.9 ± 13.7	-0.2 ± 10.4	-0.6 ± 14.0
	A	+43.7 ± 45.7	+8.0 ± 12.2	-31.7 ± 38.8	+38.2 ± 41.1

L52 GFZ - GA



L52		110806	110813	110820	110827
GFZ – GA cm	R	+0.1 ± 1.6	-0.1 ± 1.1	-0.0 ± 2.2	+0.1 ± 1.4
	C	+0.6 ± 19.0	+0.8 ± 14.5	-0.1 ± 10.3	-0.1 ± 14.1
	A	-41.6 ± 44.1	-6.9 ± 12.3	+31.0 ± 39.8	-38.3 ± 41.2

L52 GA - ASI

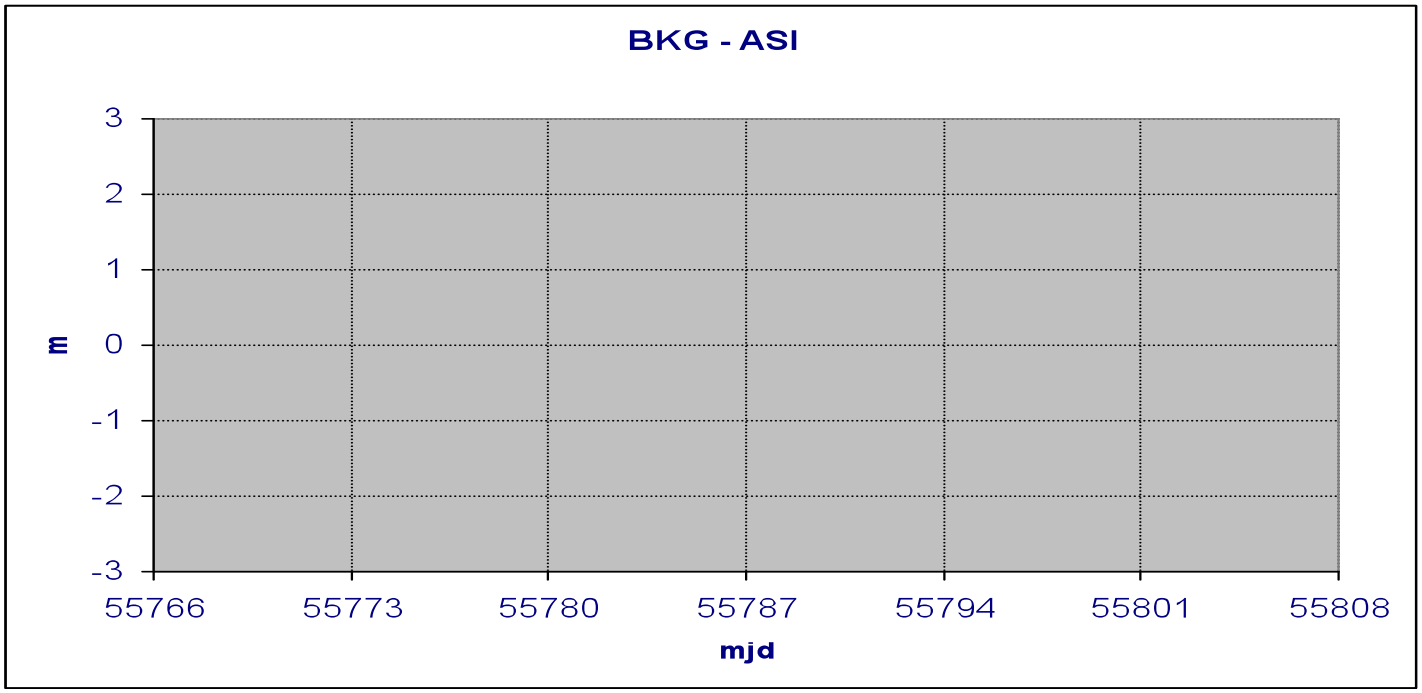


L52		110806	110813	110820	110827
GA - ASI cm	R	+0.1 ± 0.4	-0.1 ± 0.6	-0.2 ± 1.8	+0.0 ± 1.2
	C	-0.2 ± 17.6	-0.3 ± 14.5	-0.2 ± 13.0	-0.2 ± 11.3
	A	-3.8 ± 12.8	+19.2 ± 20.9	+31.1 ± 34.0	-2.6 ± 8.2

L53 – Overall statistics

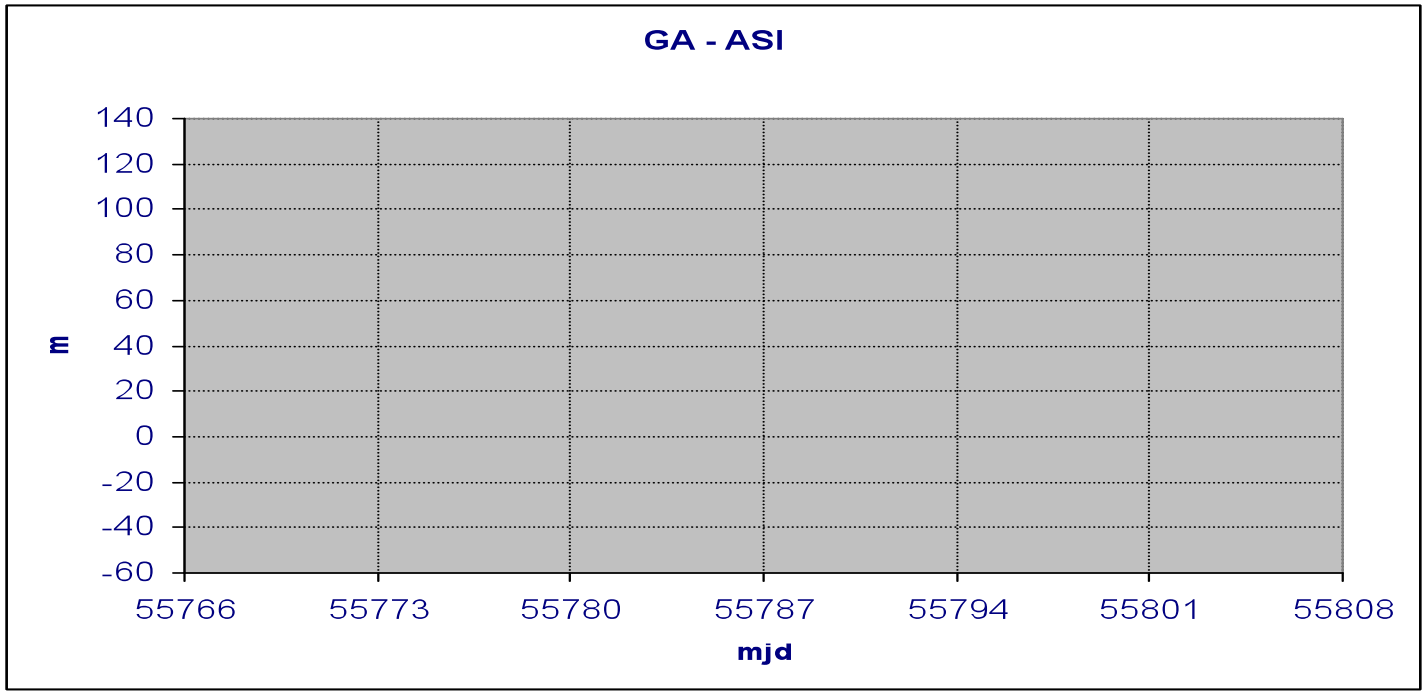
L53 Position differences (m)		ASI	BKG
BKG -	R	-0.01 ± 0.14	
	C	-0.13 ± 0.59	
	A	-0.13 ± 0.57	
GA -	R	-0.58 ± 0.48	-0.57 ± 0.51
	C	+0.40 ± 13.78	+0.51 ± 13.65
	A	+26.45 ± 26.23	+26.50 ± 25.90

L53 BKG - ASI



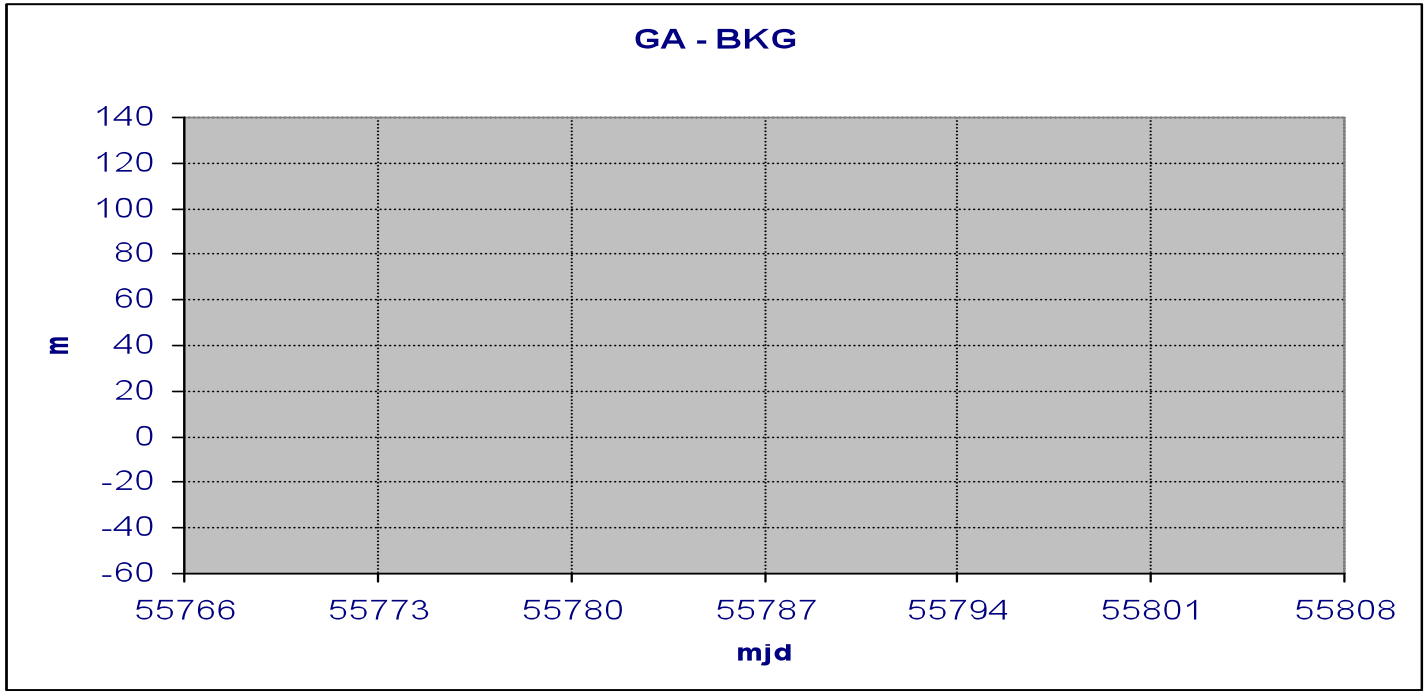
L53		110806	110813	110820	110827
BKG - ASI (m)	R	+0.00 ± 0.12	-0.02 ± 0.17	-0.01 ± 0.12	-0.01 ± 0.12
	C	-0.02 ± 0.80	-0.13 ± 0.55	-0.15 ± 0.53	-0.16 ± 0.50
	A	-0.07 ± 0.35	-0.34 ± 0.72	-0.26 ± 0.58	+0.13 ± 0.61

L53 GA - ASI



L53		110806	110813	110820	110827
GA - ASI m	R	-0.5 ± 0.5	-0.9 ± 1.1	-0.2 ± 0.3	-0.7 ± 0.9
	C	+0.3 ± 14.0	+0.6 ± 18.2	+0.2 ± 7.3	+0.4 ± 13.4
	A	+30.3 ± 37.3	35.7 ± 50.6	+15.7 ± 18.7	+24.3 ± 35.7

L53 GA - BKG

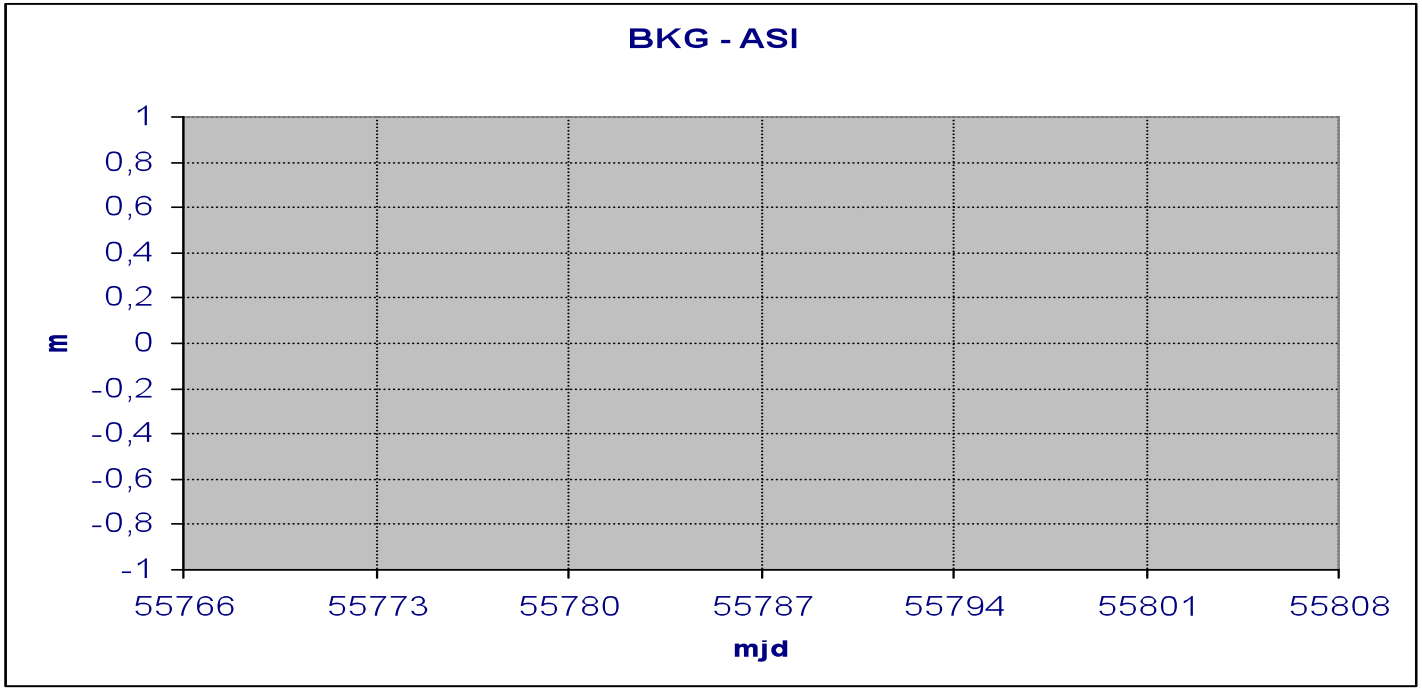


L53		110806	110813	110820	110827
GA - BKG m	R	-0.5 ± 0.6	-0.9 ± 1.1	-0.2 ± 0.3	-0.7 ± 0.9
	C	+0.4 ± 13.7	+0.8 ± 18.3	+0.3 ± 7.3	+0.5 ± 13.0
	A	+30.2 ± 37.3	+35.8 ± 50.3	+15.9± 18.7	+24.0 ± 35.0

L54 – Overall statistics

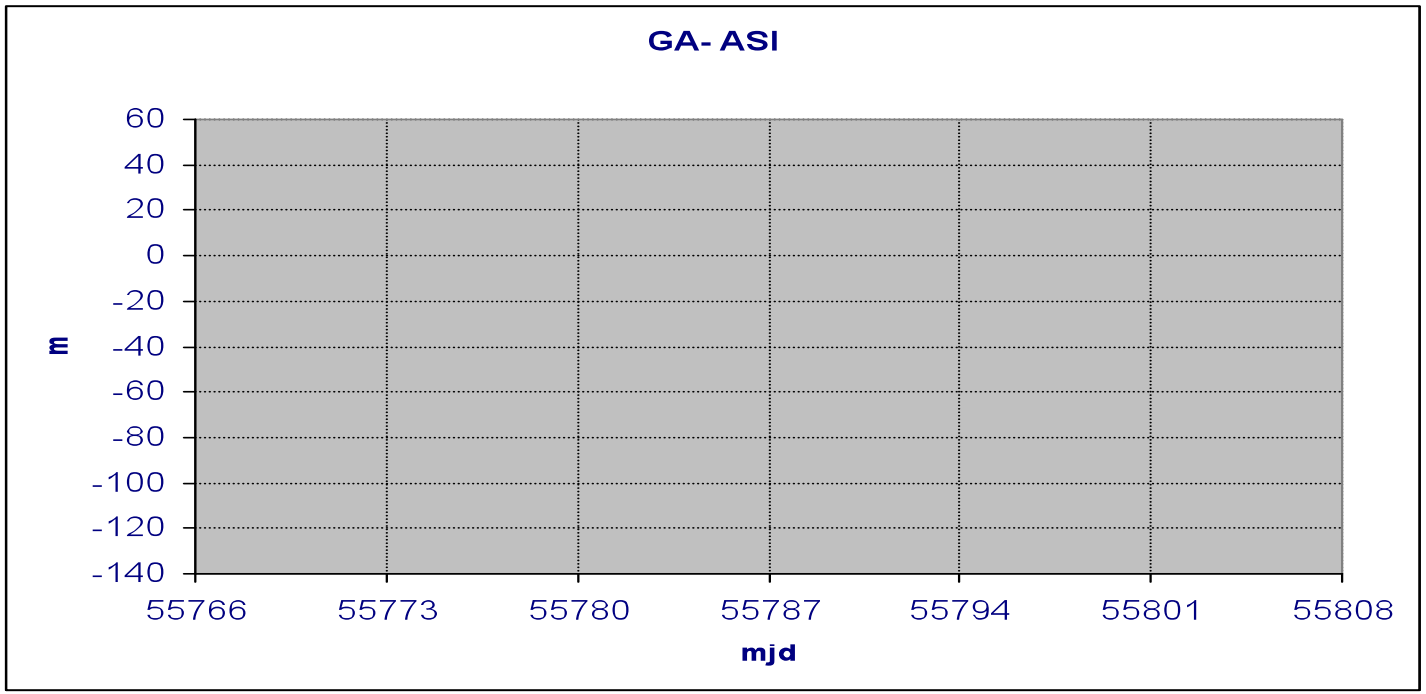
L54 Position differences (m)		ASI	BKG
BKG -	R	-0.01 ± 0.02	
	C	+0.01 ± 0.17	
	A	+0.09 ± 0.24	
GA -	R	+0.25 ± 0.65	+0.26 ± 0.65
	C	-0.13 ± 11.65	-0.11 ± 11.57
	A	-11.73 ± 29.20	-11.78 ± 29.12

L54 BKG - ASI



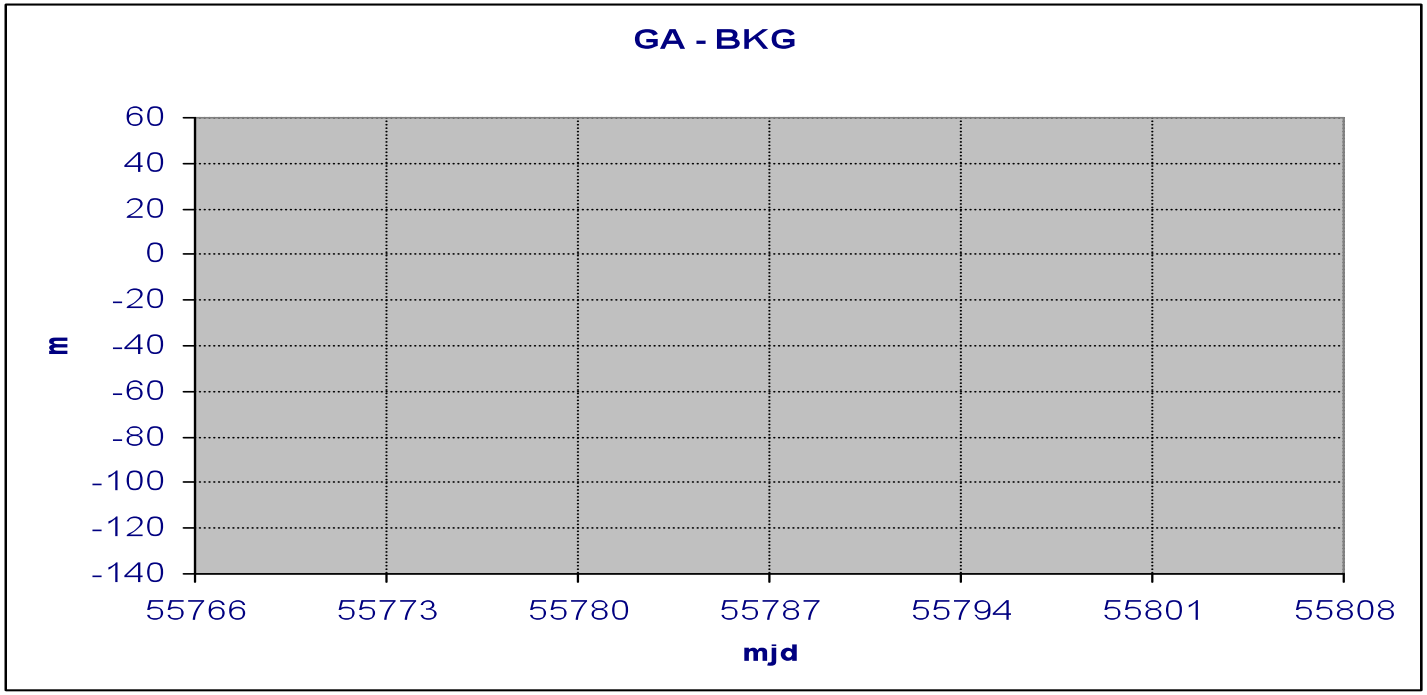
L54		110806	110813	110820	110827
BKG - ASI m	R	-0.01 ± 0.02	-0.01 ± 0.03	-0.01 ± 0.03	-0.01 ± 0.03
	C	-0.04 ± 0.20	-0.00 ± 0.14	+0.02 ± 0.15	+0.03 ± 0.18
	A	-0.09 ± 0.15	+0.02 ± 0.17	+0.39 ± 0.42	+0.05 ± 0.19

L54 GA - ASI



L54		110806	110813	110820	110827
GA - ASI m	R	-0.1 ± 0.3	+0.9 ± 1.0	-0.4 ± 0.5	+0.6 ± 0.8
	C	+0.0 ± 2.1	-0.6 ± 18.6	+0.2 ± 7.2	-0.1 ± 11.9
	A	-2.3 ± 6.1	-35.8 ± 50.4	+12.7 ± 19.3	-21.6 ± 32.1

L54 GA - BKG



L54		110806	110813	110820	110827
GA - BKG m	R	-0.1 ± 0.3	+0.9 ± 1.0	-0.3 ± 0.5	+0.6 ± 0.8
	C	+0.1 ± 2.1	-0.6 ± 18.5	+0.1 ± 7.0	-0.1 ± 11.7
	A	-2.2 ± 6.0	-35.6 ± 50.2	+12.2 ± 18.8	-21.5 ± 32.1

Towards next steps: remarks

- asi, bkg, ga, gfz, grgs L51/L52
- asi, bkg, ga L53/L54
- Format check
  - grgs: TAI, file name
  - ga: small sporadic pbs in the sp3 epochs
  - bkg: 2’ freq L53/L54
- bkg, gfz highly coherent
- Along Track asi, ga; UT?

ILRSA CC
Status of the products

C. Sciarretta, V. Luceri
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Agenzia Spaziale Italiana, CGS - Matera

ILRS AWG Meeting, 15 September 2011, Zürich

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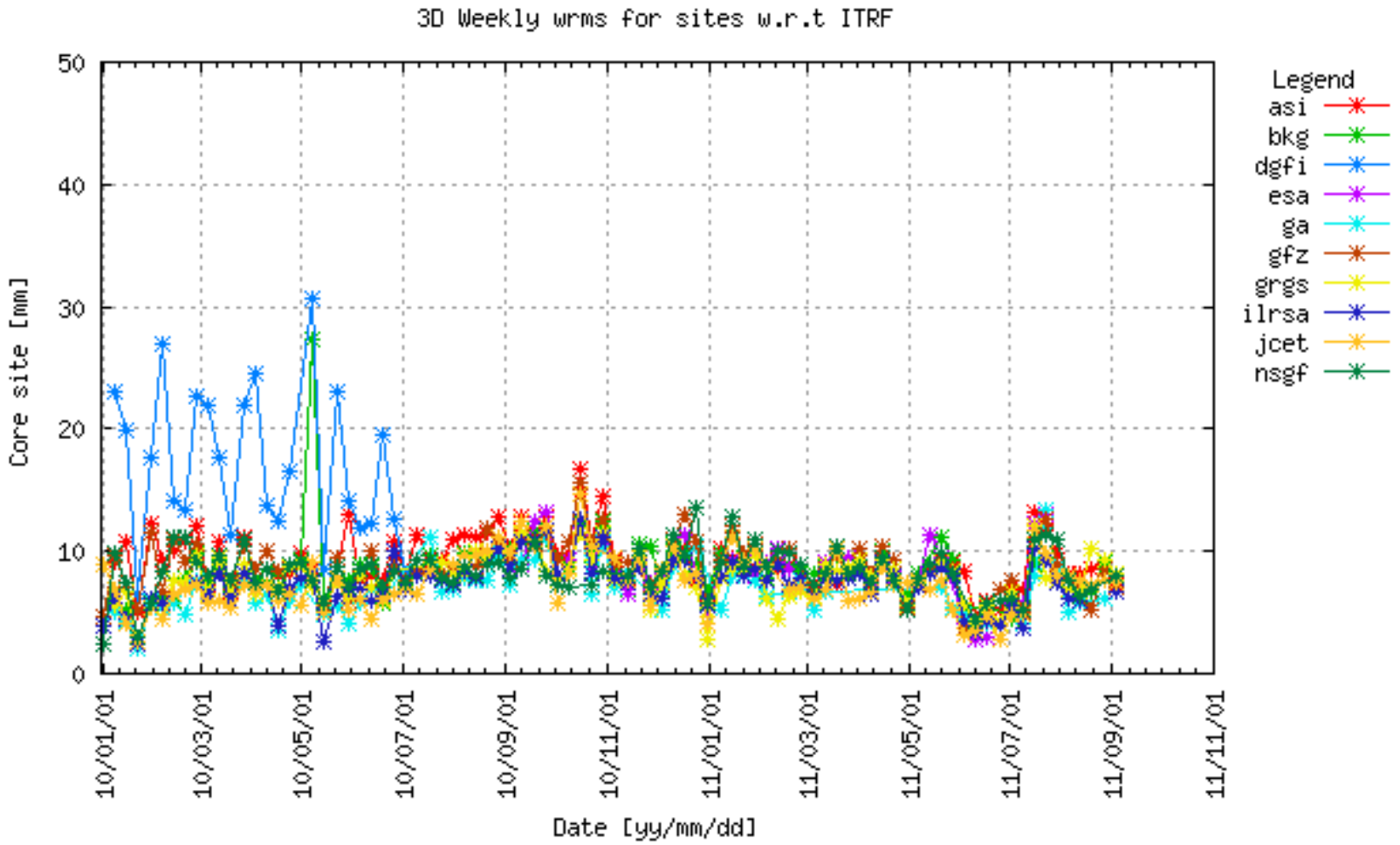
- weekly product performance (oct 2010 – sep 2011)
- SRLF2008 implementation (-> v30)
- new DGFI solution

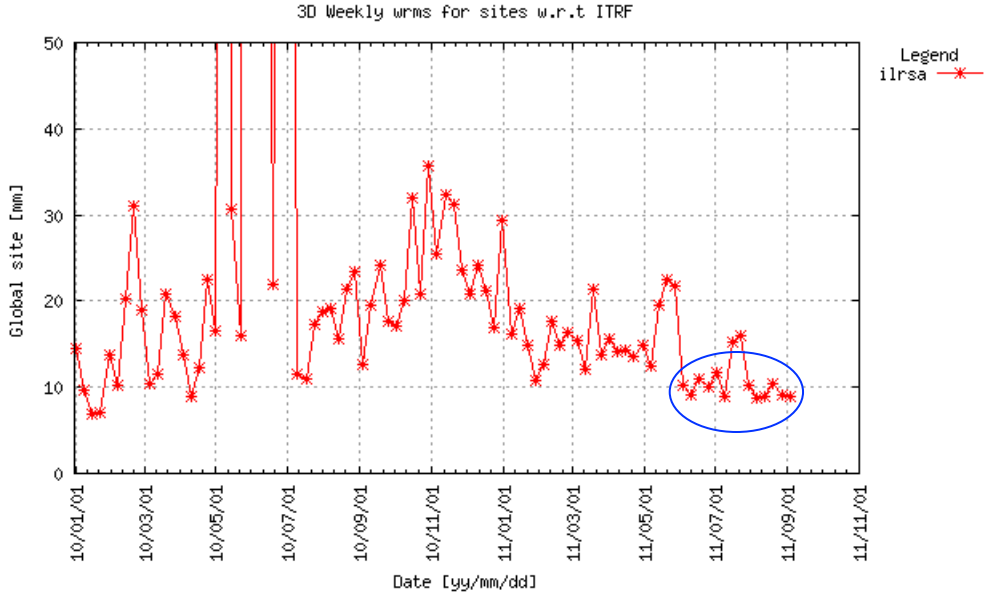
Weekly product: 2010-2011 performance



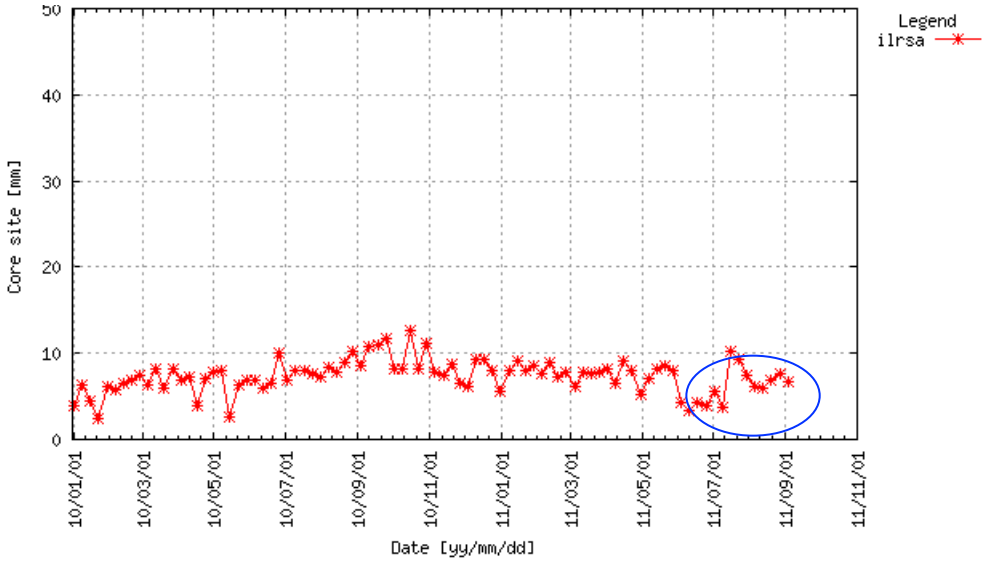
Weekly product: SLRF2008 transition

3D Weekly SSC wrms wrt SLRF2005/SLRF2008

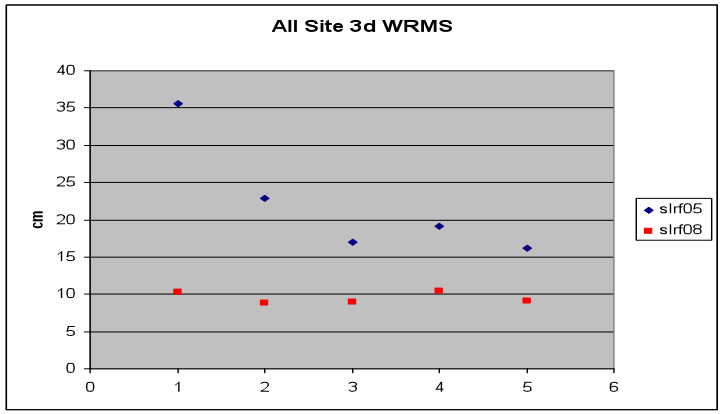
ALL SITES [mm]

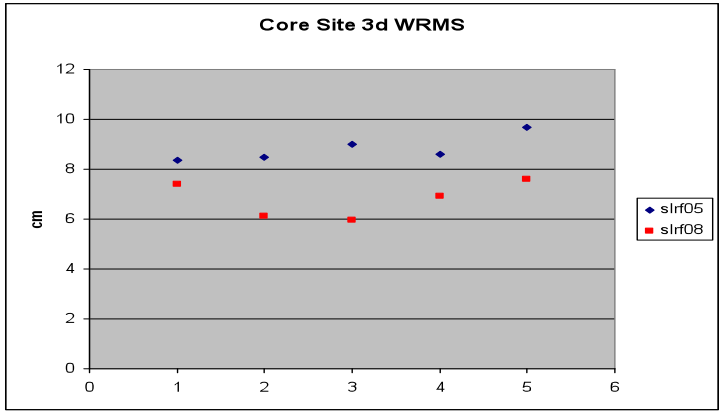


CORE SITES [mm]

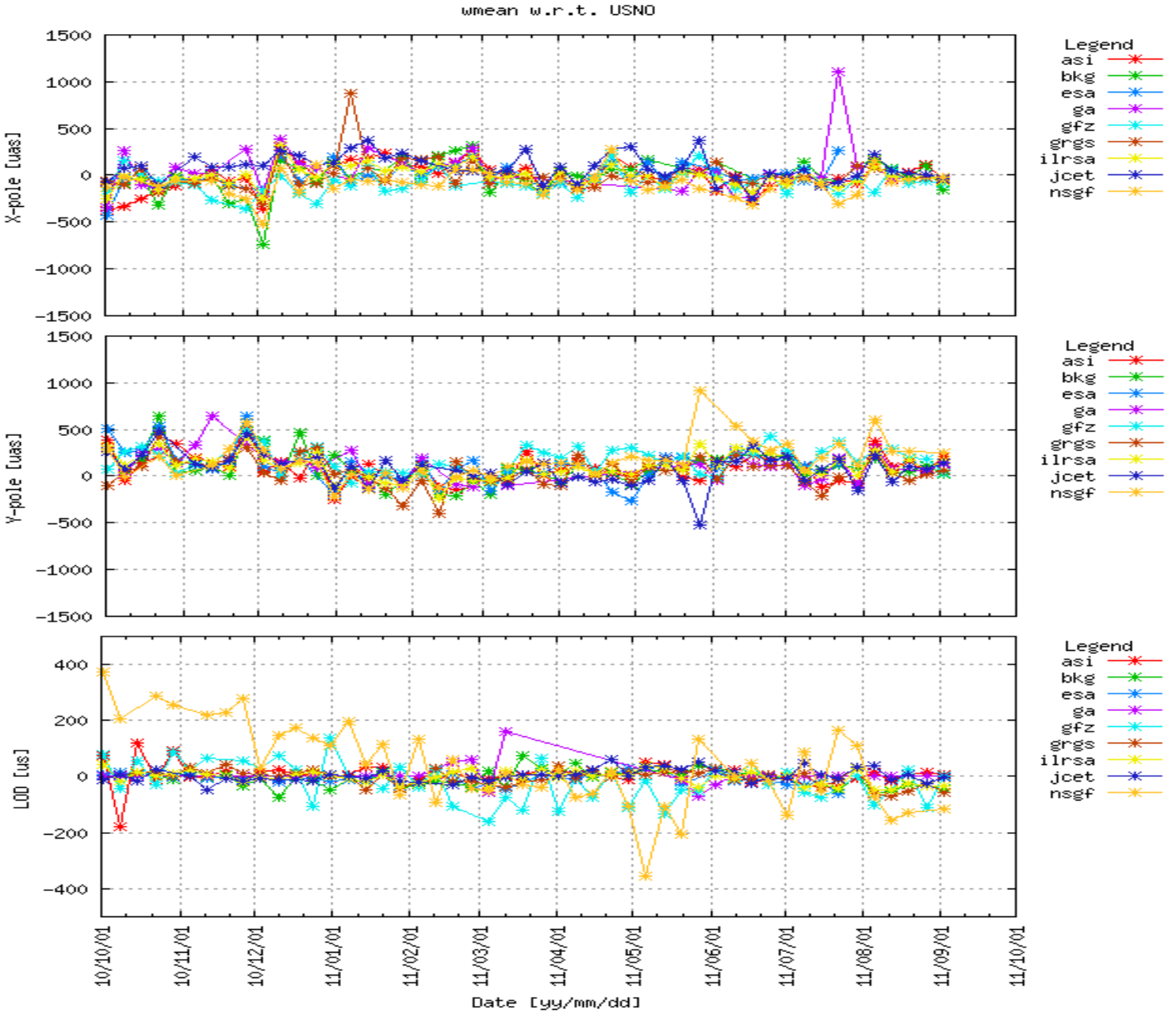


Last 5 weeks

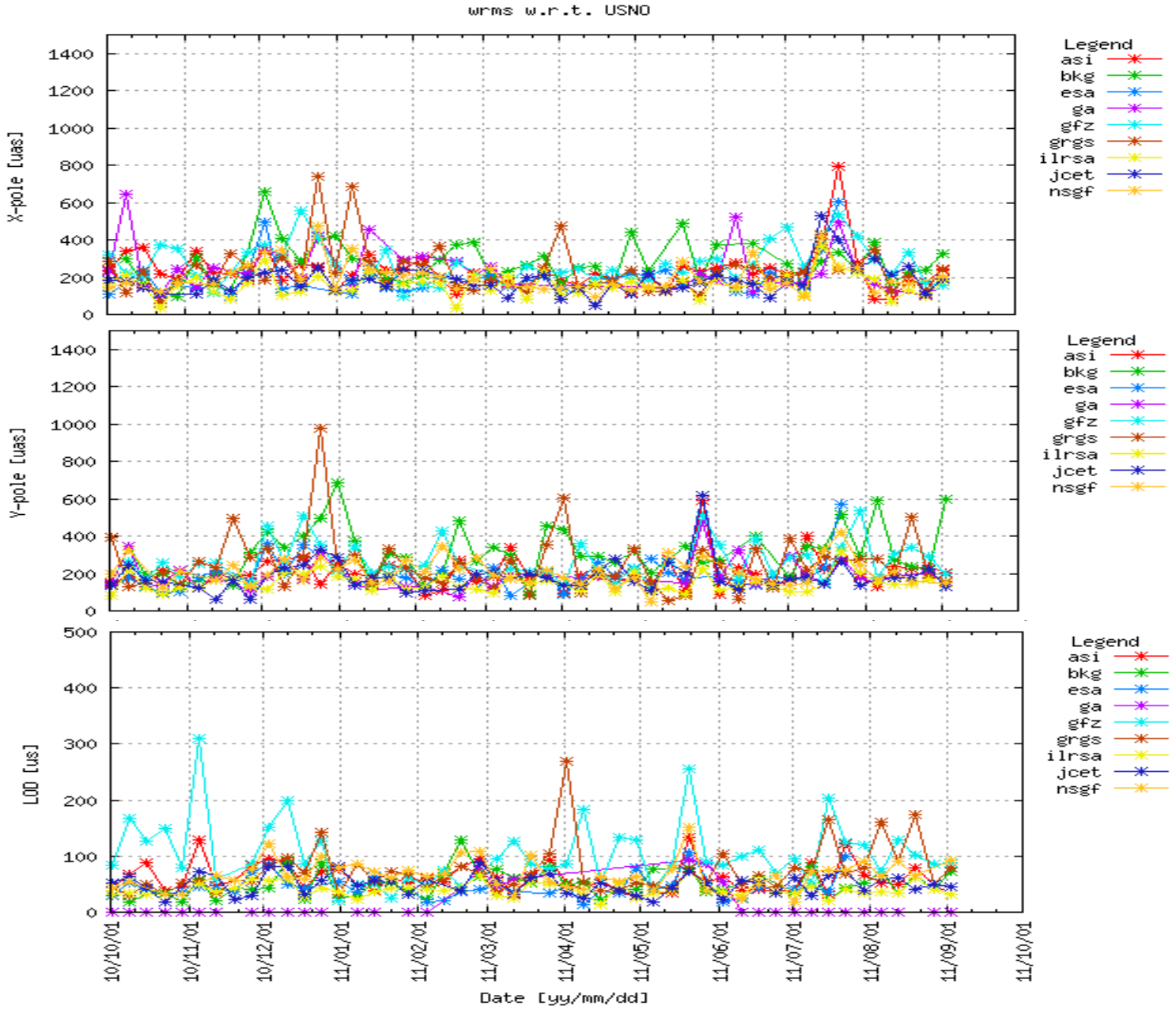




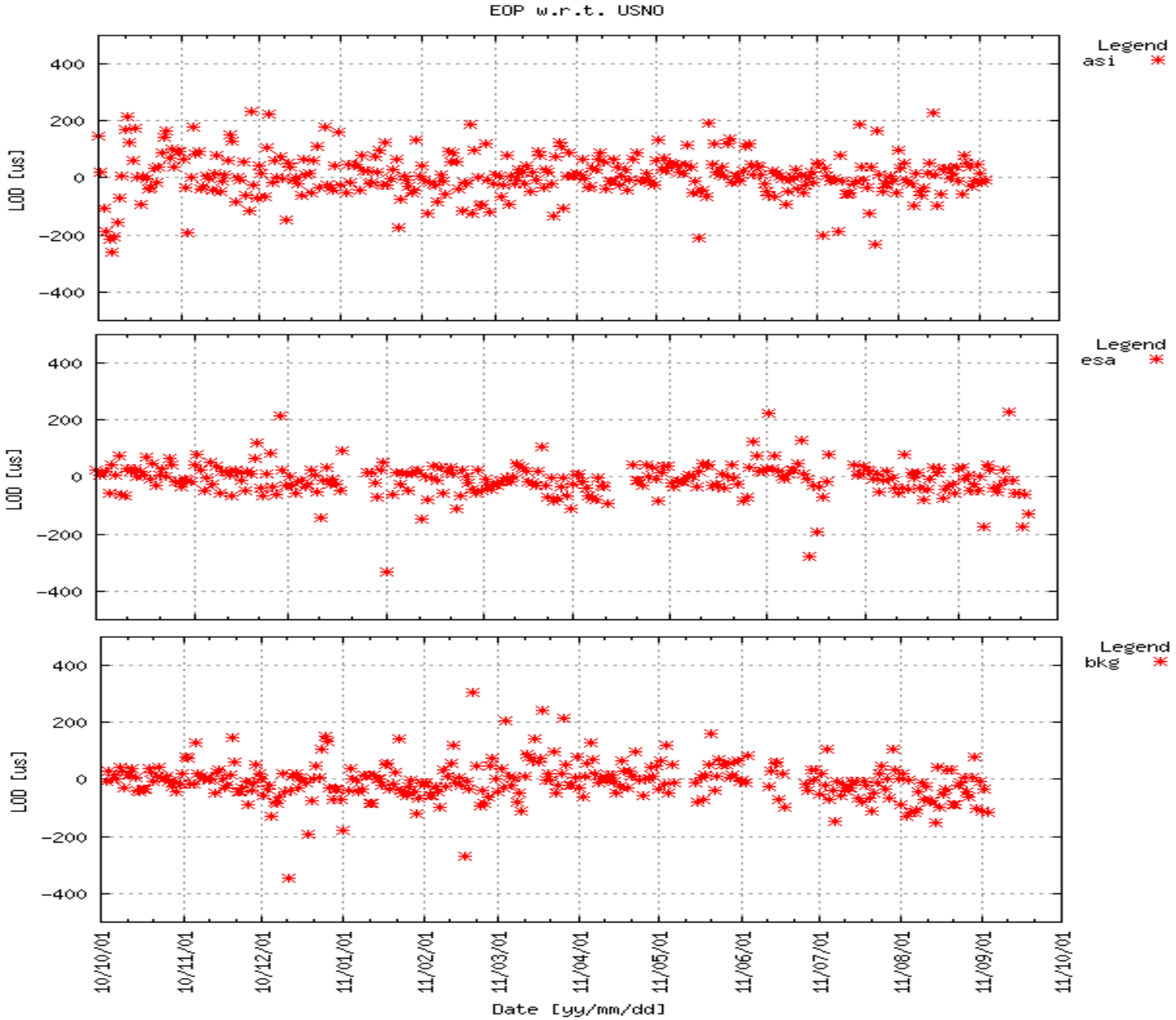
Weekly product: EOP performance



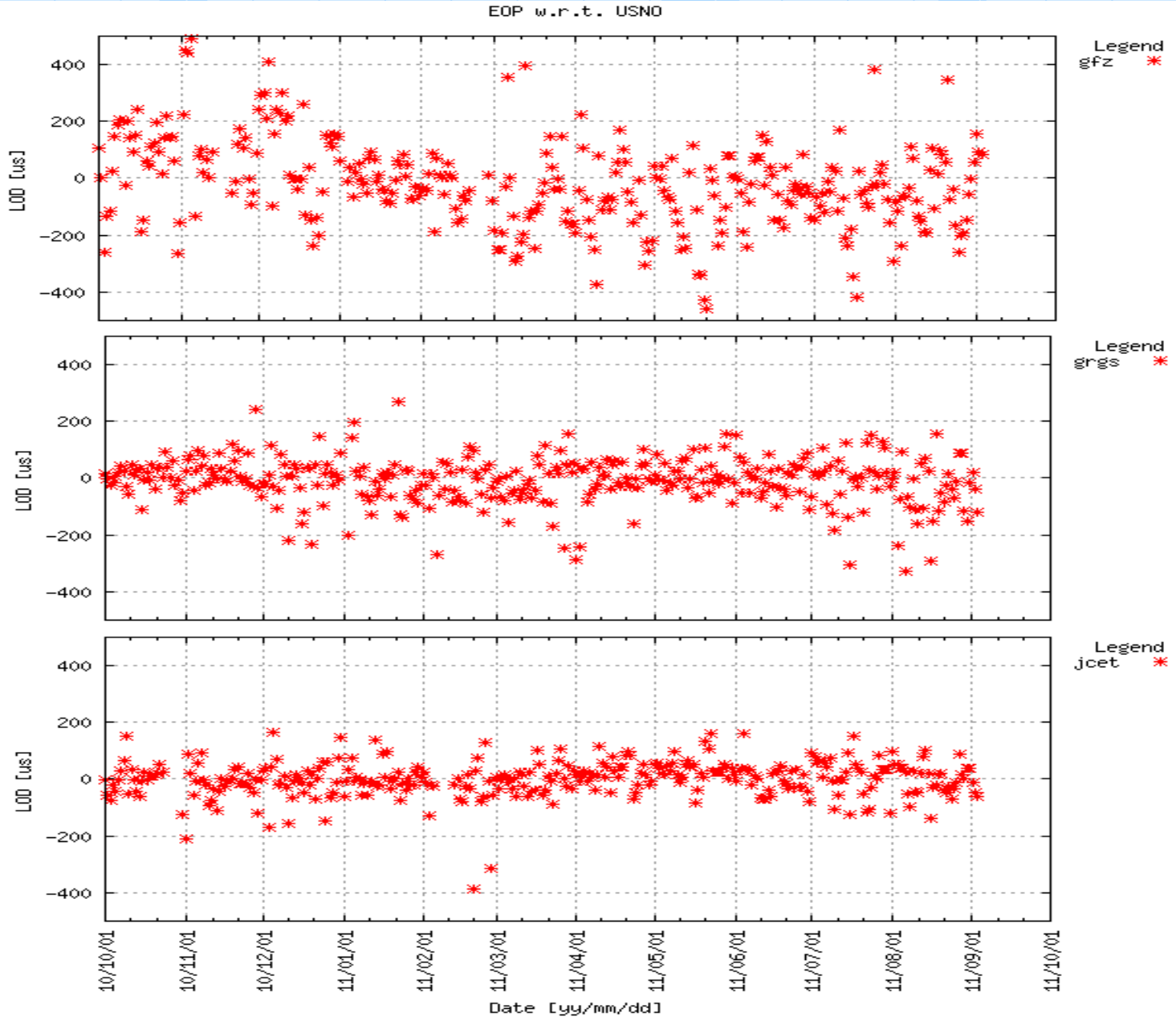
Weekly product: EOP performance



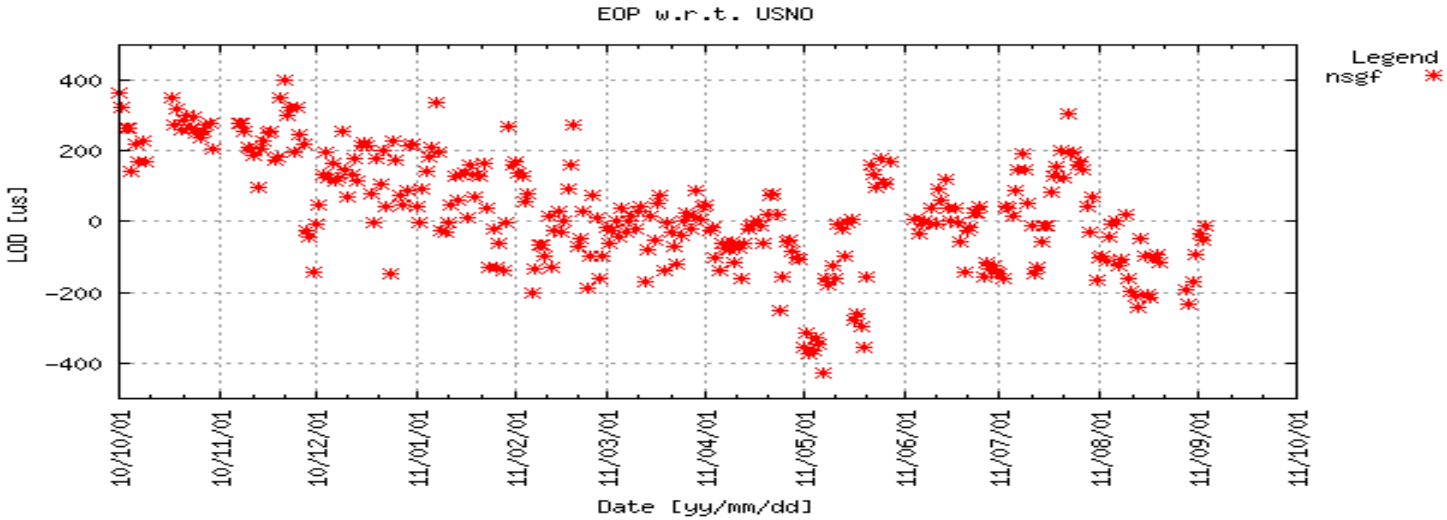
Weekly product: LOD performance



Weekly product: LOD performance



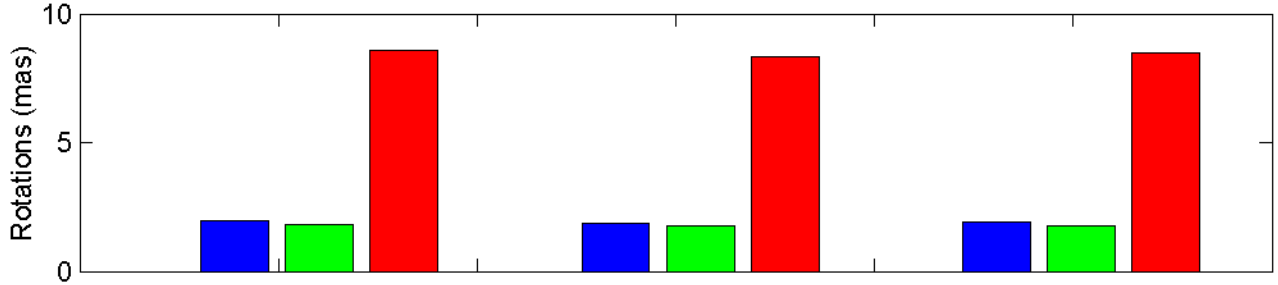
Weekly product: LOD performance



New DGFI solution

- 110827, 110903, 110910 DGFI updated solutions have been tested: good intrinsic quality and good impact on the combined solution (EOP ok)

- Looseness: acceptable



ILRS-AC@BKG

in cooperation with AIUB

Status on Contributions and Modeling

Bundesamt für
Kartographie und Geodäsie

AC report

top	status	update
DAILY	OK	
WEEKLY	OK	
Orbit SP3	OK	
SLRF2008	OK	
CRD_OBS	implemented	EDC+CDDIS, Testing
CoM	OK	Graham ?
Press-corr. San Fernando	?	any Repro task … ?
IERS_CONV. 2010	implemented/Test	October 2011
Atm._LOAD, TU Vienna –APL non-tidal , 6hourly	effect on SLR stations, displacement radial, horizontal	effect on orbit … not yet
GEOP ->(2,2)	implemented	SINEX_OUTPUT

Report of DGFI/AC

Horst Müller

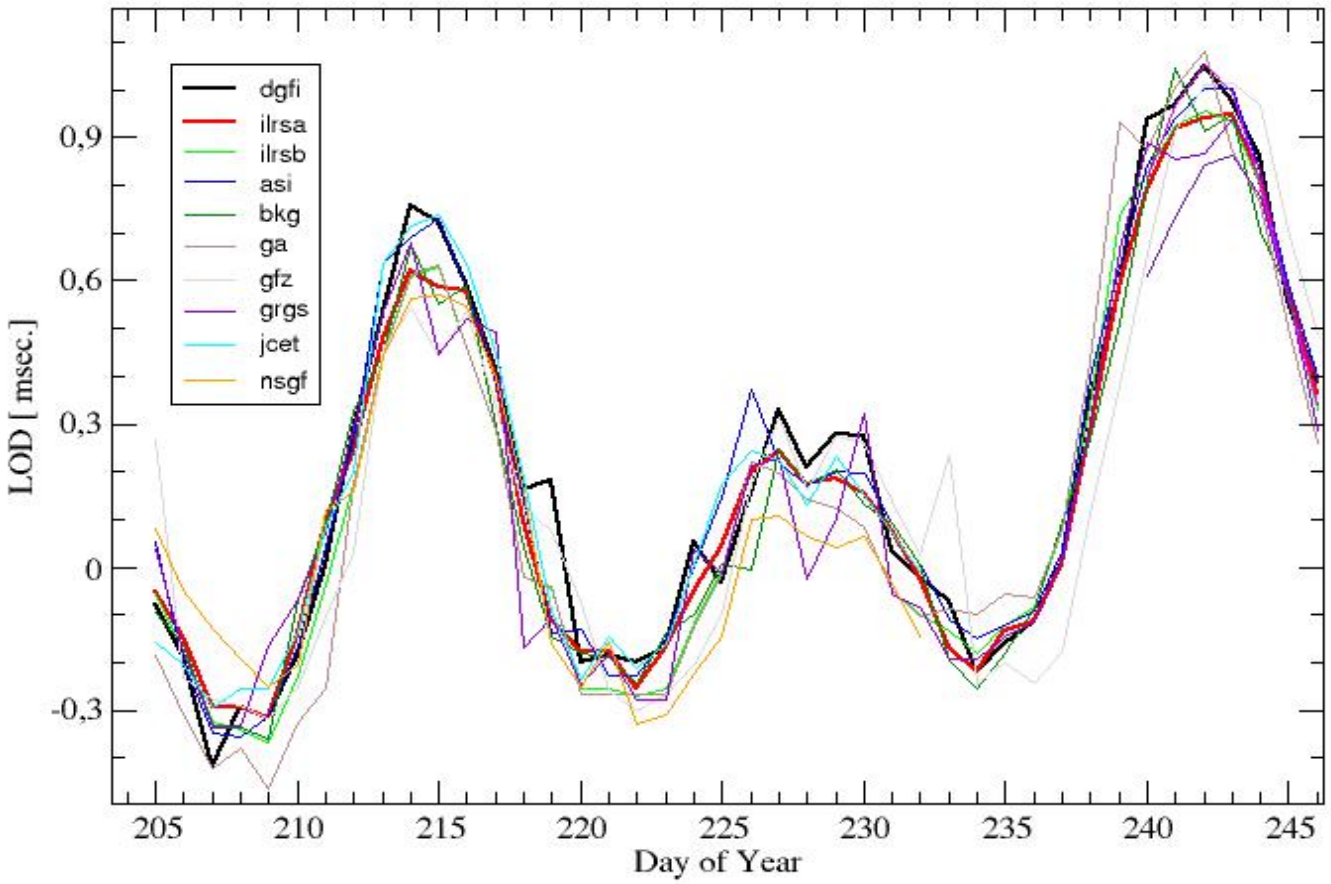
Deutsches Geodätisches Forschungsinstitut, München
E-Mail: mueller@dgfi.badw.de

Routine POS+EOP Solution

- Status
  - No solution delivered since July 17 2010
  - Some problems solved (arc dep. param.)
  - Relativistic corrections (Lense-Thirring, de Sitter) not yet implemented (test version shows only marginal differences)
  - Still needs some changes in eop interpolation
  - Gravity field (GGM02s) ?
  - CoM correction
- Future Plans
  - Integration in inertial frame
- Comments

  Thanks to Cecilia, Erricos and Keith for testing

DGFI


dgfi
ilrsa
ilrsb
asi
bkg
ga
gfz
grgs
jcet
nsgf
LOD [msec.]
0,9
0,6
0,3
0
-0,3
205
210
215
220
225
230
235
240
245
Day of Year

r.m.s of station positions after transformation

GPS-Week	core sites	all stations
1646	0.74	1.33
1647	1.08	1.56
1648	0.71	1.59
1649	0.55	2.52
1650	0.75	1.88
1651	0.89	1.68

Similarity trasnformation parameters (core sites)

GPS-Week	TX[cm]	TY[cm]	TZ[cm]	Scale[ppb]
1646	0.22 +- 0.29	-0.51 +- 0.29	-0.83 +- 0.28	-0.78 +- 0.44
1647	0.08 +- 0.38	-0.25 +- 0.38	0.16 +- 0.38	-0.31 +- 0.58
1648	-0.17 +- 0.25	-0.59 +- 0.25	0.51 +- 0.25	-0.52 +- 0.38
1649	0.55 +- 0.19	-0.10 +- 0.19	0.14 +- 0.19	-0.26 +- 0.29
1650	0.29 +- 0.26	-0.19 +- 0.26	-0.00 +- 0.26	-0.54 +- 0.40
1651	-0.00 +- 0.31	-0.17 +- 0.31	-0.33 +- 0.31	-0.93 +- 0.48

CRD data

- switch between QL NP and CRD data is possible
- usually QL NP used
  - at EDC there are still less CRD data then QL NP
- problems with CRD data (Arkhyz)

Part 2

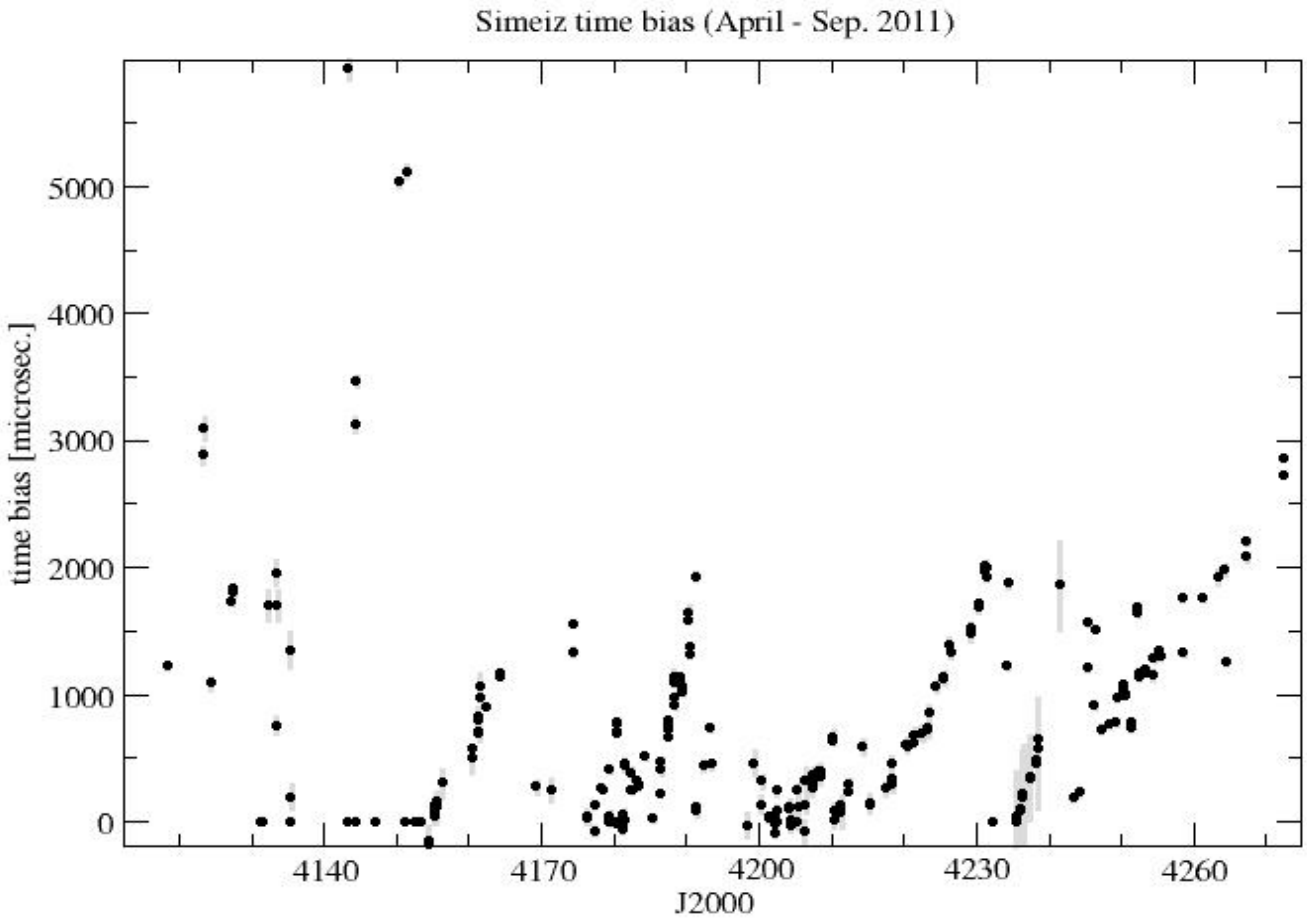
Data Handling File

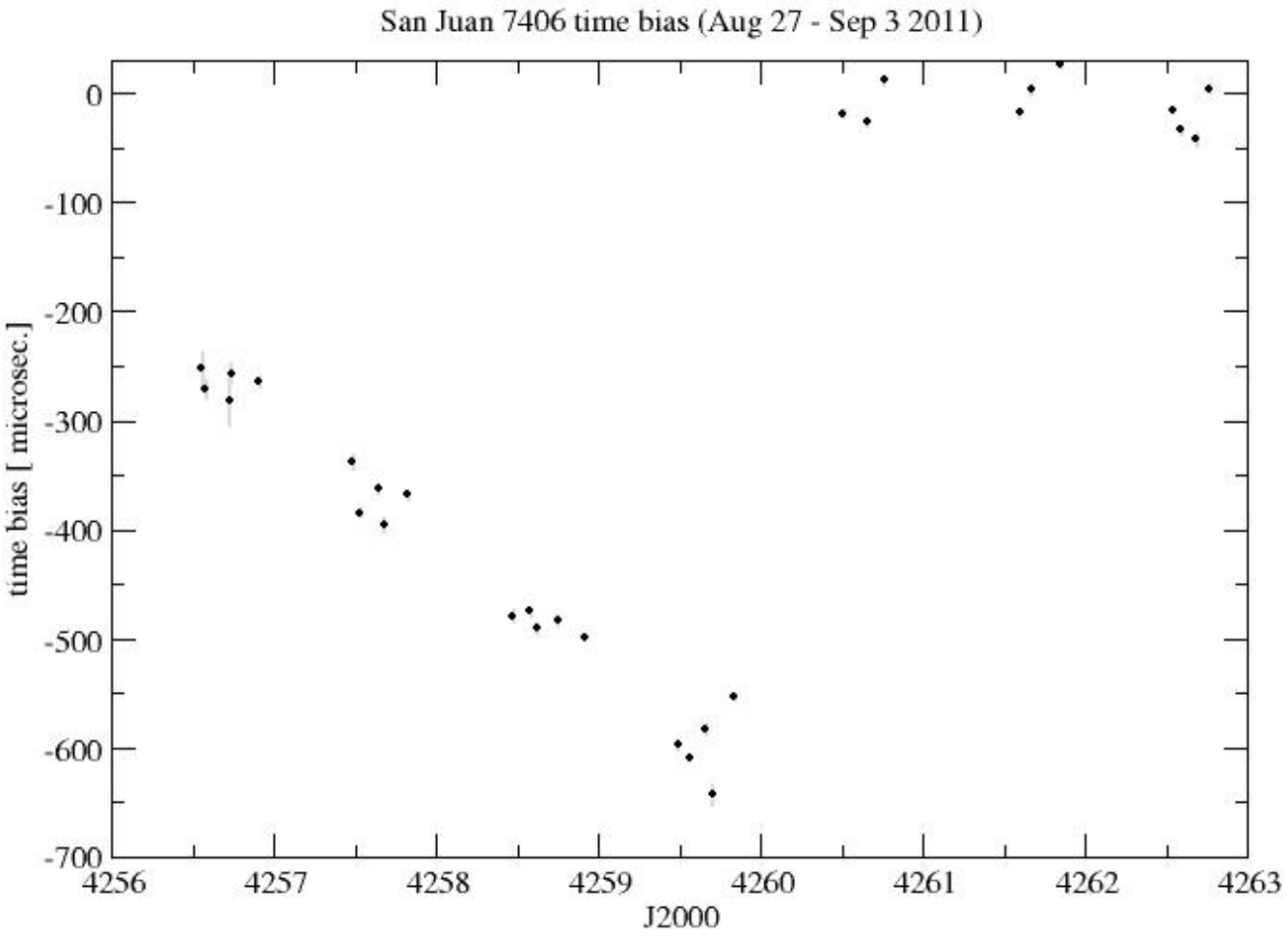
- Status
  - Last update Nov. 18 2010
  - Wettzell range bias estimation

- Comments
  - More frequent updates are reasonable (who)
  - Some critical stations

- Candidates
  - San Juan
  - Simeiz
  - Wettzell time bias during thunderstorm (May)
  - …..

Simeiz time bias




San Juan 7406 time bias (Aug 27 - Sep 3 2011)
time bias [microsec.]
0
-100
-200
-300
-400
-500
-600
-700
4256
4257
4258
4259
4260
4261
4262
4263
J2000

Rapid Service Mail

- Established after Bad Koetzing AWG-meeting
- Presently 9 messages to stations (HITU,DGFI)
- 3 responses from stations

Available from:
http://rapidservicemail.dgfi.badw.de/
and via mailing list maintained by DGFI (mailman)

Header:

```
**************************************************************************
ILRS/AWG Rapid Service Mail  (HITU) 1873 up to 200 ms time bias Message No. 0006
**************************************************************************
```

Part 3

Station Qualification

- New stations
  - 1886 Arkhyz, Russia, QL NP qualified since Sep. 07 2011,
    CRD data still under quarantaine
  - 7822 Tahiti FTLRS fully qualified Sep. 12 2011

- Stations back in operation after longer period of inactivity, normally used in processing resp. with new system
  - 7119 Haleakala, Telescope repair, Aug. 04 2011
  - 7841 Potsdam new Khz system, still in quarantaine
    not enough passes up to now, released data look promising
  - 1831 Lviv, laser repair, no data yet
  - 7811 Borowiec, laser repair, no data yet

Station Qualification

New stations

- Tahiti 7822
  - ASI solution: epoch 11:230 velocity = 7124

    X -5246415.504 ± 0.0015 m
    Y -3077274.506 ± 0.0019 m
    Z -1913807.550 ± 0.0015 m
  - DGFI solution: epoch 11:237 velocity = 7124

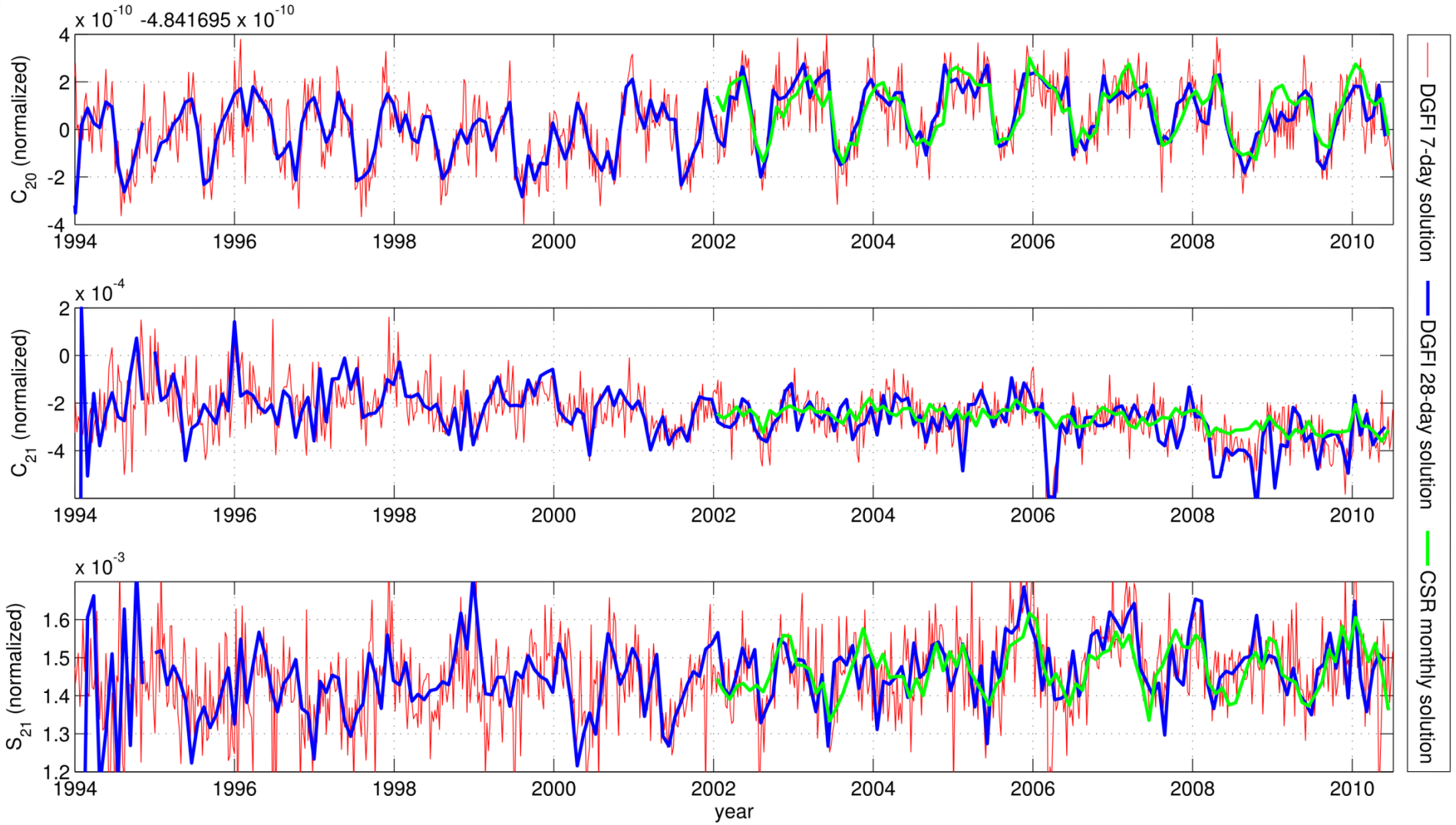
    X -5246415.518 ± 0.0022 m
    Y -3077274.500 ± 0.0034 m
    Z -1913807.540 ± 0.0028 m

- Arkyz 1886 Approximate coordinates only

Part 4

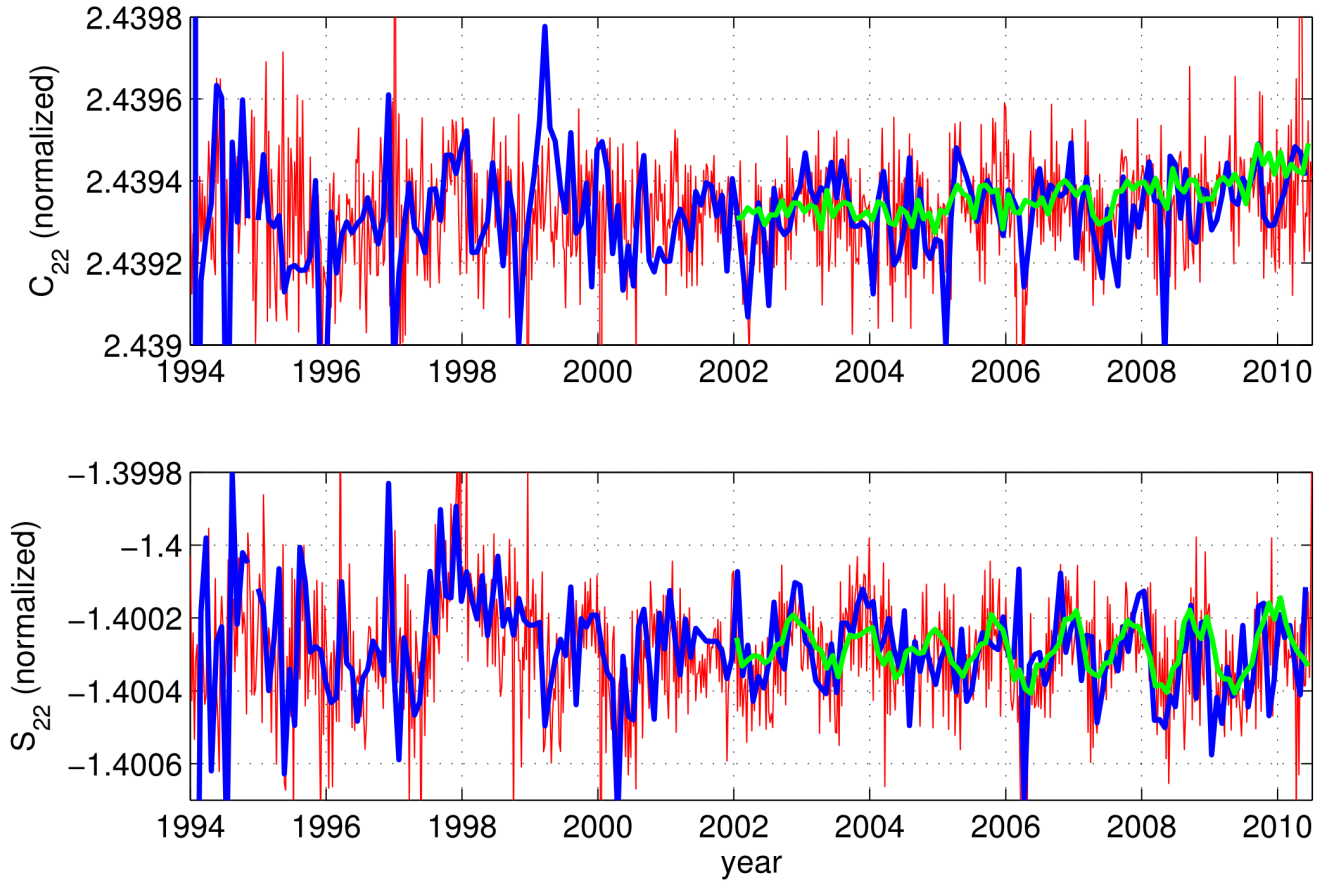
ILRS Analysis Working Group Meeting, Zürich, Sep. 15, 2011

low degree harmonics



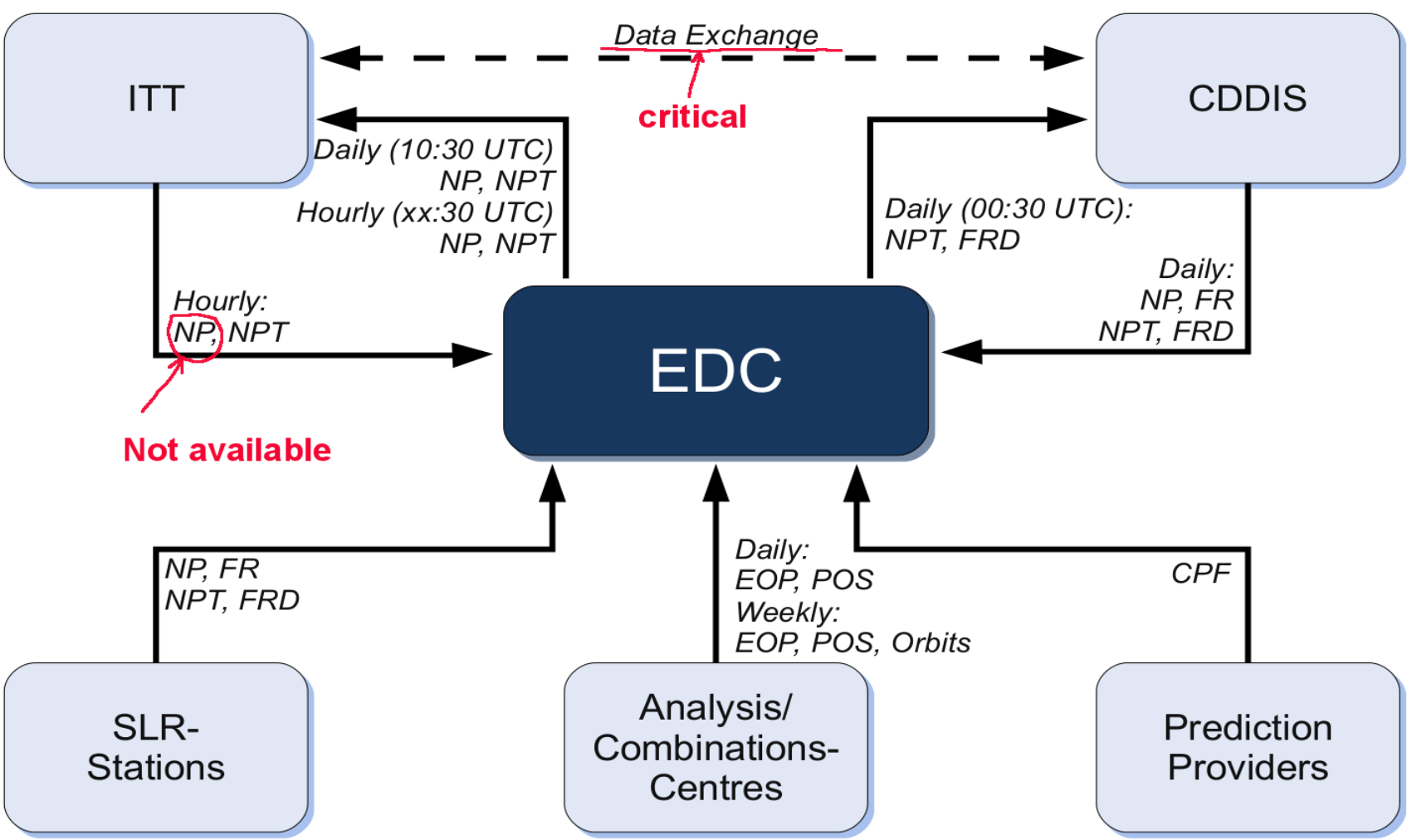
ILRS Analysis Working Group Meeting, Zürich, Sep. 15, 2011

low degree harmonics



Part 5

Unified Analysis Workshop 2011, Zürich, Sep. 16/17 2011
data flow to EDC



JCET AC REPORT

Erricos C. Pavlis
GEST/UMBC – NASA Goddard 698
M. Kuzmicz-Cieslak
GEST/UMBC

ILRS AWG, Zürich, CH
Sept. 15, 2011

Activities since last AWG

- Station validation for Haleakala, FTLRS@Tahiti, new Russian sites (thank you Horst and Cinzia)
- CRD validation for a few stations (remaining: Riyadh, Borowiec, etc.)
- Site log compilation updates (Excel spreadsheets & SCH-SCI database)
- SLRF2008 release and updates (new sites included)
- Data flow investigation (affects primarily CDDIS users)
- Atmospheric de-aliasing application tests and test-files generated
- Graham's CoG model for L1&2 & E1&2 tested over 1993 - 2010
- Implemented SLRF2008 in DGFI's ILRS-B s/w, with Rainer Kelm's help
  - Working now on SP3c file combination now for orbital products

Weekend data delivery issues

Monday

110426_daily_sate_stats.txt Tue May 03 13:10:22 2011 1

RESIDUAL SUMMARY STATISTICS FOR ARC 110426 BY DAY AND BY TRACKING STATION

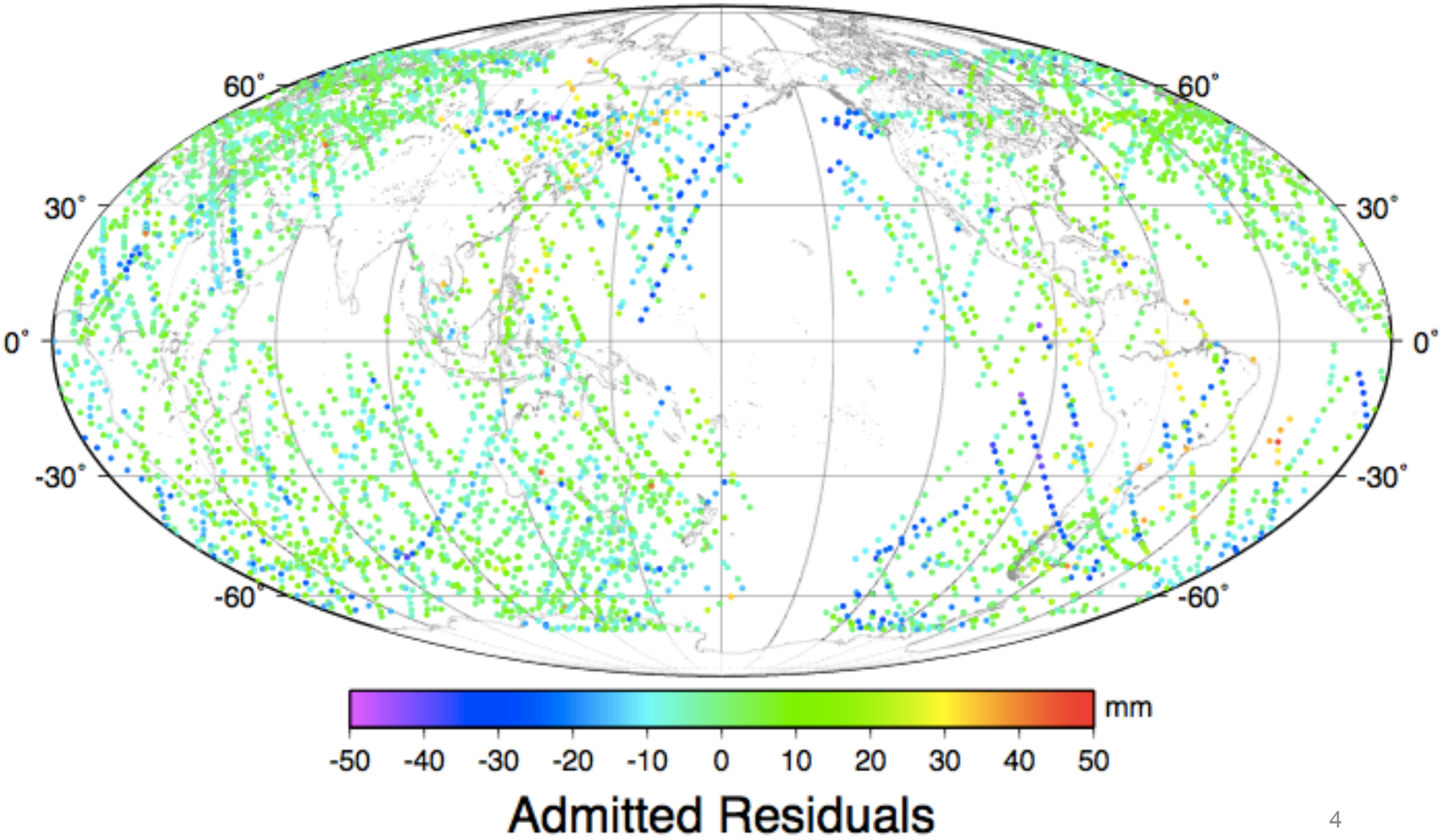
		11/04/26			11/04/27			11/04/28			11/04/29			11/04/30			11/05/01			11/05/02		
SITENAME	SITE_NUM	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS
Kiev	18248101							0.0	9.5	6												
Altay	18799401	0.0	7.4	11																		
Riga	18844401	-18.5	15.4	9				5.1	13.2	17	-4.5	17.1	21	2.9	8.8	14	7.3	17.2	18			
Mcdonald	70802419							0.0	5.0	3							0.0	5.6	18			
Yarragad	70900513	-0.4	8.4	55	-3.3	6.1	23	-2.5	8.9	75	-0.2	8.1	139	0.9	6.4	132	1.0	6.3	107	3.6	9.1	21
Greenbel	71050725	-0.7	4.9	15							0.2	6.1	67									
Monument	71100412	-14.5	20.5	12	-1.6	16.6	77	4.0	13.7	95	-1.7	15.8	56	0.6	17.0	23						
Changchu	72371901				-1.4	15.6	52										4.2	24.5	9			
Zimm8532	78106821	-0.3	6.8	146	2.7	8.9	64	3.2	13.1	55	-0.2	8.4	53	-0.8	5.7	137	-1.6	6.0	115			
Shanghai	78212801				-2.2	17.6	19	21.0	5.9	2												
Mount St	78259001	1.1		1	-4.3	13.0	14	-5.7	9.4	17				2.7	14.1	40						
Simosato	78383603							-2.5	25.4	19												
Herstmon	78403501	2.0	9.1	50	-1.1	7.6	24	2.3	6.0	23				-1.3	4.9	21	-2.8	2.7	28	-2.1	4.3	11
Grasse	78457801	0.0	7.0	43																		
Matera	79417701										0.2	8.5	19				-0.3	5.3	17			
Wettzell	88341001	-2.2	5.0	31	3.2	5.9	7	3.0	6.3	5	7.1	9.3	15	-4.0	5.1	10	-0.8	8.0	29	-0.5	8.2	29
GRAND TOTAL	16	-1.0	9.0	373	-0.7	13.4	280	1.3	13.1	317	-0.3	10.2	370	0.3	8.4	377	0.0	8.2	341	0.7	8.2	61

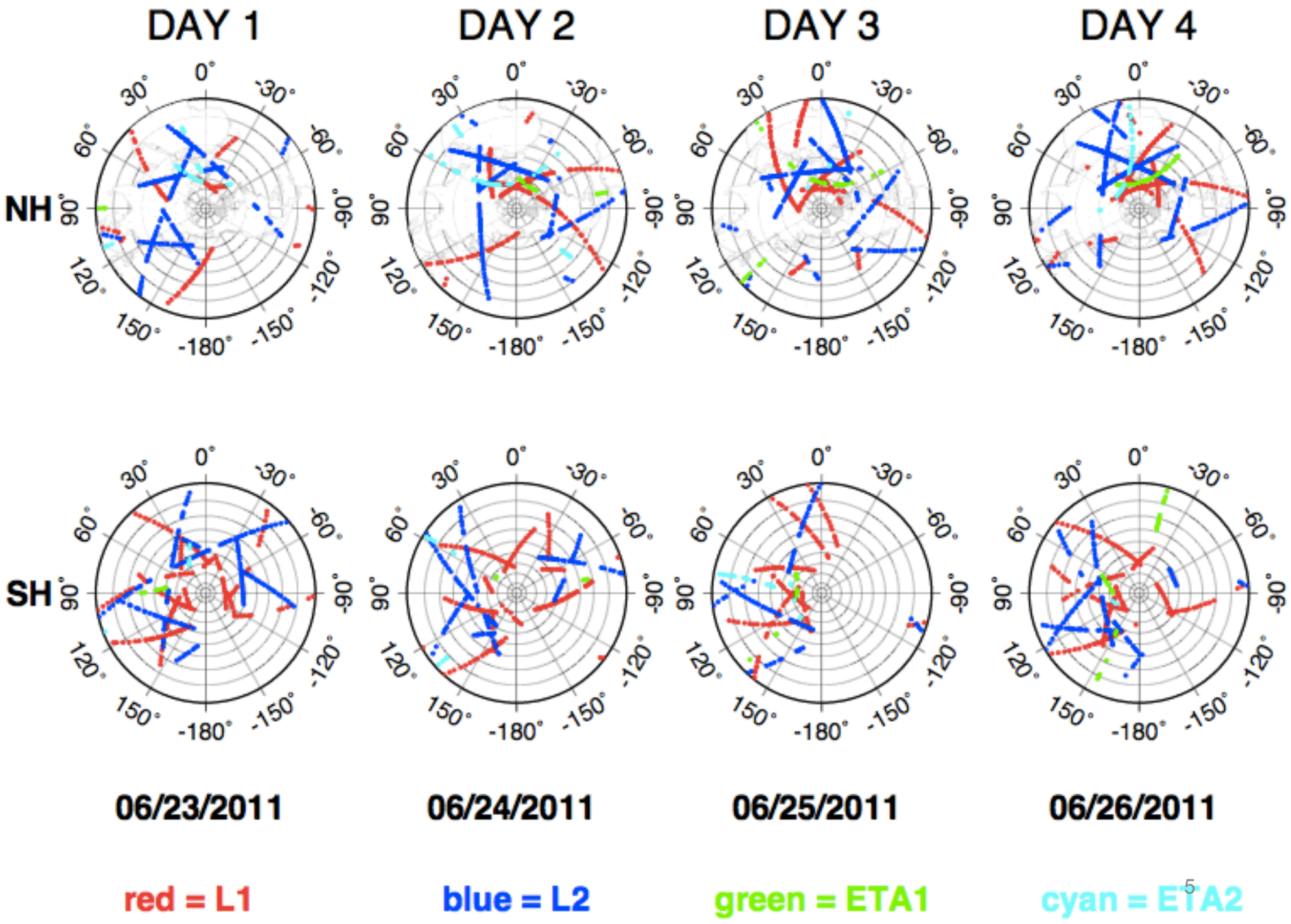
110427_daily_sate_stats.txt Wed May 04 13:13:14 2011 1

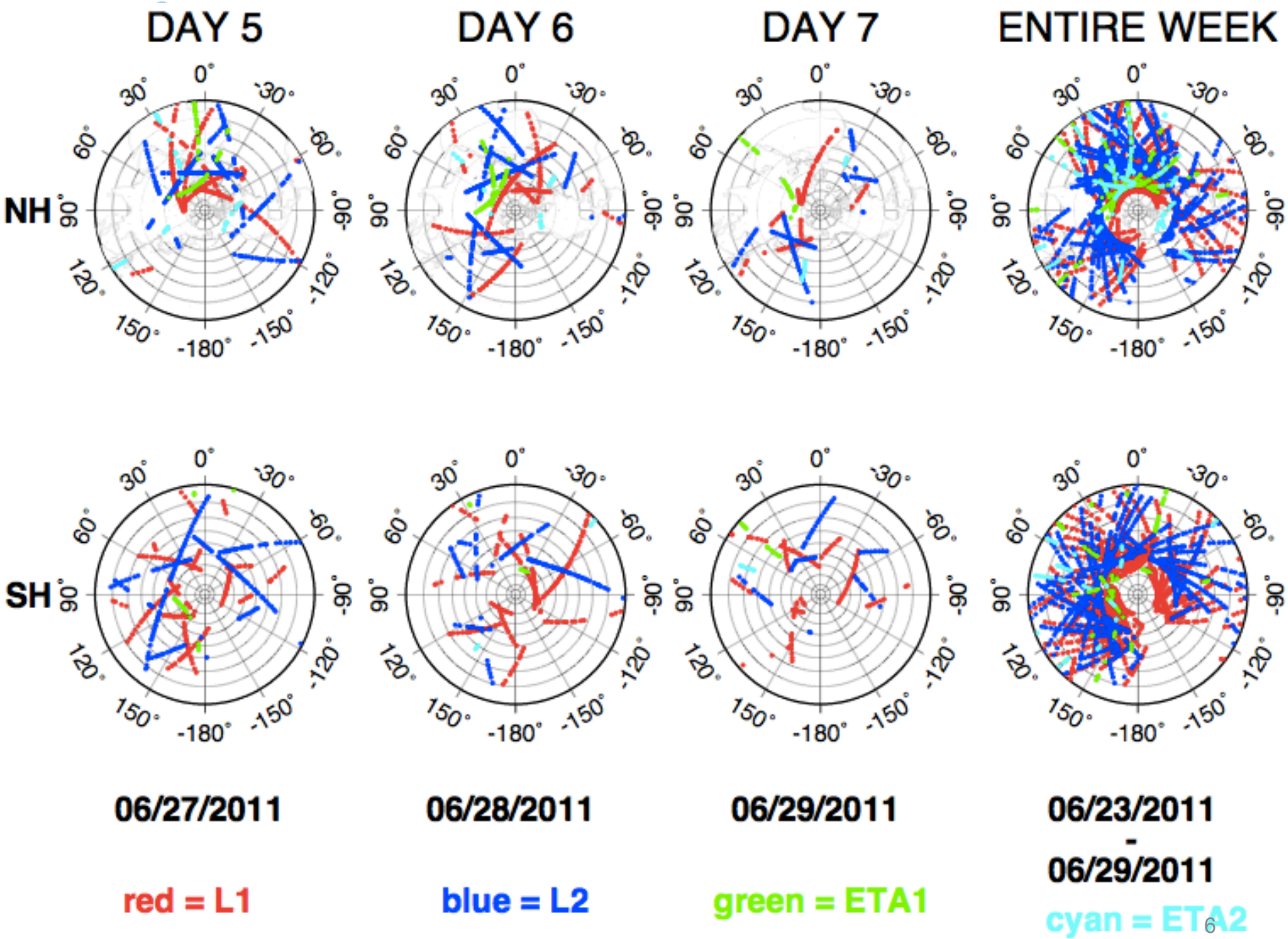
RESIDUAL SUMMARY STATISTICS FOR ARC 110427 BY DAY AND BY TRACKING STATION

		11/04/27			11/04/28			11/04/29			11/04/30			11/05/01			11/05/02			11/05/03		
SITENAME	SITE_NUM	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS	AVG	STD	NPTS
Simeiz	18734901	0.0		1																		
Riga	18844401				1.9	13.4	17	-7.0	18.9	24	0.0	7.9	14	6.8	18.6	20						
Mcdonald	70802419				0.0	5.1	3							0.0	5.6	18						
Yarragad	70900513	-3.4	7.4	23	-4.0	9.0	75	-0.3	5.9	139	0.4	6.4	132	0.9	12.0	107	4.2	8.0	74	-1.9	8.1	21
Greenbel	71050725							0.0	8.1	67												
Monument	71100412	-3.6	12.8	79	3.9	13.8	95	-3.3	17.9	57	-3.1	17.7	23				6.6	14.8	56	-2.3	16.0	60
Changchu	72371901	-2.9	16.0	49	-13.8	1.2	2										-2.9	18.2	9	16.7	21.6	14
Koganei	73085001																0.0	24.0	3			
Zimm8532	78106821	-0.3	11.6	64	3.5	12.6	55	0.0	7.2	53	2.0	7.1	137	-2.4	7.4	115				-3.5	14.5	47
Shanghai	78212801	-1.9	18.0	19	18.5	5.8	2															
Mount St	78259001	-13.2	18.6	14	2.9	17.6	19				2.2	14.2	40							42.3		1
Simosato	78383603				0.0	24.8	20															
Herstmon	78403501	-1.7	6.5	24	0.0	5.2	23				3.1	5.3	21	-0.3	3.8	28	-1.6	5.7	11			
Matera	79417701							0.2	6.7	19				-0.3	3.4	17						
Wettzell	88341001	1.4	6.3	7	-2.7	6.4	5	7.0	8.2	15	-2.1	4.1	10	1.0	6.5	29	-3.8	11.0	29			
GRAND TOTAL	15	-2.8	13.2	280	1.1	13.5	316	-0.8	10.6	374	1.0	8.8	377	-0.2	10.1	343	3.2	11.8	173	-0.5	16.5	143

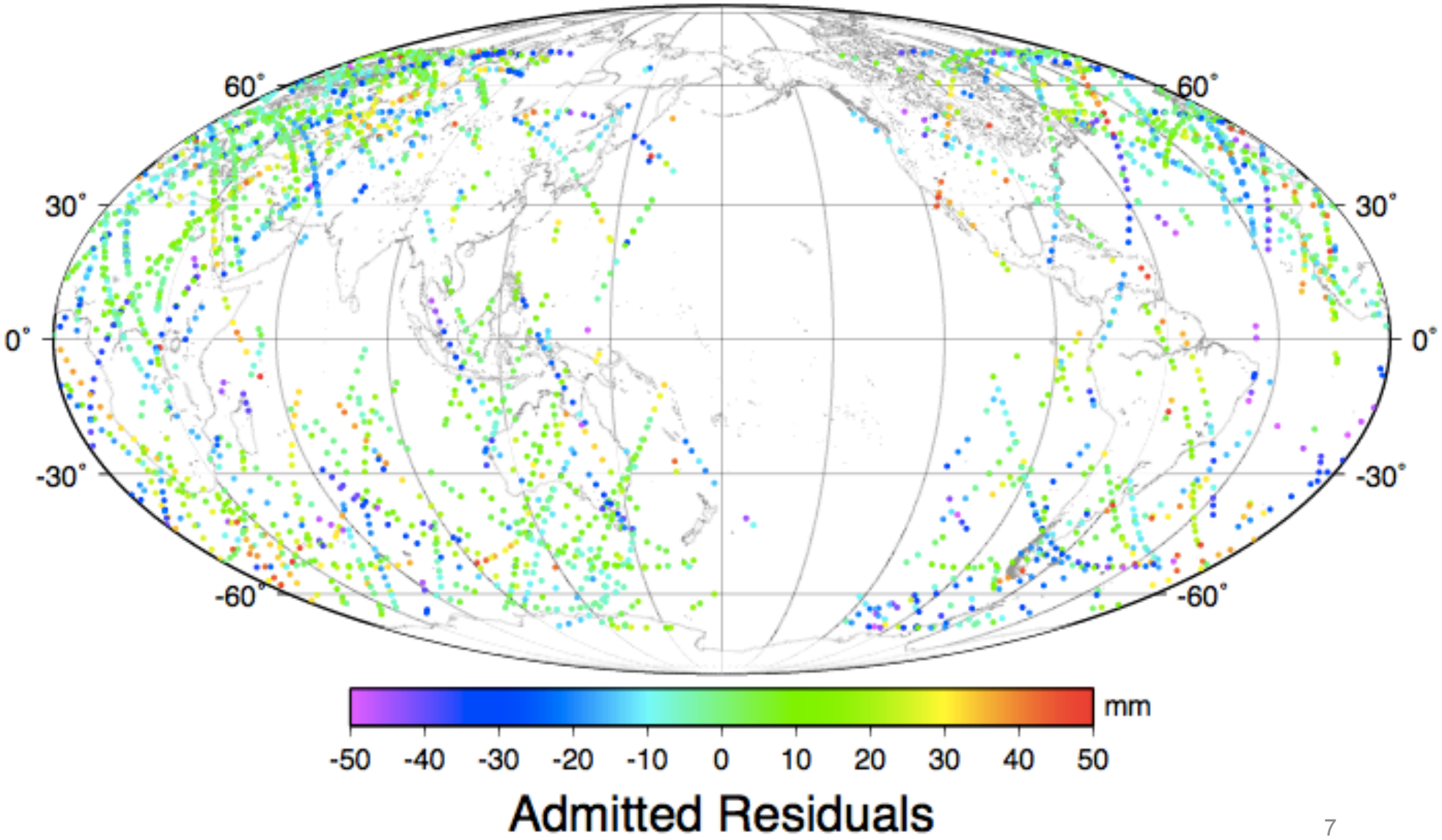
Residuals for arc 110623

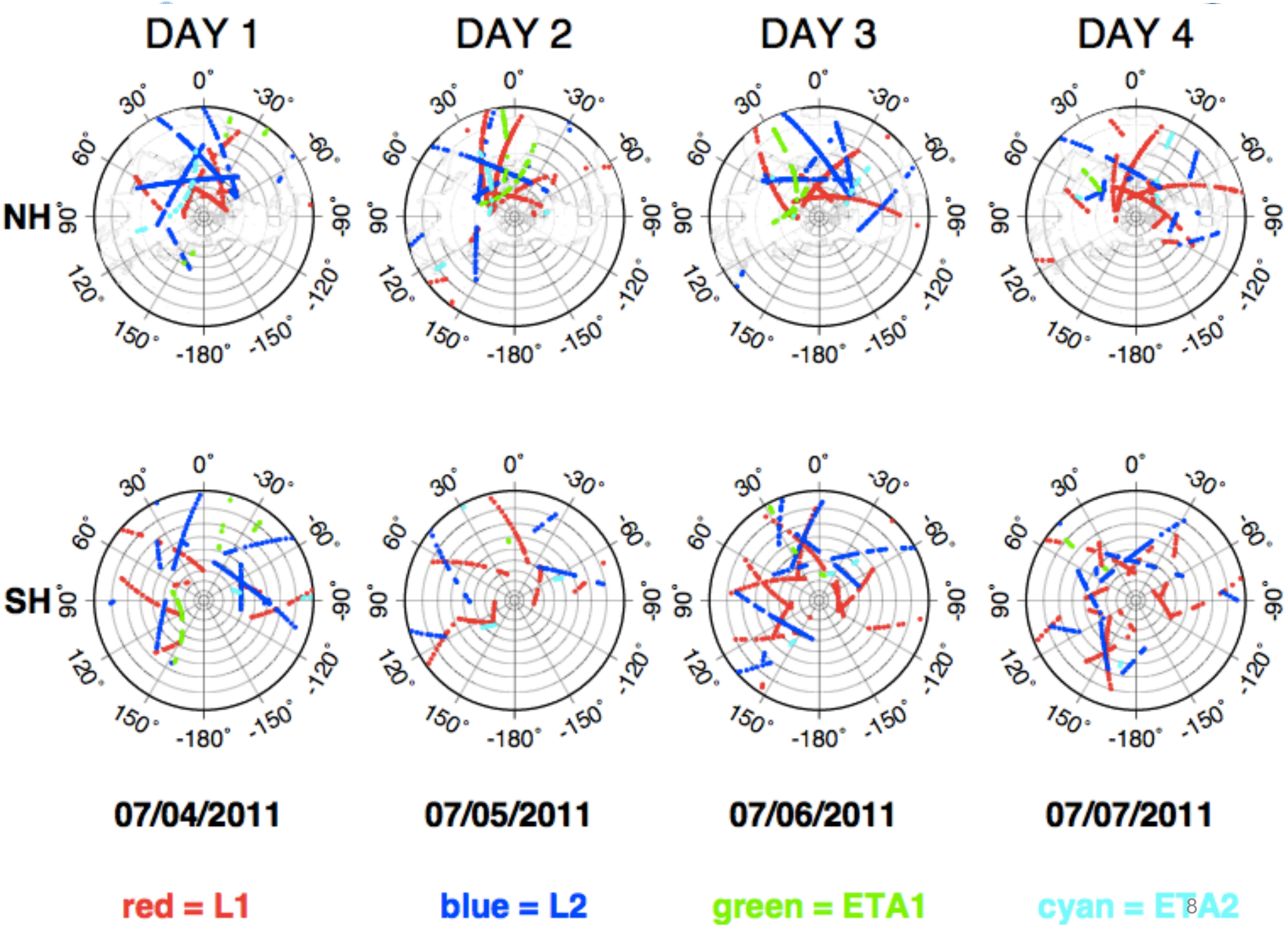


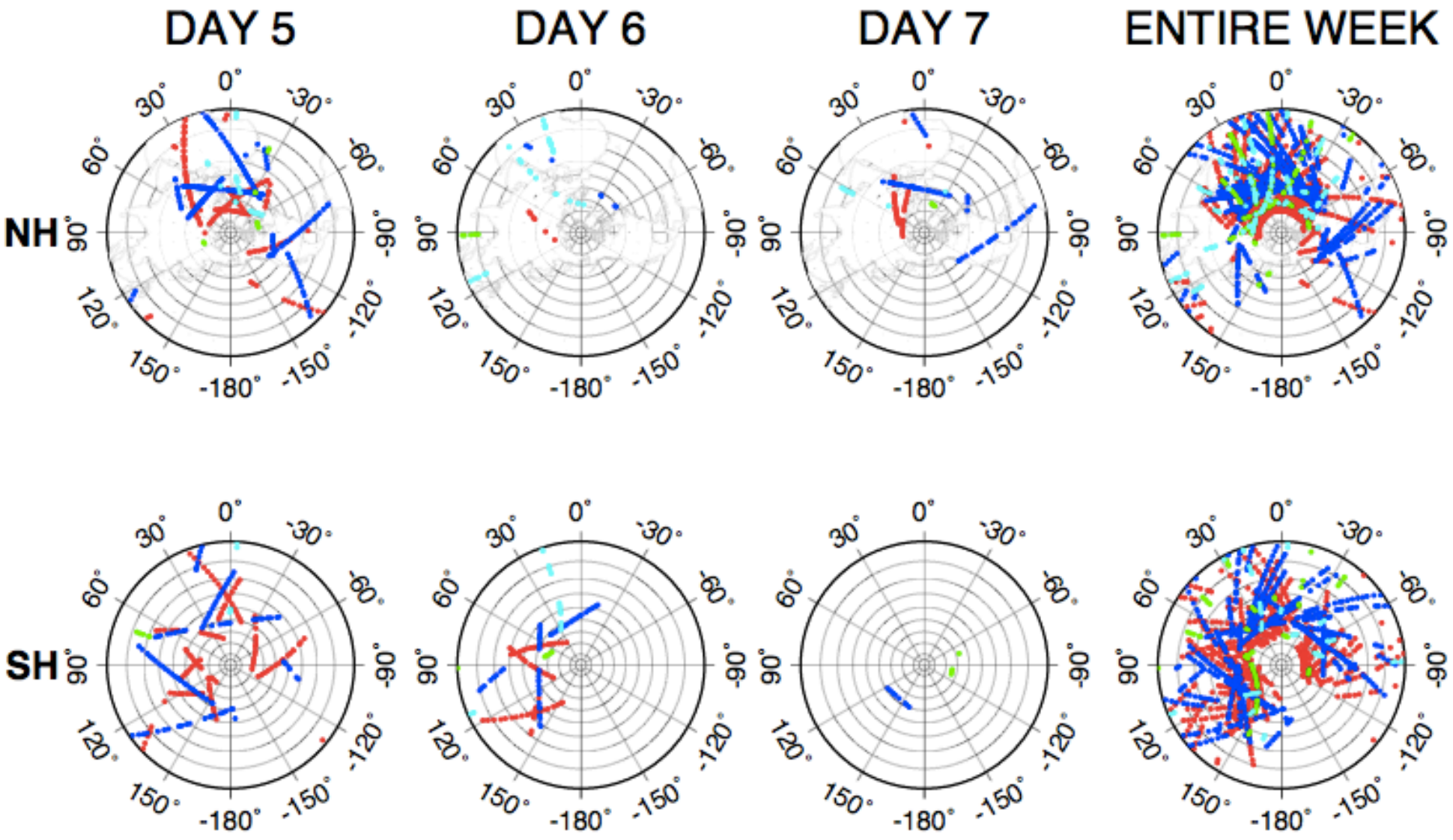

DAY 1
DAY 2
DAY 3
DAY 4
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
06/23/2011
06/24/2011
06/25/2011
06/26/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2


DAY 5
DAY 6
DAY 7
ENTIRE WEEK
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
06/27/2011
06/28/2011
06/29/2011
06/23/2011
-
06/29/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2

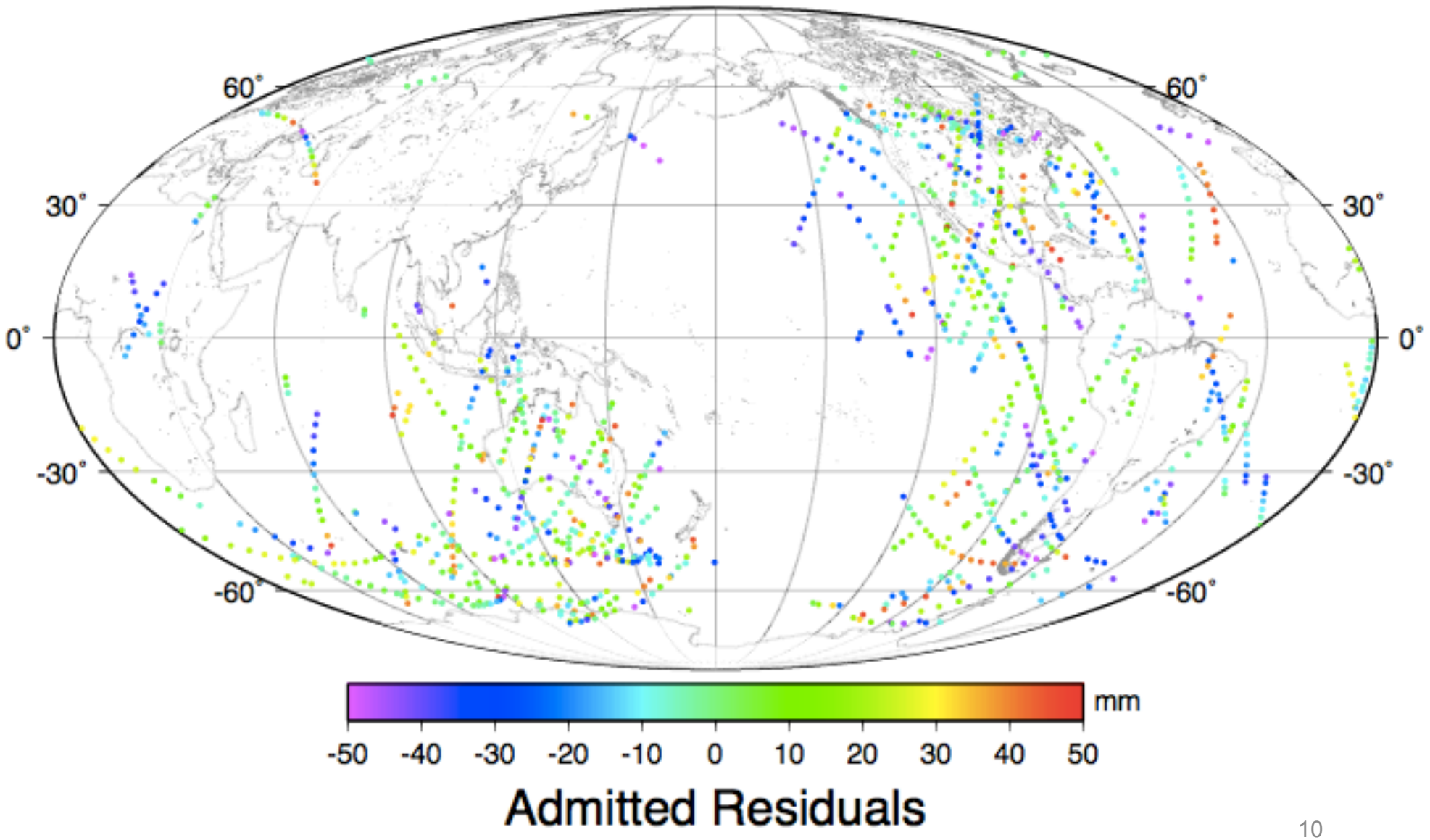
Residuals for arc 110703

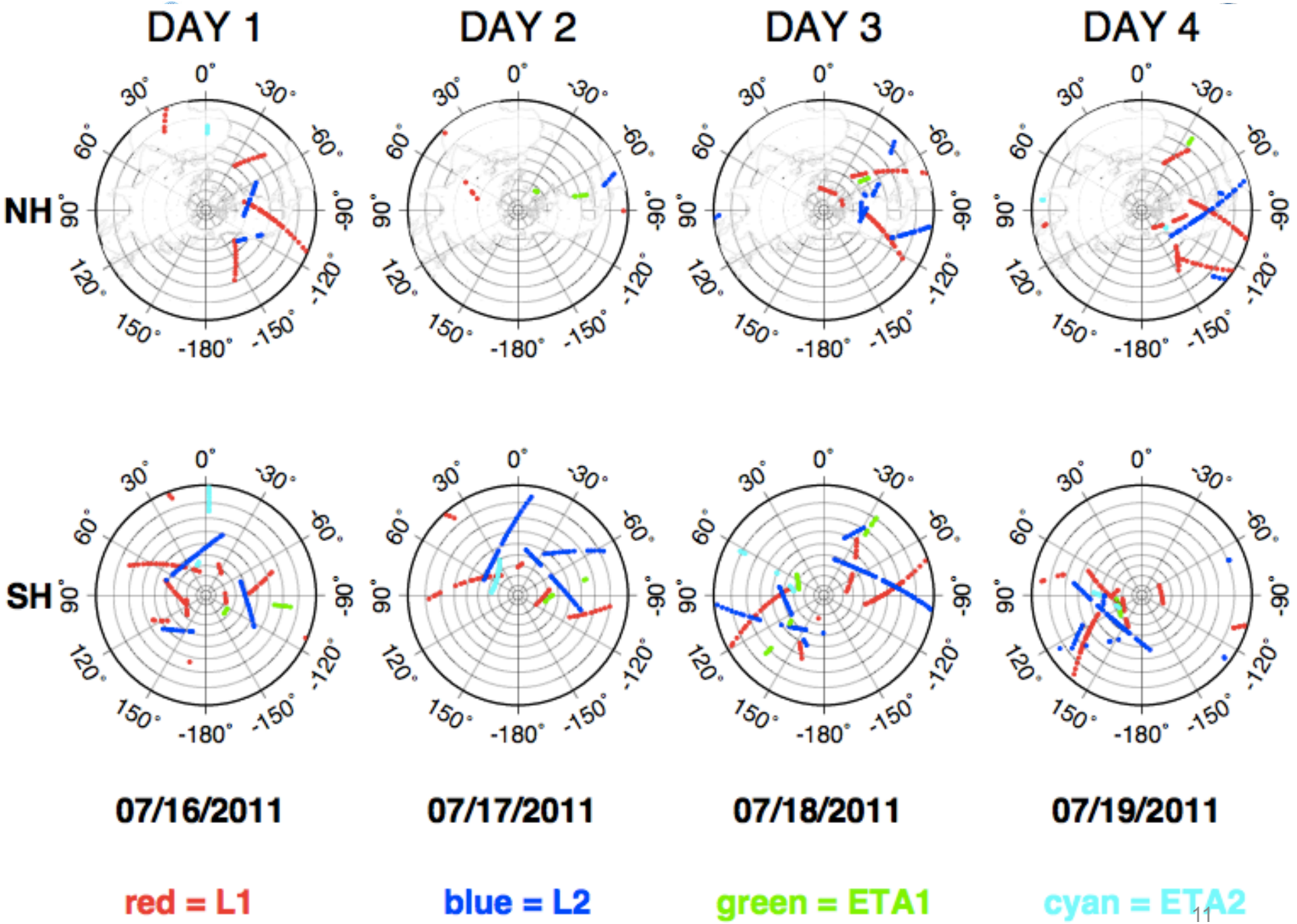


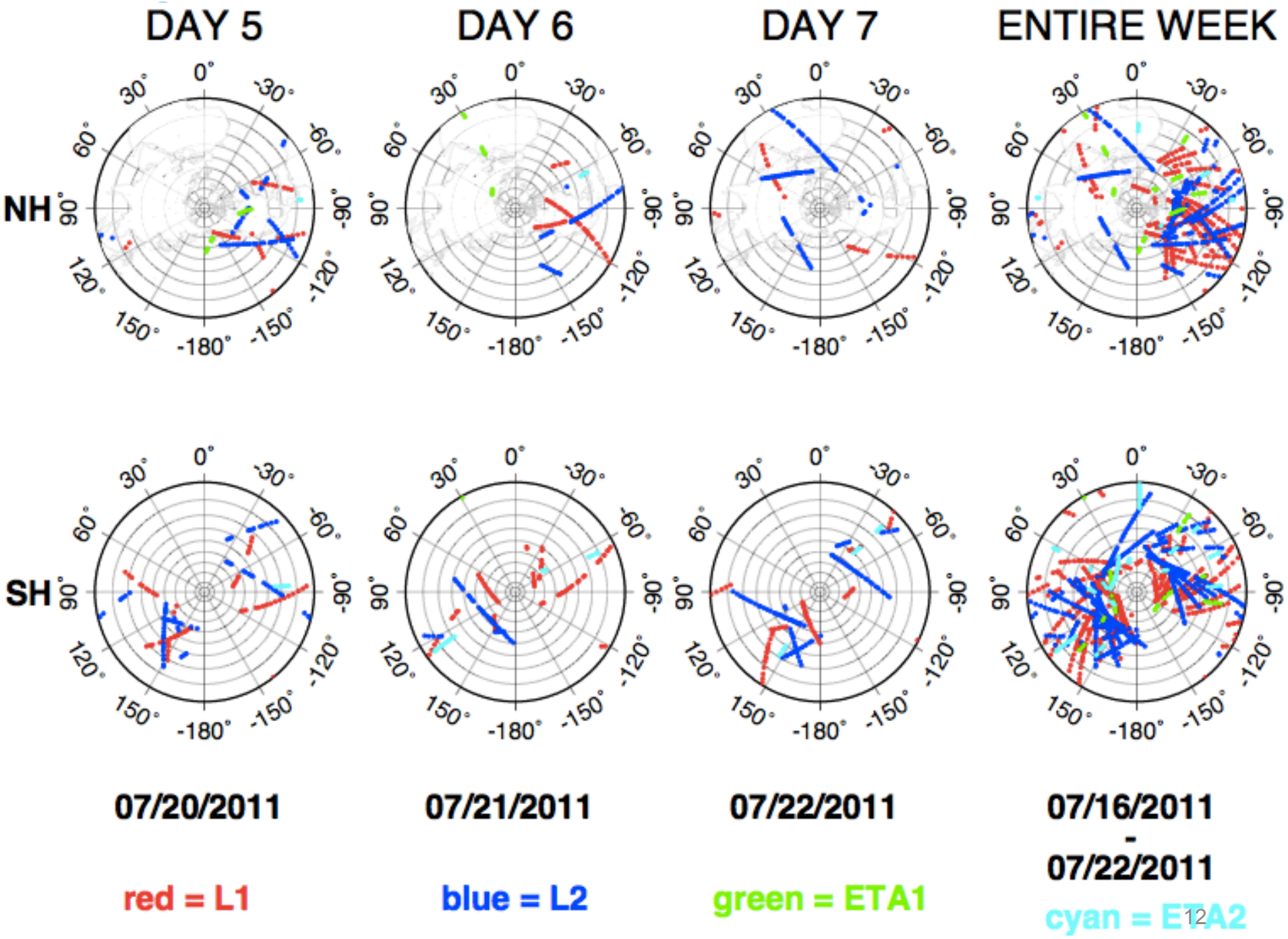

DAY 1
DAY 2
DAY 3
DAY 4
NH
SH
0°
30°
-30°
60°
-60°
90°
-90°
120°
-120°
150°
-150°
-180°
07/04/2011
07/05/2011
07/06/2011
07/07/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2


DAY 5
DAY 6
DAY 7
ENTIRE WEEK
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
07/08/2011
07/09/2011
07/10/2011
07/04/2011
-
07/10/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2

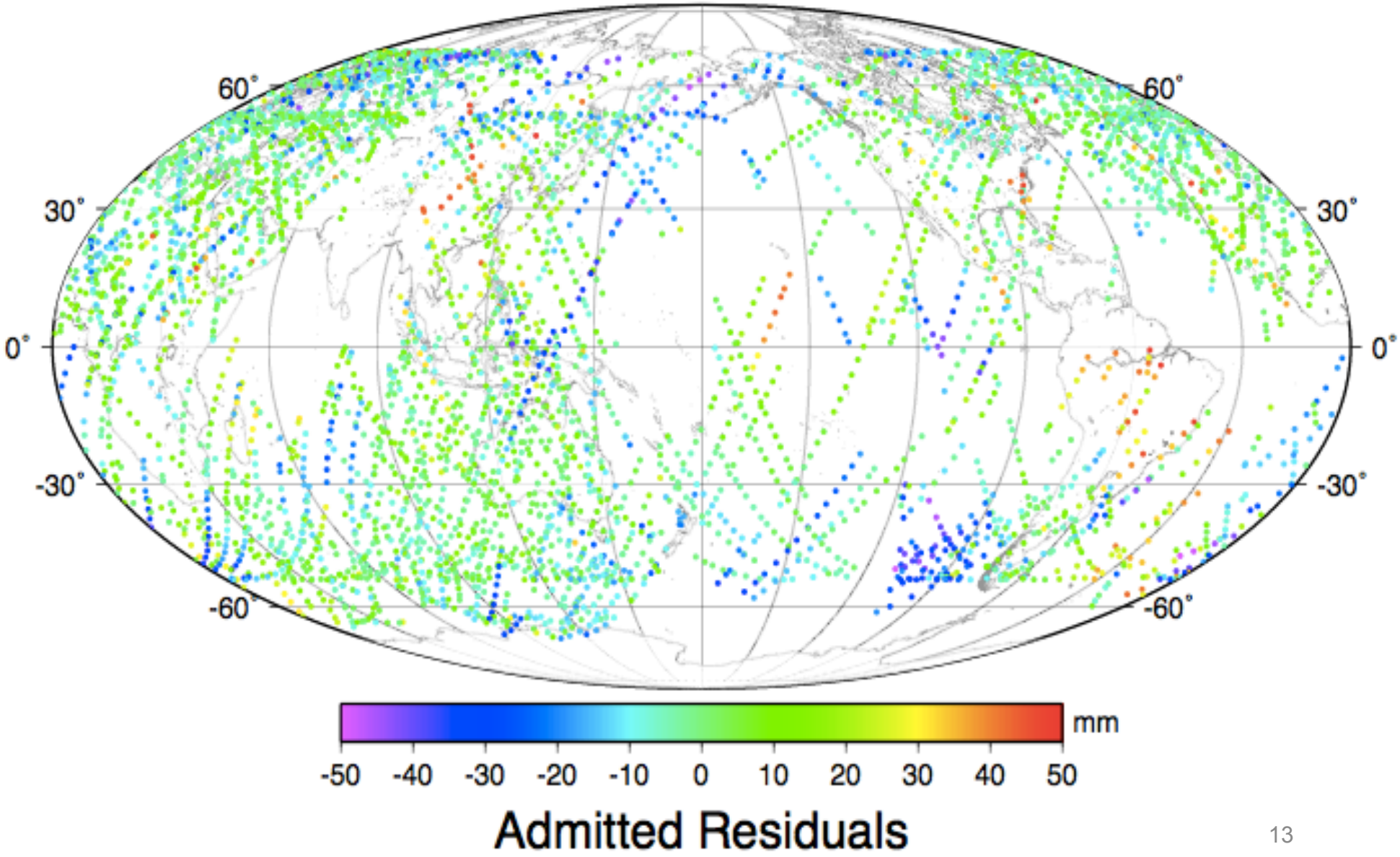
Residuals for arc 110716

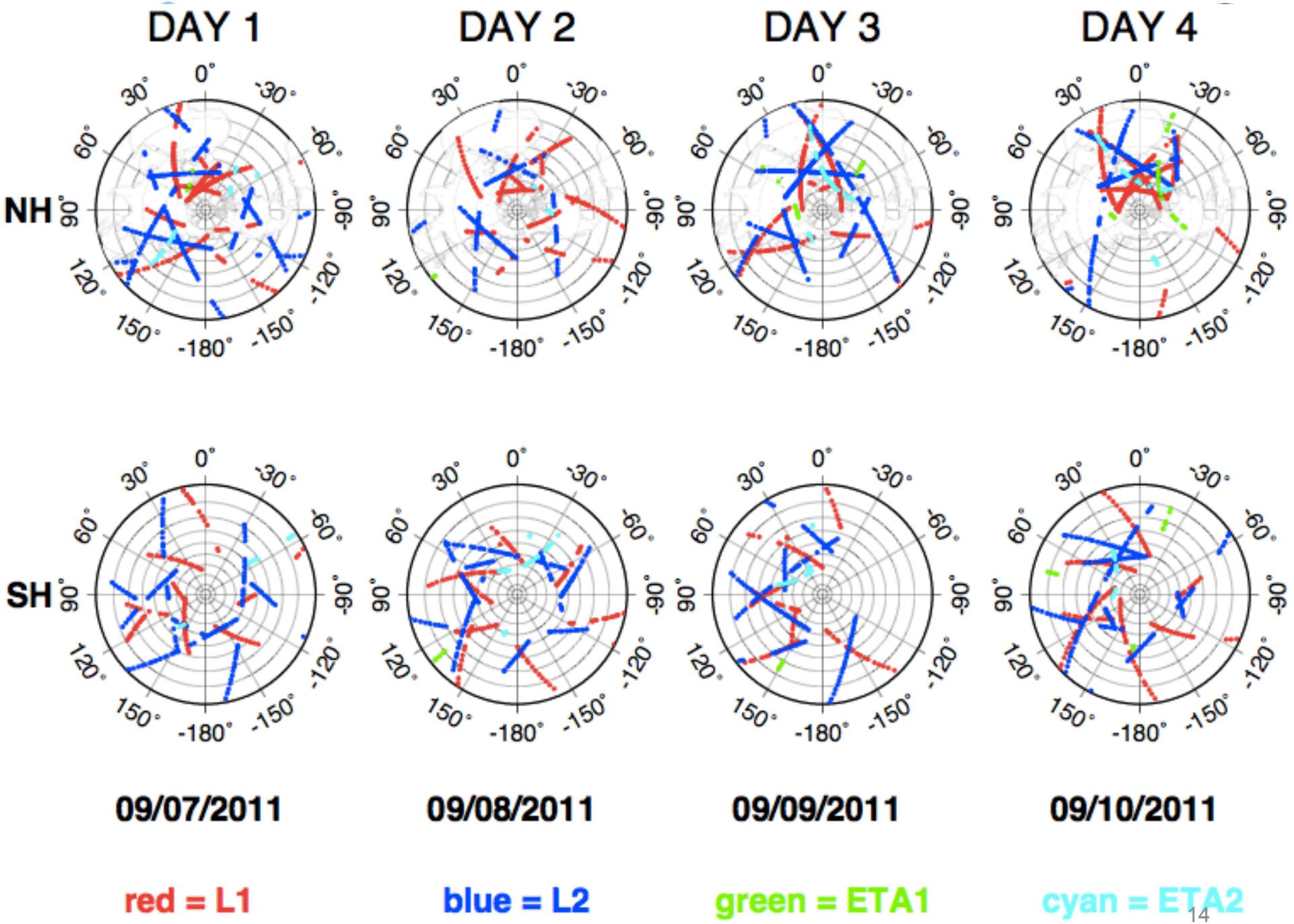


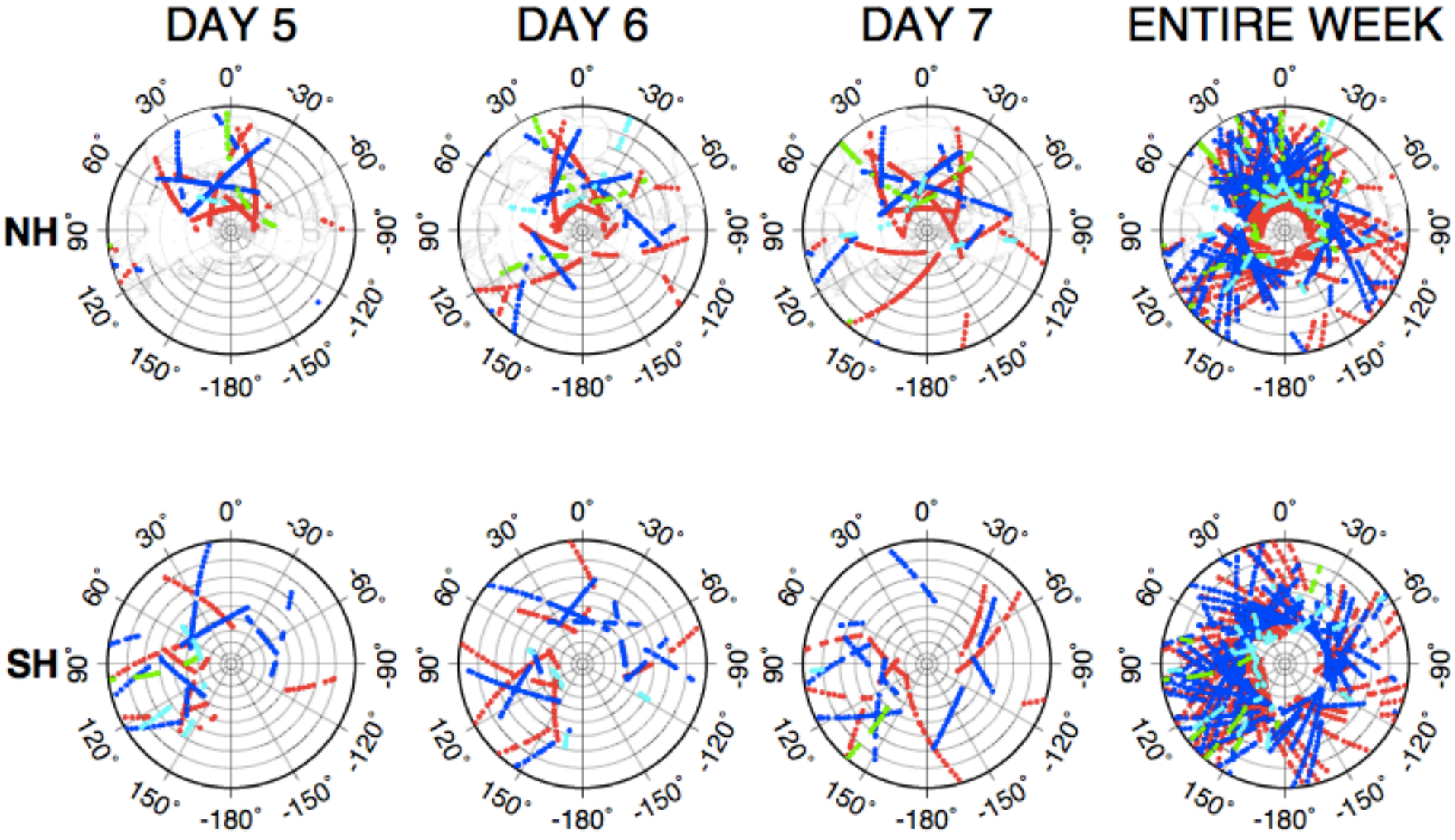

DAY 1
DAY 2
DAY 3
DAY 4
NH
SH
07/16/2011
07/17/2011
07/18/2011
07/19/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2


DAY 5
DAY 6
DAY 7
ENTIRE WEEK
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
07/20/2011
07/21/2011
07/22/2011
07/16/2011
-
07/22/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2

Residuals for arc 110907




DAY 1
DAY 2
DAY 3
DAY 4
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
09/07/2011
09/08/2011
09/09/2011
09/10/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2

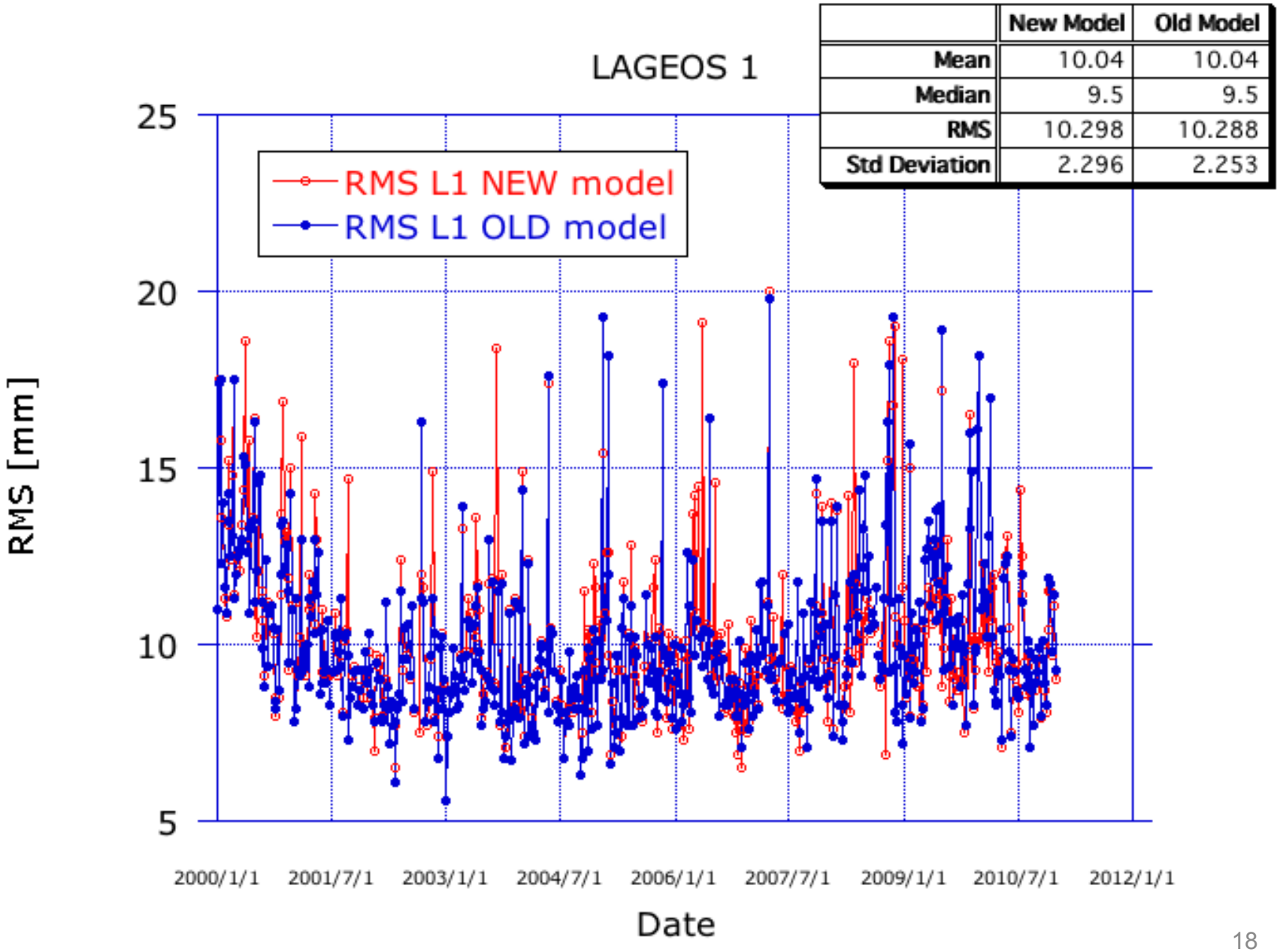

DAY 5
DAY 6
DAY 7
ENTIRE WEEK
NH
SH
0°
30°
60°
90°
120°
150°
-180°
-150°
-120°
-90°
-60°
-30°
09/11/2011
09/12/2011
09/13/2011
09/07/2011
-
09/13/2011
red = L1
blue = L2
green = ETA1
cyan = ETA2

Loading & gravity models

- Data (atmospheric loading only) available from IERS GGFC web site:
  - http://geophy.uni.lu/ggfc_atmosphere/NCEP-loading.html
- GEODYN-compatible files (atmospheric loading and gravitational effect) available from JCET (site TBD)
  - Eventually it can include oceans and hydrology (from Jean-Paul Bois)
- GRACE project files (atmospheric AND oceanic!) available from GFZ's ISDC:
  - http://isdc.gfz-potsdam.de
- New service from TUW to provide eventually atmos. loading & gravity effect
- New sub-daily EOP model from VLBI+GPS (UniBonn & TUM)
- Need to have these tested and compared between a few ACs: ???
  - Preferably by ACs using a mix of s/w packages (DOGS, EPOS, GEODYN, etc.)

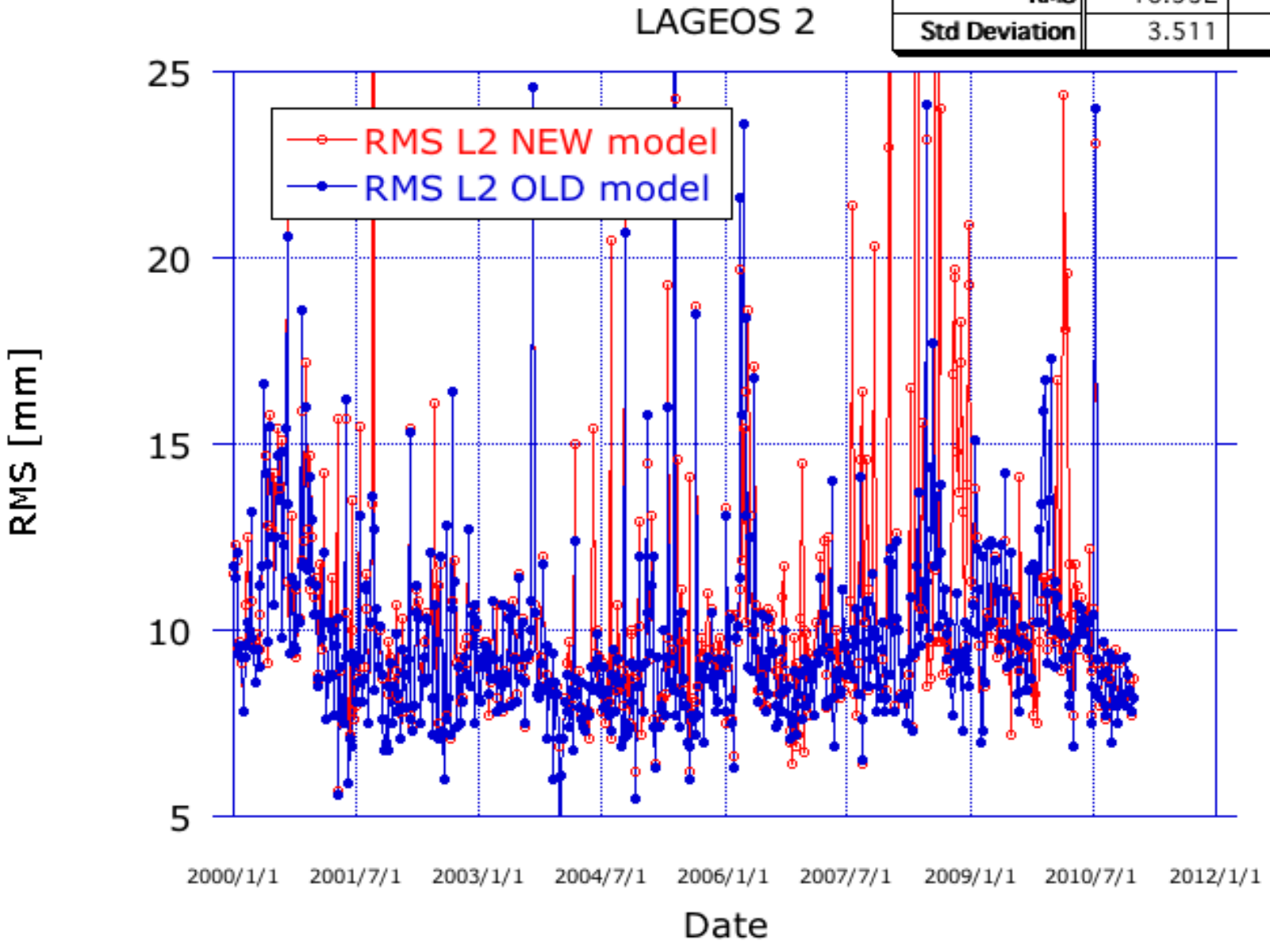
CoG Model Tests

- Appleby model provided in terms of a routine and data base files
  - Covers only LAGEOS and ETALON and a number of sites are still missing
- JCET processed all of the LAGEOS and ETALON arcs over 1993 to 2010 using GEODYN and site specific CoG corrections
- For sites not in the model we used the default CoG correctiosn
- Sites which toggled between configurations over the same period of time, we used one CoG for now.
  - In these cases we need to check the configuration flag on the data record to decide which correction is the correct to pick. This requires a significant additional effort in bookkeeping such info and it is postponed for the future, since these cases are rather limited and in the early years mostly, when data quality is lower than at present.
- We need to decide the schedule of implementation in the official product (prior to making any other modeling enhancements!)



	New Model	Old Model
Mean	10.04	10.04
Median	9.5	9.5
RMS	10.298	10.288
Std Deviation	2.296	2.253

	New Model	Old Model
Mean	10.38	9.75
Median	9.5	9.2
RMS	10.952	10.103
Std Deviation	3.511	2.645



Proposed plan for product evolution

a) Complete AC certification of IERS 2010 Conventions implementation (how?)

b) Verify AC ability to estimate low-degree gravity terms

c) Verify AC ability to implement environmental loading from external data

d) Pilot project to verify compatibility of all AC's products with (b) and (c)

e) Apply new product to the weekly series with a ~10^{d}-15^{d} latency

f) Daily product will remain the same as is now (no forward modeling of Geo-fluids and no additional parameters estimated)

JoG SI Table of Contents – Status 2011.09.15

#	TITLE	Lead Author(s)
0	**Foreword**	**The Guest EB**
1	**The International Laser Ranging Service (ILRS): The First Decade and Beyond**	**Pearlman, Appleby, Noll, Pavlis, Torrence**
2	**Information Resources Supporting Scientific Research for the International Laser Ranging Service**	**Noll, Horvath, Ricklefs, Schwatke, Torrence**
3	*Past, Present and Future of the ILRS Global Tracking Network*	*Wetzel, Horvath, Carter, Pierron, Bianco, Govind, ???*
4	**Next Generation Satellite Laser Ranging Systems**	**Degnan, McGarry, Kirchner, Appleby, Prochazka, Jäggi, Moore, Artyukh, Samain, Schreiber**
5	**Geodetic satellites: a high accuracy positioning tool**	**Pearlman, Arnold, Davis, Barlier, Biancale, Vasiliev, Paolozzi. Ciufolini, Pavlis**
6	**Satellite Laser Ranging to Global Navigation Satellite Systems**	**Thaller, Dell'Agnello, Fumin, Govind, Nakamura, Noda, Springer**
7	**Lunar Laser Ranging – A Tool for General Relativity, Lunar Geophysics and Earth Science**	**J. Müller, Murphy, Schreiber, Shelus, Torre, Williams, Boggs**
8	**Interplanetary Ranging**	**Degnan, Schreiber, McGarry, Sun, Zagwodzki, Murphy, Samain, Turyshev**
9	**Target Signature Systematic Errors for Geodetic Satellites and Novel LR Array Design**	**Appleby, Otsubo, Arnold, Kirchner, Neubert, Grunwaldt, Vasilliev**
10	**Data Quality Control Service for the ILRS Tracking Network**	**Otsubo, H. Müller, Pavlis, Torrence, Thaller, Glotov, Xiaoya, Appleby**
11	**Systematic errors in SLR Data: Documentation and Discussion of their Sources**	**Luceri, H. Müller, Vei, Appleby and Pavlis**
12	**Operational and Definitive Products of the ILRS Analysis Working Group**	**Sciarretta, Luceri, Pavlis and Kelm**
13	*Monitoring Mass Redistribution in the Earth System with SLR*	*Pavlis, König, Ries, Deleflie, Cheng, H. Müller, ???*
14	*The ILRS Contribution to the International Terrestrial Reference Frame (ITRF)*	*Pavlis and the AWG ACs and CCs*

We also have EIGHT (8) "un-solicited" abstracts so far

1) **BOLD** indicates working title from author(s) for a submitted abstract
2) RED indicates lead author
3) *Non-bold entries in italics are still pending!!!*

Report from SGF Herstmonceux Analysis Centre

Graham Appleby
SGF Herstmonceux, UK

Contributions from Matt Wilkinson and Vicki Smith

NATURAL ENVIRONMENT RESEARCH COUNCIL

Satellite signature effects

* The satellite signature effect needs careful station/ epoch-dependent treatment in order to refer range measurements to the centres-of-mass of the geodetic satellites
* Up to 10mm station-dependent differences for LAGEOS, 30mm for Etalon (Otsubo & Appleby, 2003)
* These effects are similar to the antenna phase-centre effects on GNSS satellites and receivers, as being addressed in IGS

Satellite signature effects

* ILRS stations' site logs are a valuable source of relevant information:
* Detectors, laser pulse-length, operational practices (return-energy regimes), etc.
* Used to derive time-series of CoM corrections and their uncertainties for each station for LAGEOS and for Etalon
  * - using the published models
* Results being evaluated using SATAN; recent 7-day arc full 4-satellite solutions show small improvement in post-fit WRMS at sub-mm level; much more to be done to test.

Detail from CoM table for LAGEOS

Station	Time-span		detector info	CoM min, max, adopted (mm)
7838	01 04 2008	31 12 2050	20 MCP CSM 3.0	6 15 252 252 248 **250**
7838	01 07 1990	01 04 2008	100 MCP CSM 3.0	20 40 252 252 248 **250**
7839	01 01 1983	31 12 2000	300 PMT NC 3.0	120150 245 245 241 **243**
7839	01 11 1981	08 10 2003	35 CSP NCM 2.2	3 9 255 255 250 **252**
7839	09 10 2003	31 12 2050	10 CSP NSF 2.2	3 9 255 255 250 **252**
7840	01 02 2007	31 12 2050	10 CSP CS 2.5	3 9 245 245 245 **245**
7840	31 03 1983	31 03 1992	100 PMT NCF 3.0	35 45 252 252 244 **248**
7840	31 03 1992	31 12 2050	100 CSP CS 3.0	6 15 246 246 244 **245**
7841	20 07 2001	31 12 2050	50 PMT CSF 2.5	10 18 254 254 248 **251**

Availability of CoM data tables

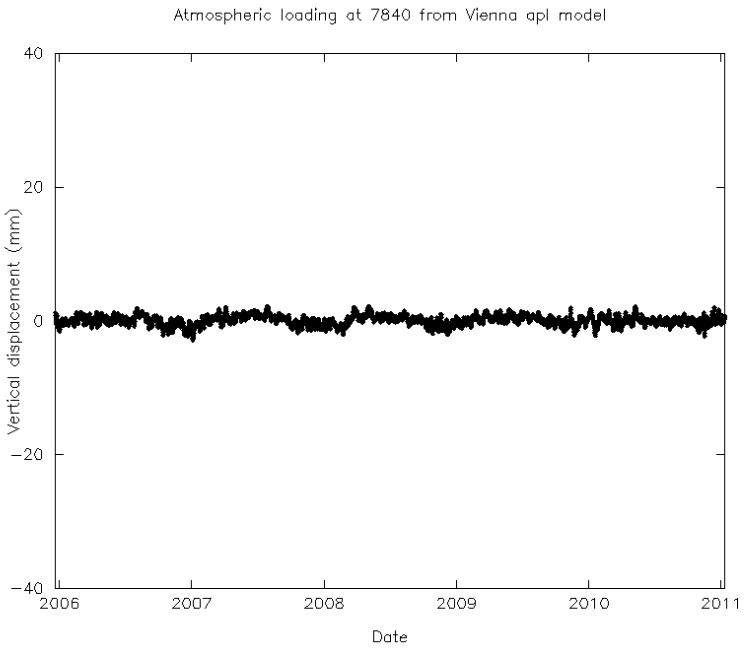
* In principle, complete for LAGEOS and Etalon for 1980s onwards;
* Some missing stations/epochs discovered during discussions with Erricos and Cinzia;
* Some conflicts for stations with multi-configurations
  * Will need to utilise system configuration flags;
  * GA to add config flag to CoM data sets;
* Almost ready to release data for Ajisai
* Starlette/stella under preparation

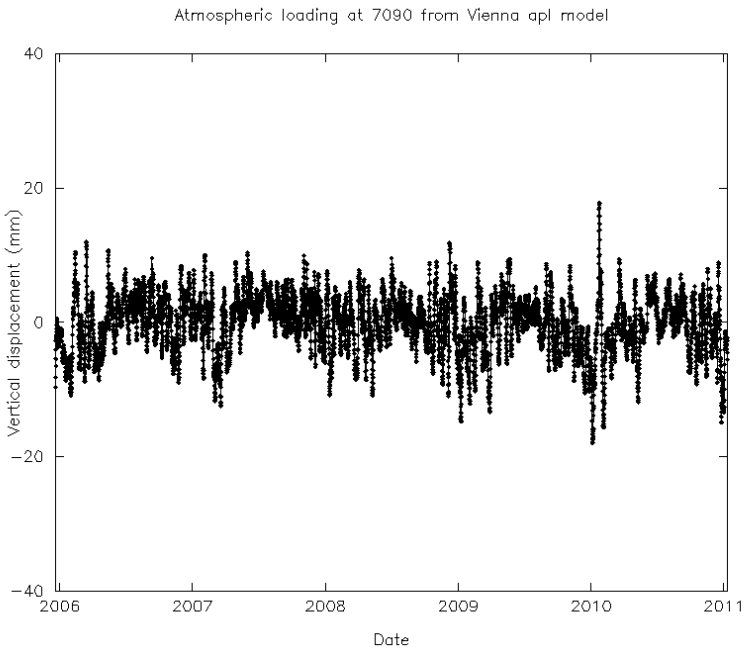
Progress with updates to SATAN

* Using ITRF2008 coordinates and IERS08_c04 as a-priori for daily and weekly ILRS coordinate and EOP solutions;
  * No progress with LoD problem
* Daily LAGEOS and Etalon QC web-based solutions also use ITRF2008.
* Atmospheric loading at observation level:
* Scheme devised to use Vienna APL V2 data:
* Interpolation in 6-hourly data to NP epochs during a data pre-processing stage

Progress with updates to SATAN

* Interesting variability in magnitude of radial APL among the ILRS stations (geographic & IB effects):





Progress with updates to SATAN

* Some tests done on APL, but with coordinates fixed to ITRF2008;
* Very little change in post-fit residual WRMS;
* Implementation working, needs full test whilst solving for station coordinates and EOPs.

Other analysis work

* In-orbit study of LRA efficiency on GNSS completed
  * Used 3 years FR data from five ILRS stations
  * Published in ASR
* SGF site-stability monitoring via short-baseline GPS analysis
  * Up to 4 receivers operating on site;
  * Sub-mm ‘annual’ signatures in all baselines
  * Published (accepted) in IAG REFAG2010

Other analysis work

* Comparison of space geodetic coordinates (heights) of SGF Herstmonceux with gravity time-series from permanent FG-5 absolute gravimeter;
* AG series little affected by groundwater variations
  * -> stable site, compacted clay.
* post-service ~4μGal (~15mm) probable 'jumps' in AG time-series suggested by geodetic results
  * -> Important study into systematic AG effects

SLR heights vs height variation from AG at Herstmonceux