ILRSA CC
Status of the products

C. Sciarretta, V. Luceri
eGEOS S.p.A., CGS – Matera

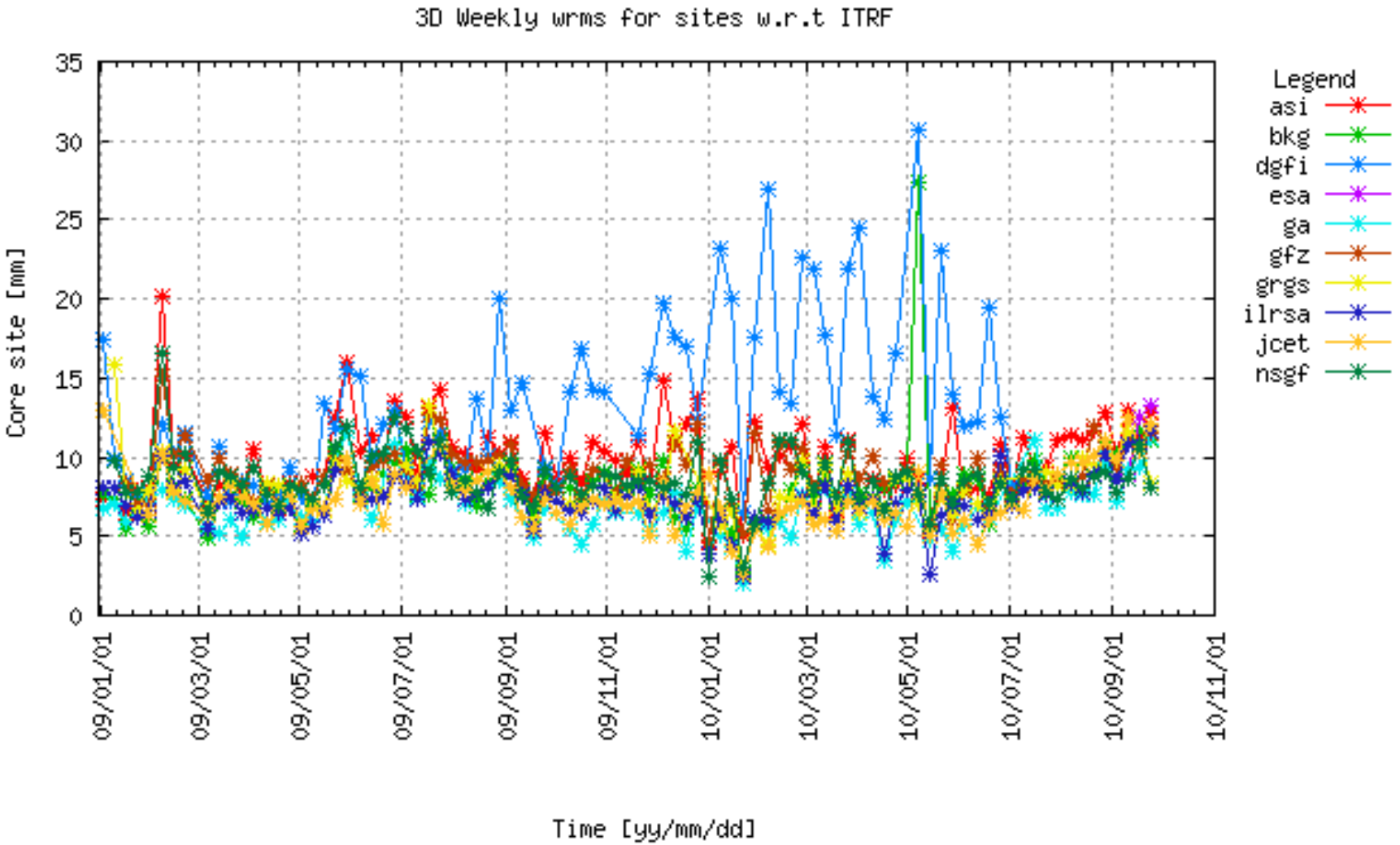
G. Bianco
Agenzia Spaziale Italiana, CGS - Matera

ILRS AWG Meeting, 1st October 2010, Paris

Contents

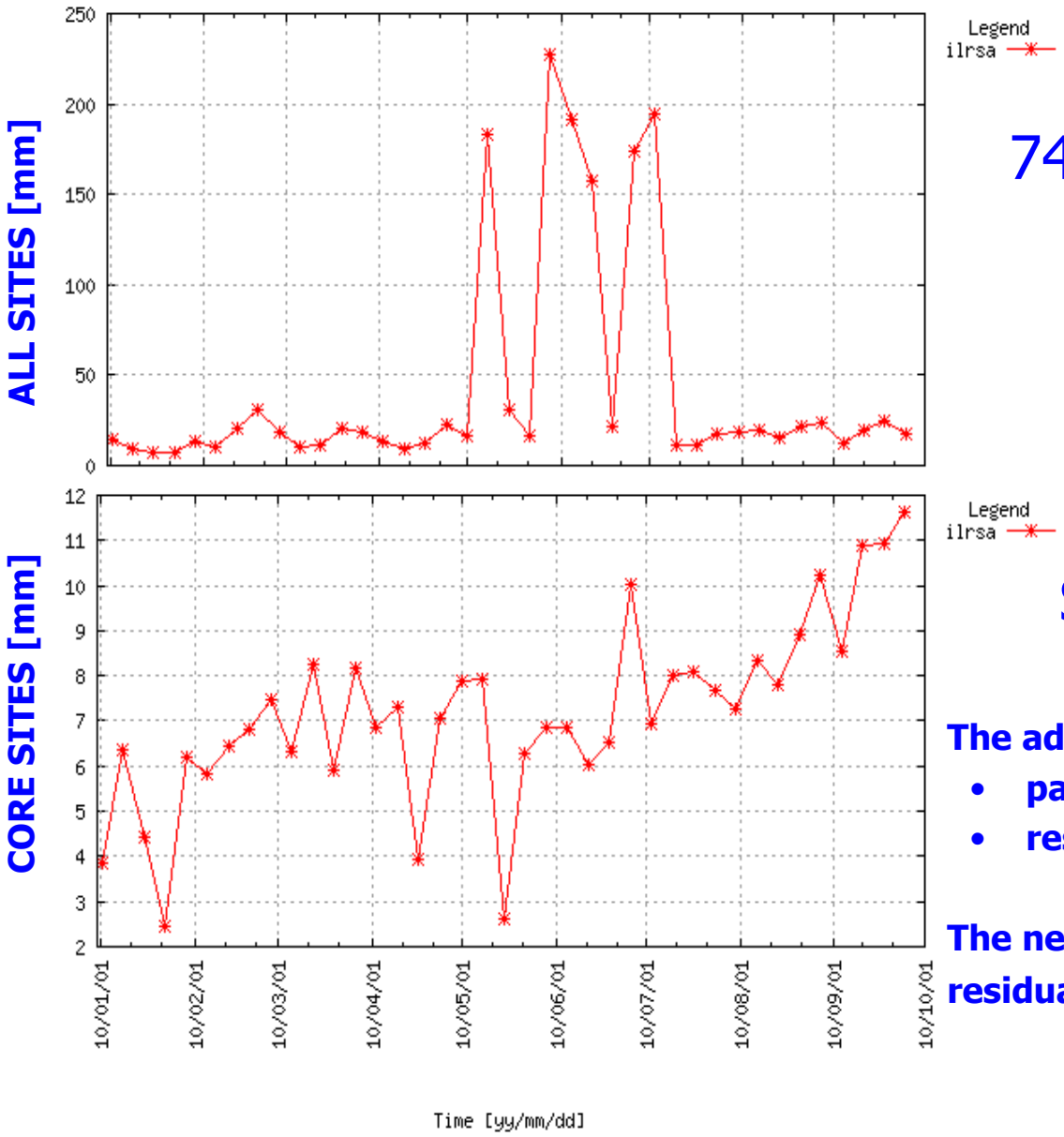
- weekly product performance for 2010
  - SSC issues
  - EOP issues (June-July x,y pb; LOD)
- new/revised contributing solutions: ESA, BKG

Weekly product: 2009-2010 performance



Weekly product: 2010 SSC issues

3D Weekly SSC wrms wrt SLRF2005



7405 – Concepcion coordinates

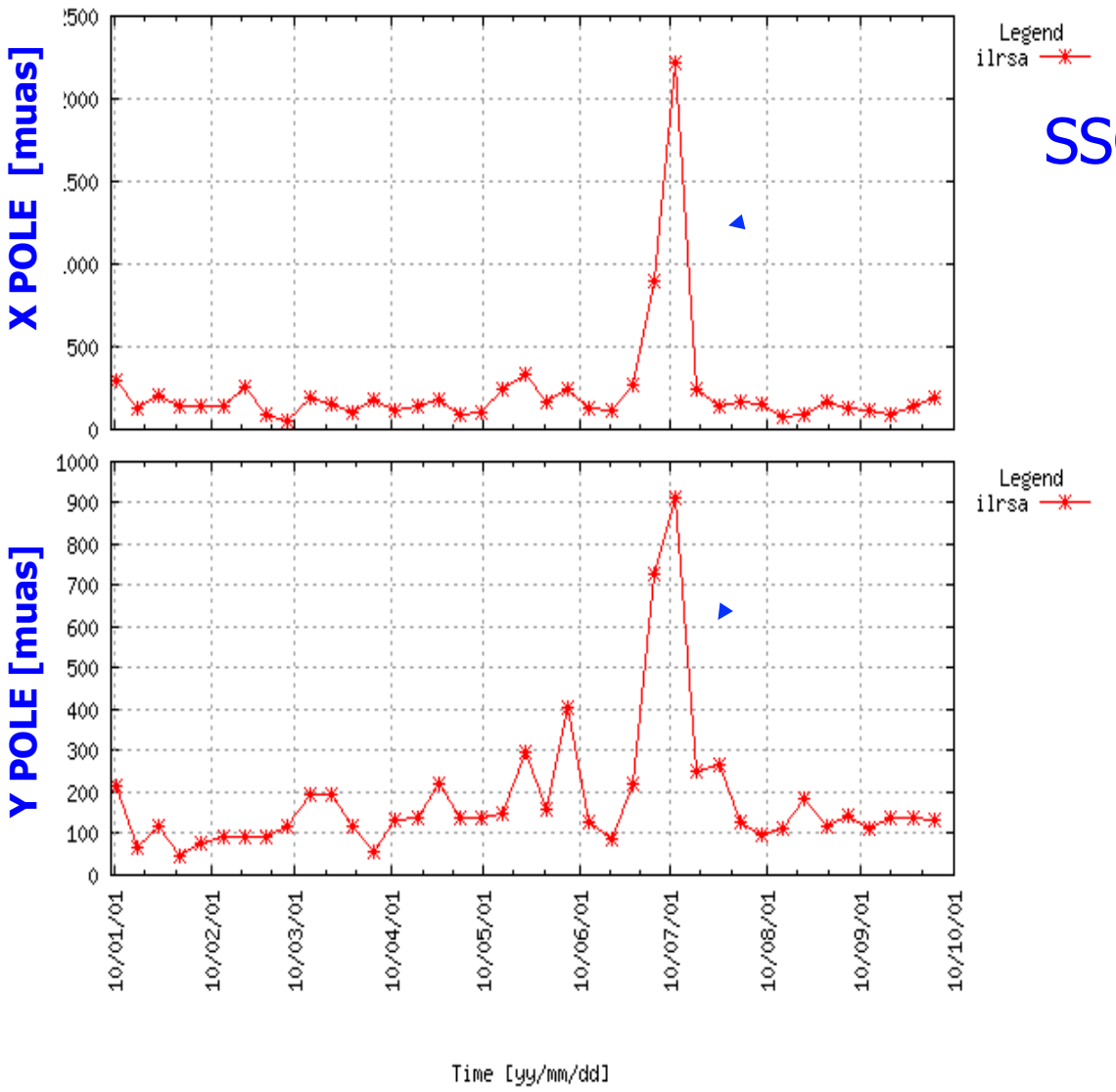
SLRF2005 "aging"

The adopted TRF in the combination procedure impacts

- **parameter editing (mismodelled sites)**
- **rescaling factor (mismodeled & missing sites)**

The new ITRF2008 shows a 5mm wrms of coordinate residuals (core sites)

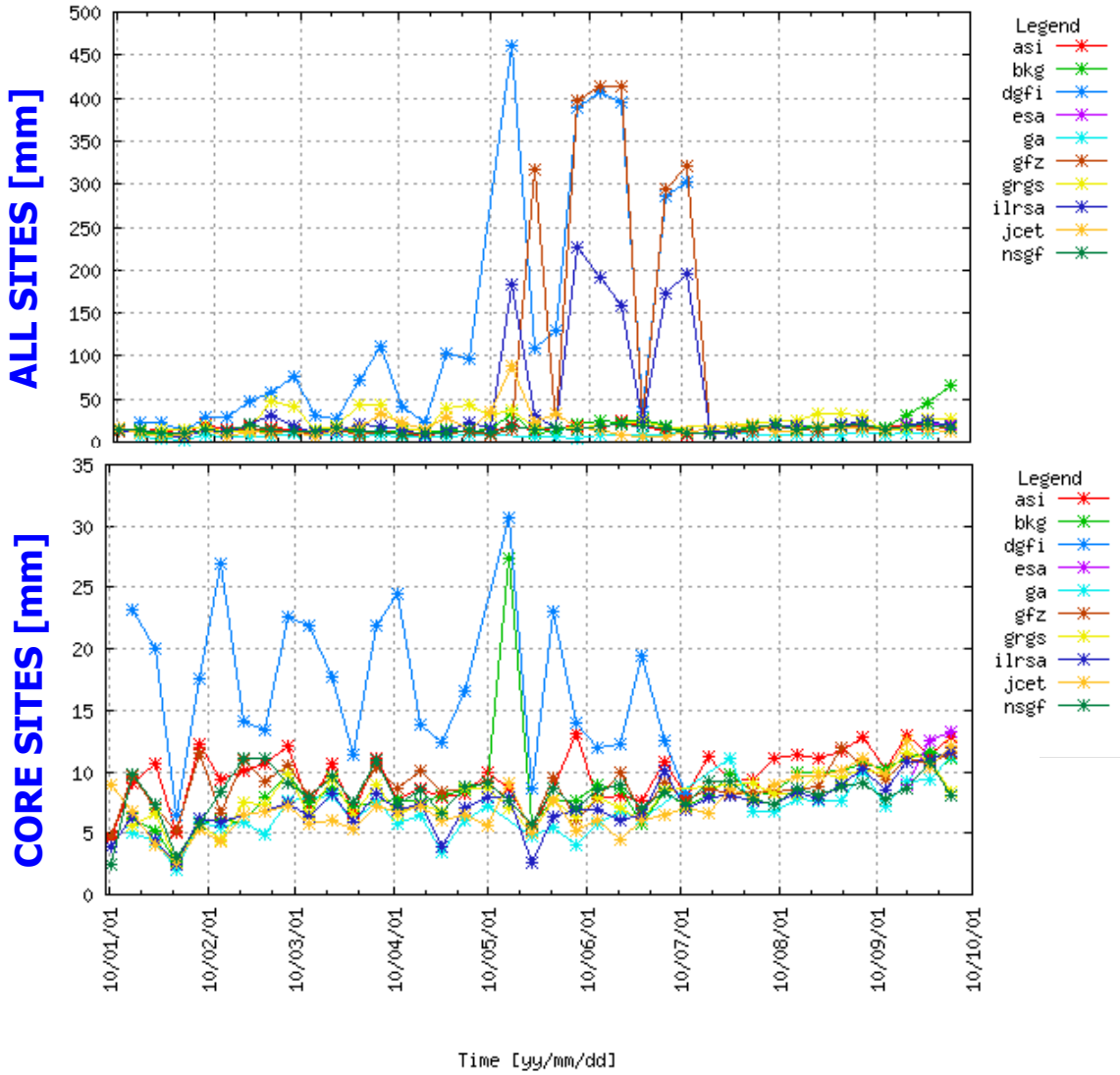
Weekly product: 2010 EOP (x,y) issues



SSC pb indirect impact

Weekly product: detection of the problems

3D Weekly SSC wrms wrt SLRF2005

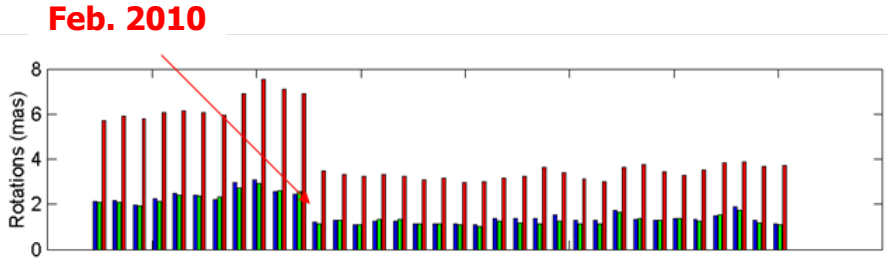


DGFI and GFZ were the only ACs using 7405 data after earthquake (may-july); DGFI solution exhibited bad SSC/EOP performances and unexpected tighter constraints: the mix of these facts impacted also EOP (x, y).

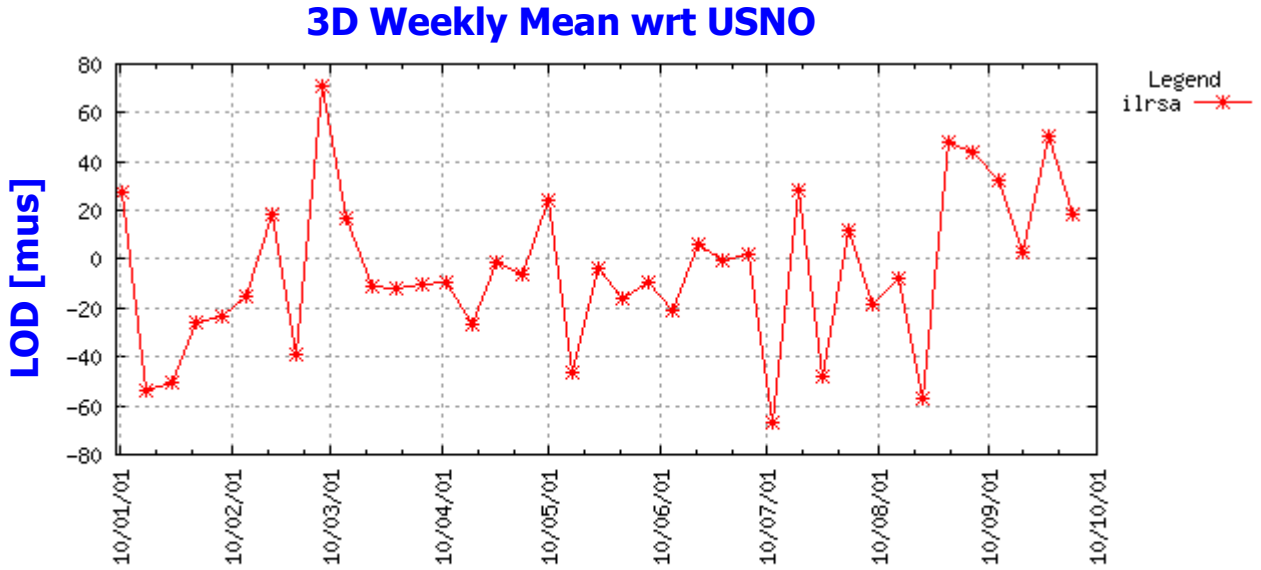
Since 100710 weekly solution, DGFI has been suspending the contribution to fix the problems, while 7405 has been removed from all the solutions.

7405 coo have been corrected and reinstated in August 2010.

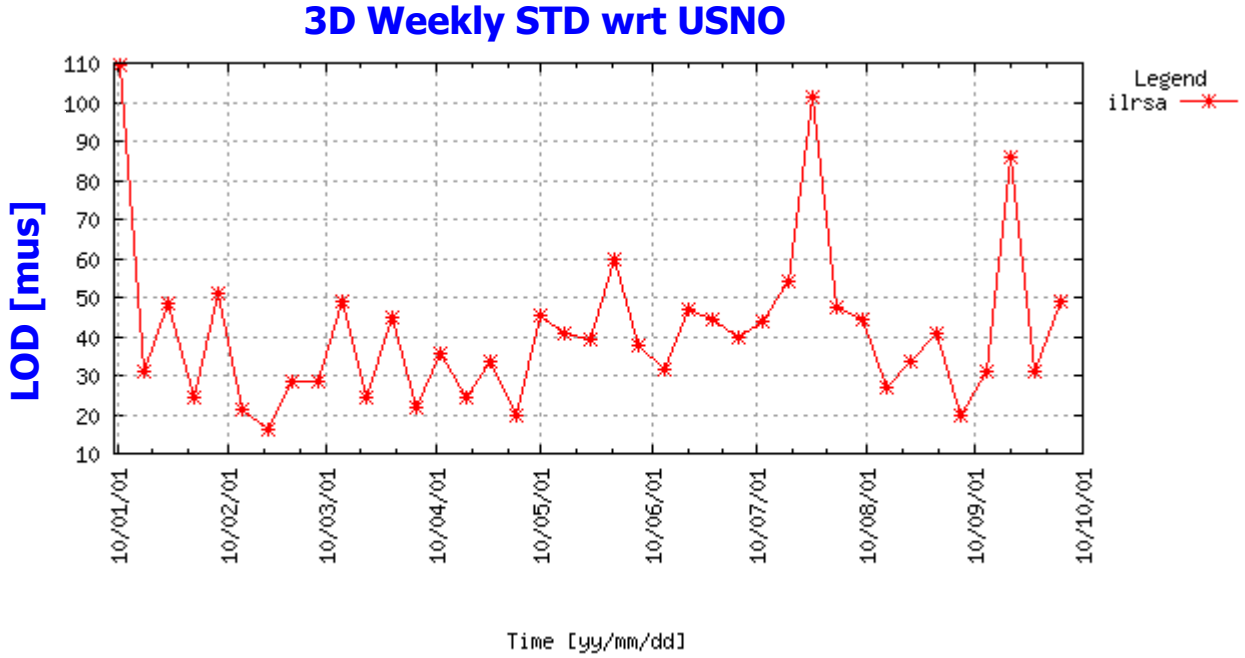
DGFI solution looseness



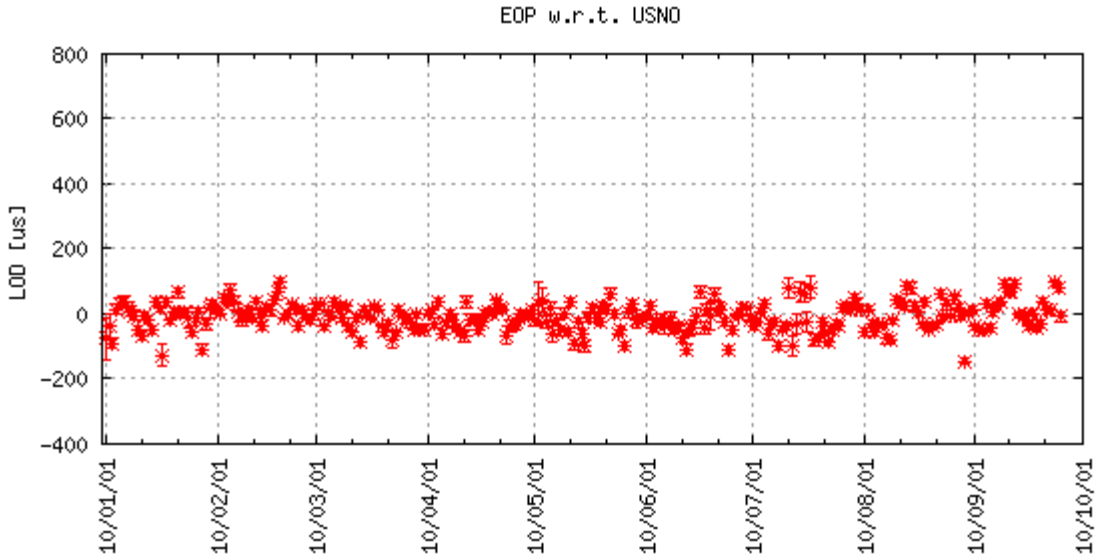
Weekly product: 2010 LOD issues



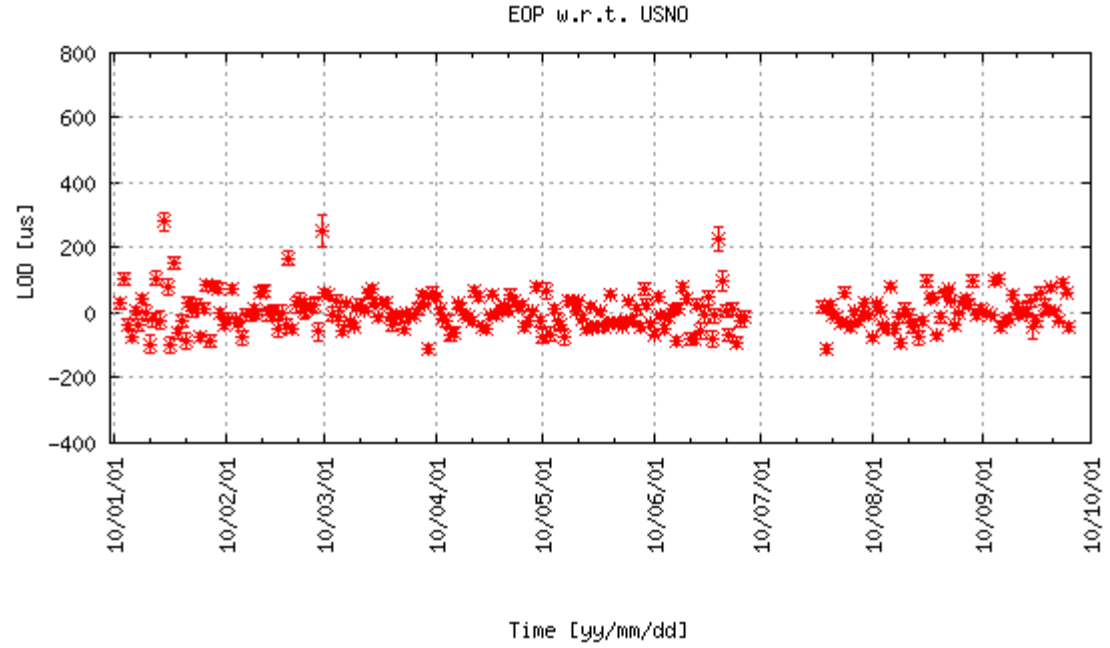
Highly variable



Weekly product: 2010 LOD issues

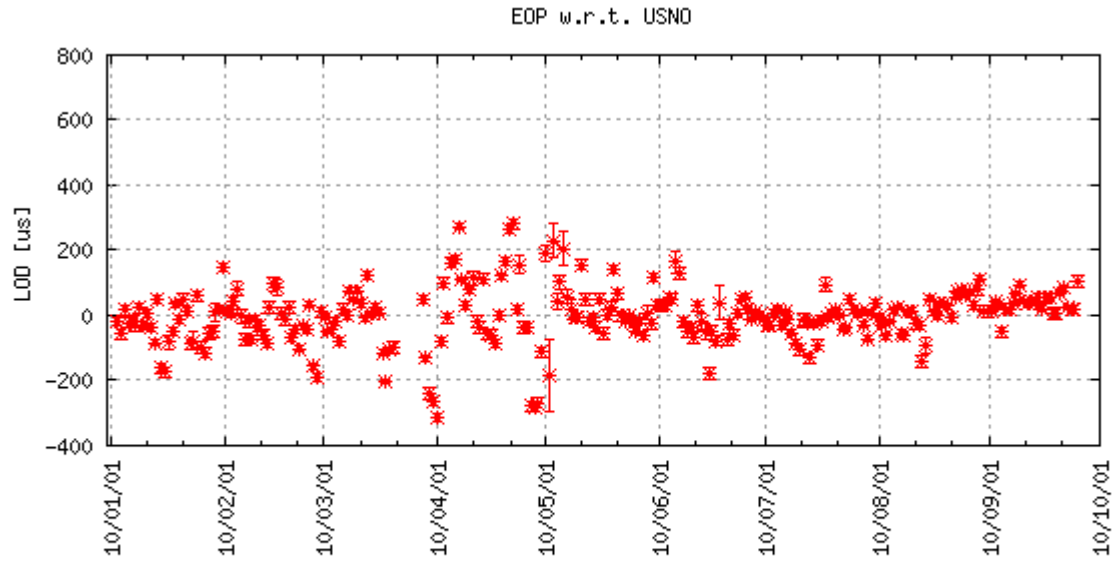


JCET

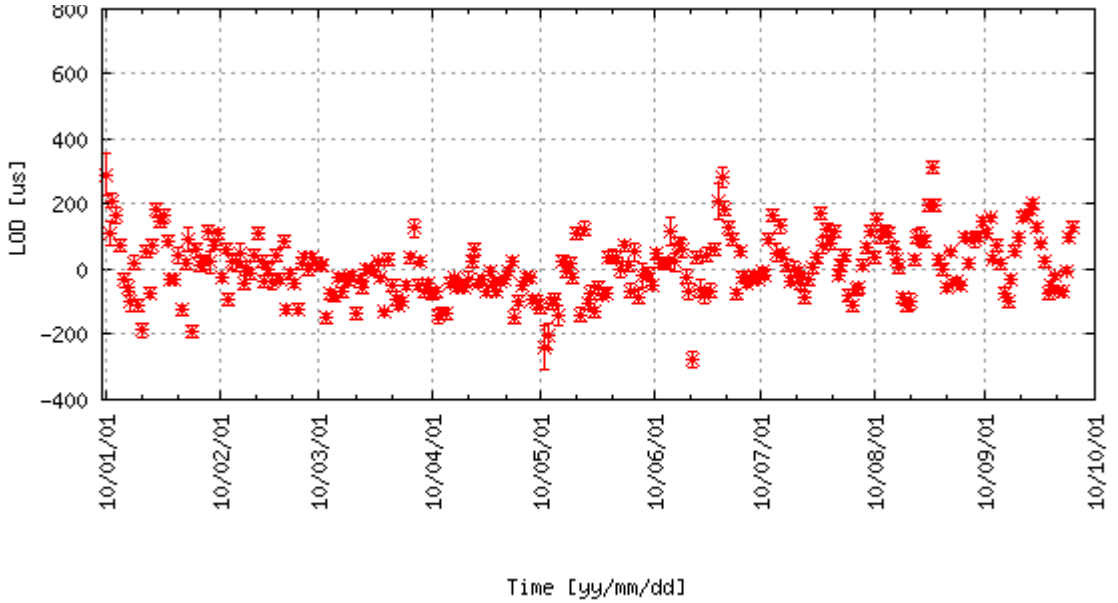


GRGS

Weekly product: 2010 LOD issues

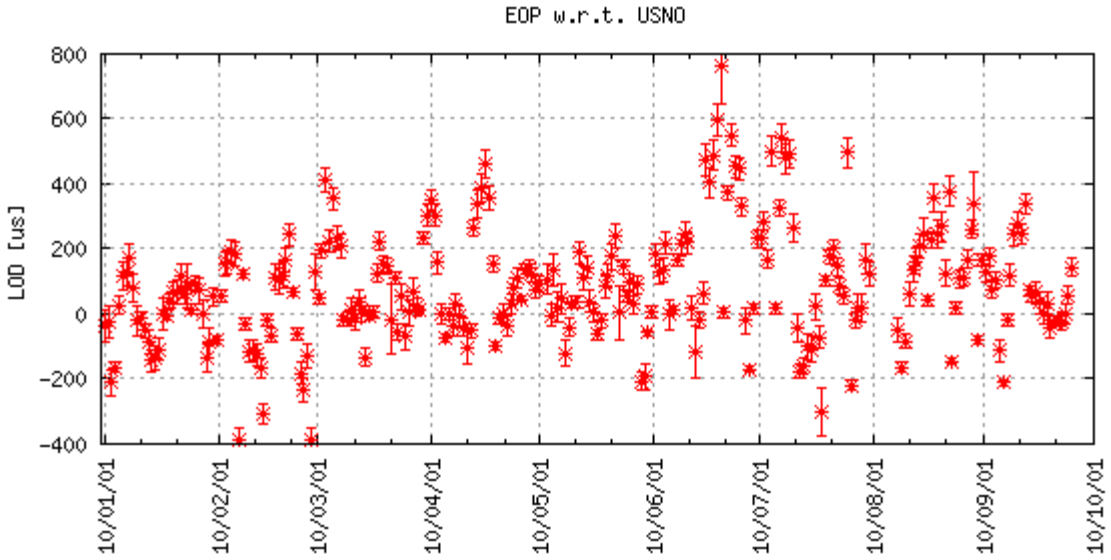


BKG

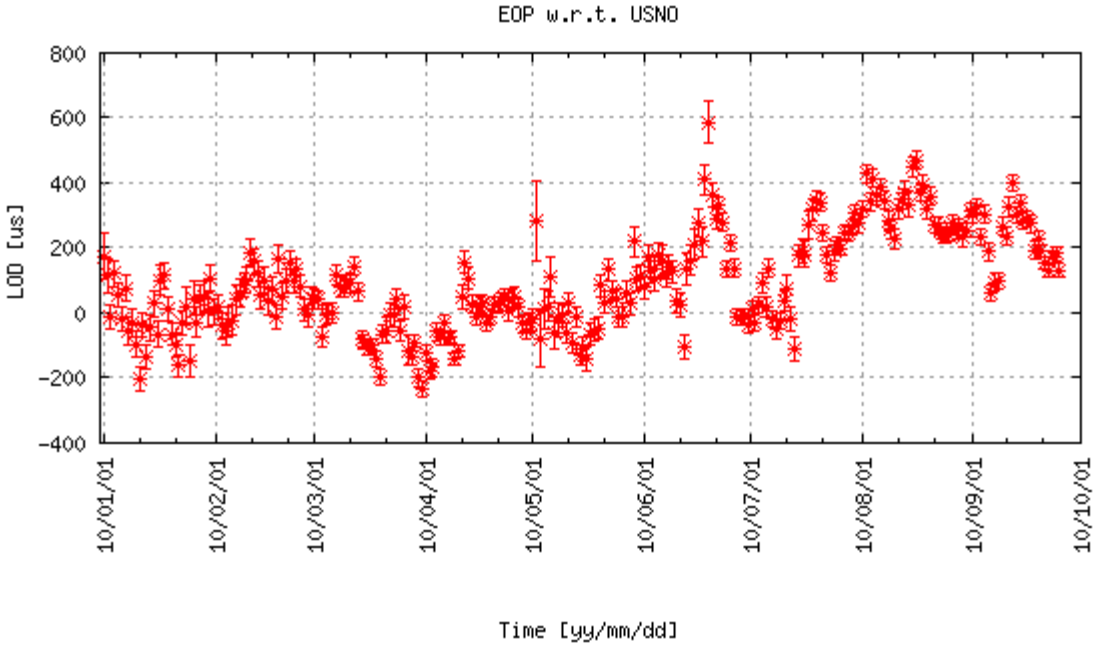


ASI

Weekly product: 2010 LOD issues

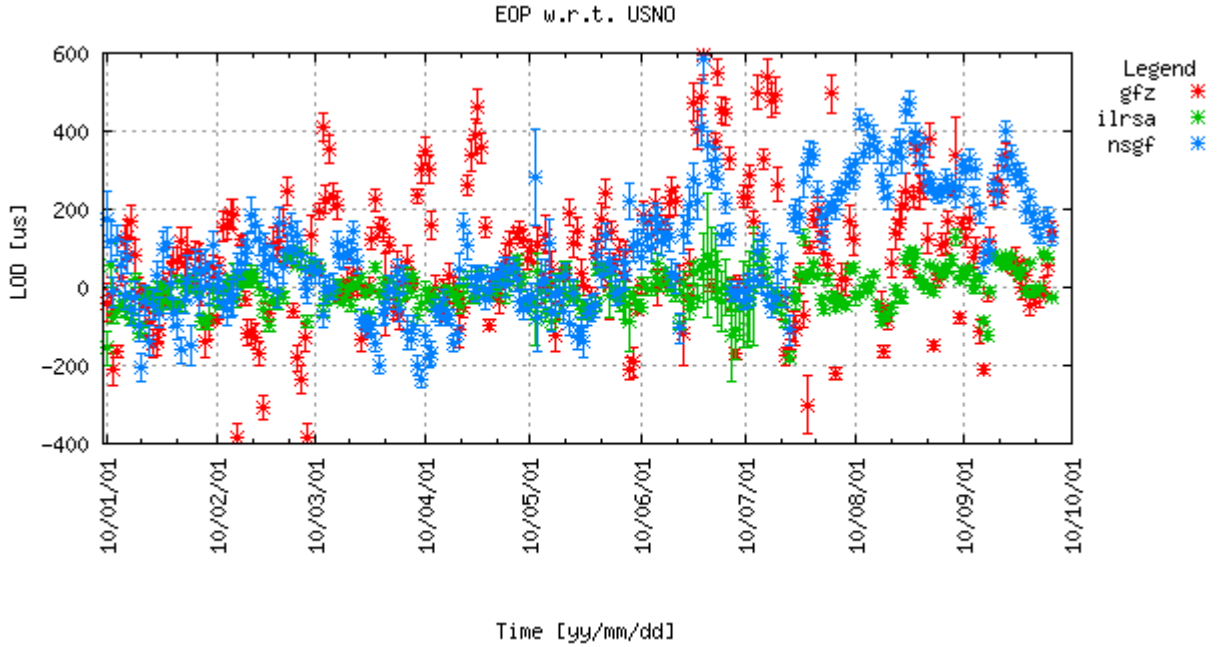


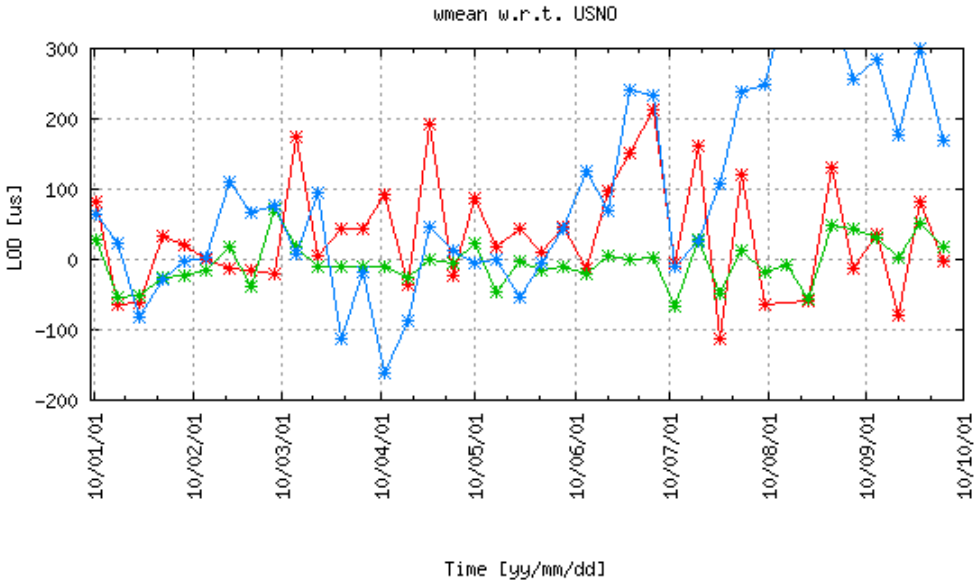
GFZ

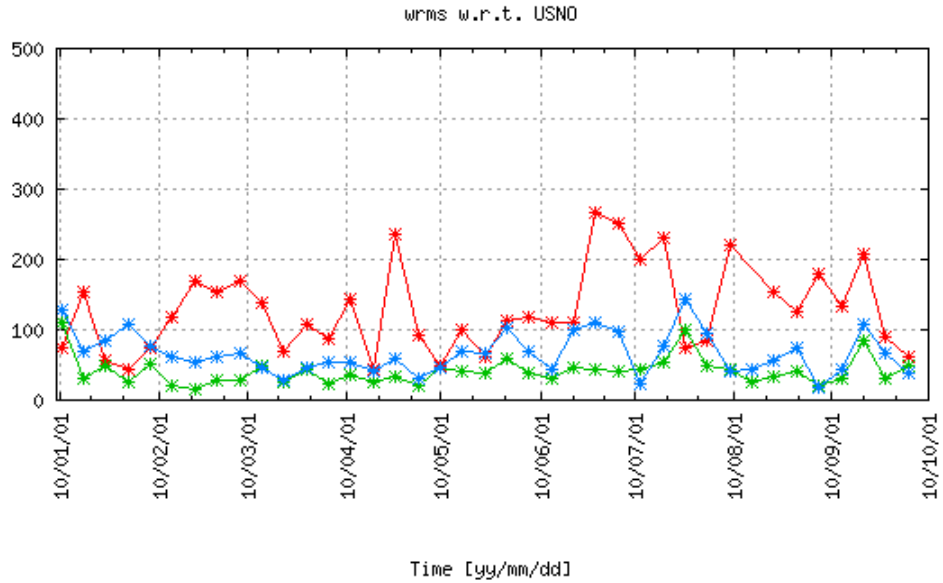


NSGF

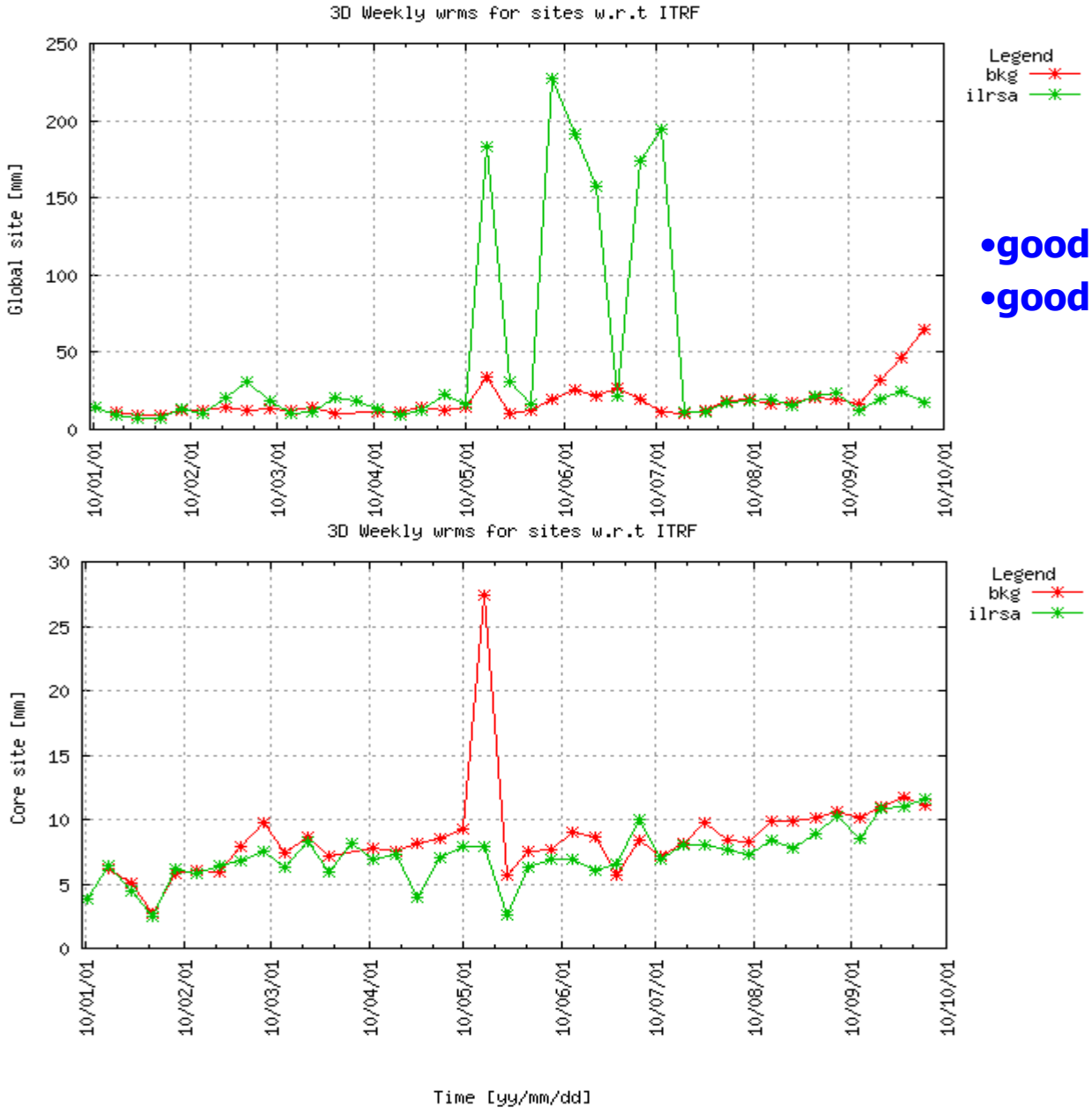
Weekly product: 2010 LOD issues





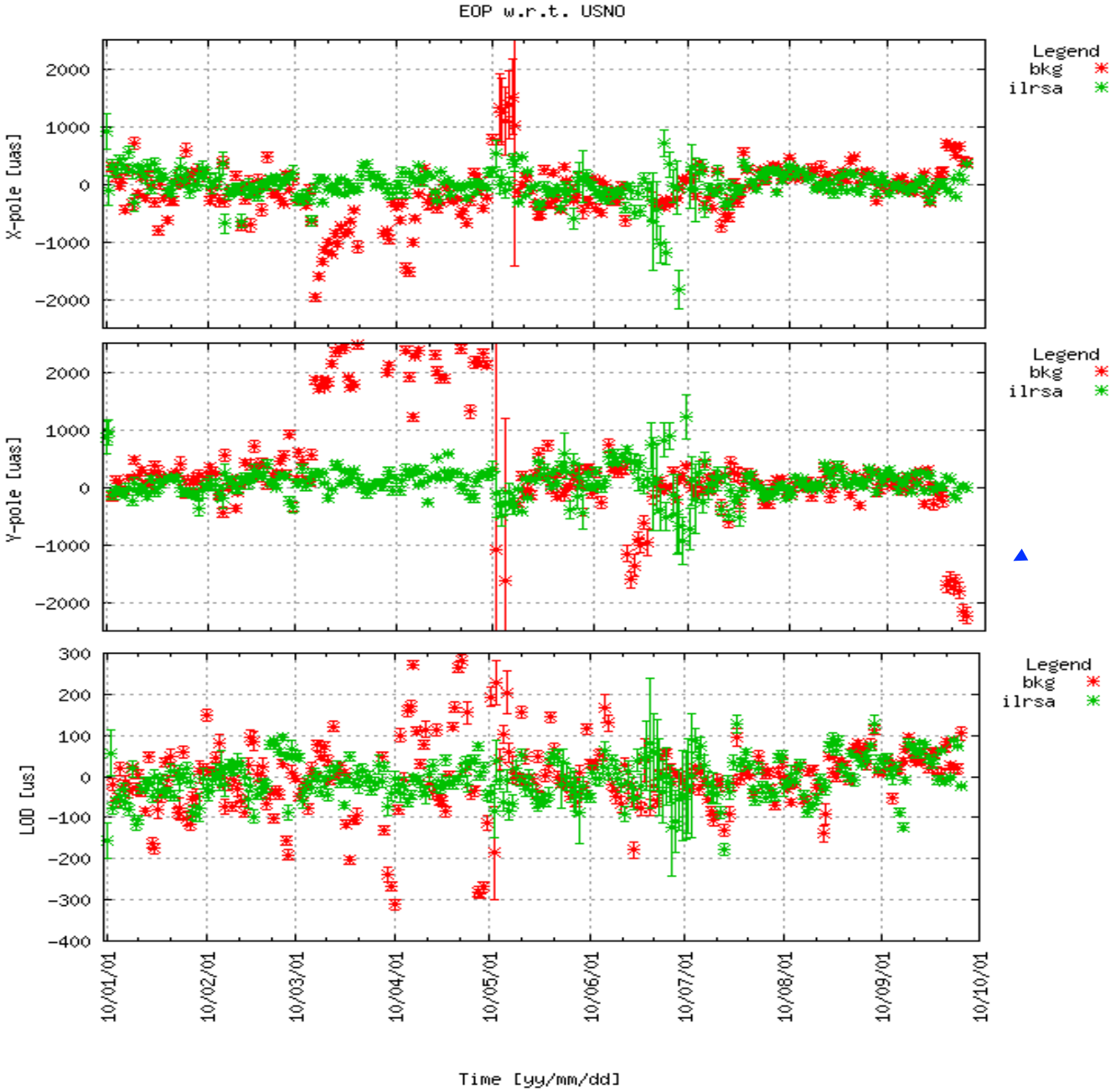


Weekly product: BKG Bernese solution

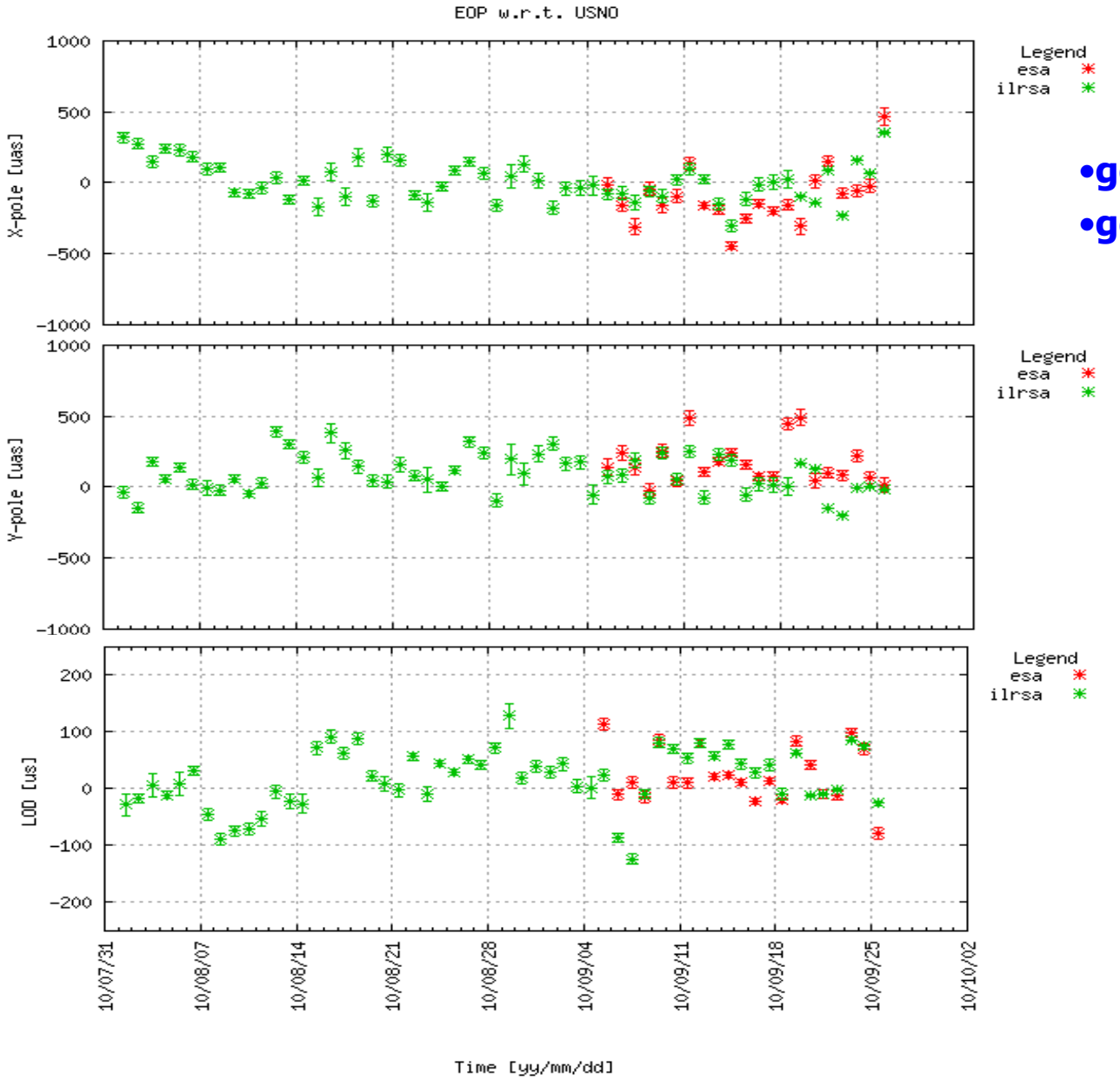


- **good looseness degree**
- **good agreement with ref/solutions**

Weekly product: BKG Bernese solution



Weekly product: ESA solution



- **good looseness degree**
- **good agreement with ref/solutions**

ASI Analysis Center activities

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

G. Bianco - Agenzia Spaziale Italiana, CGS

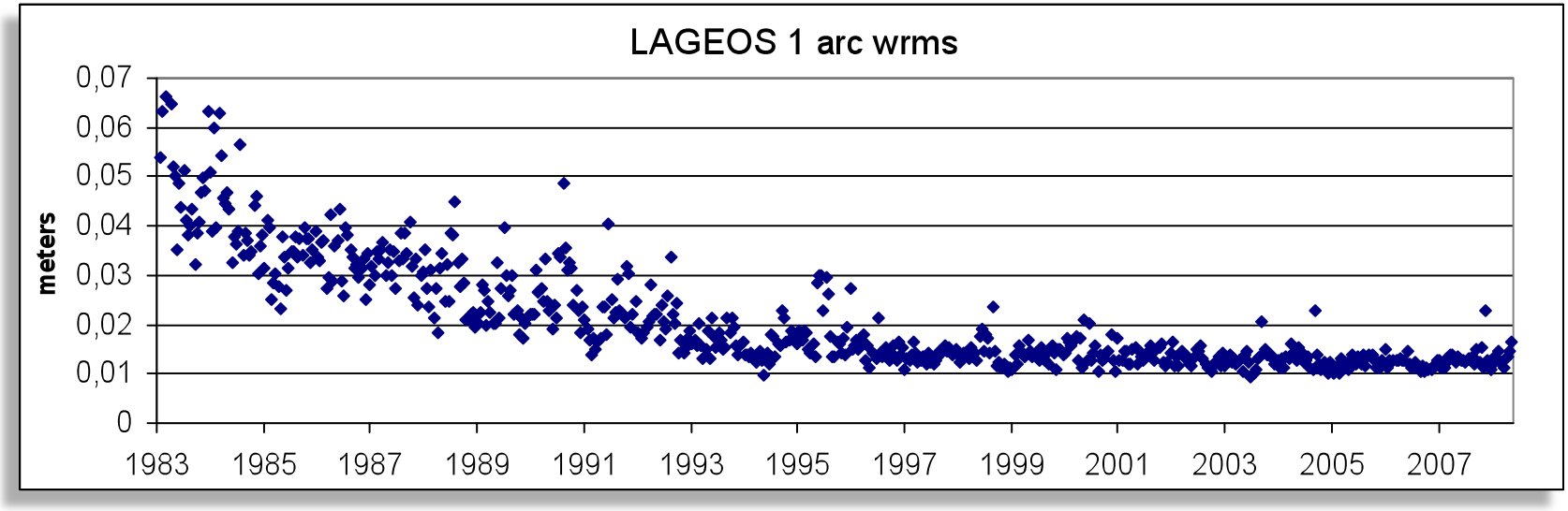
ILRS AWG Meeting, October 1st, 2010, Paris

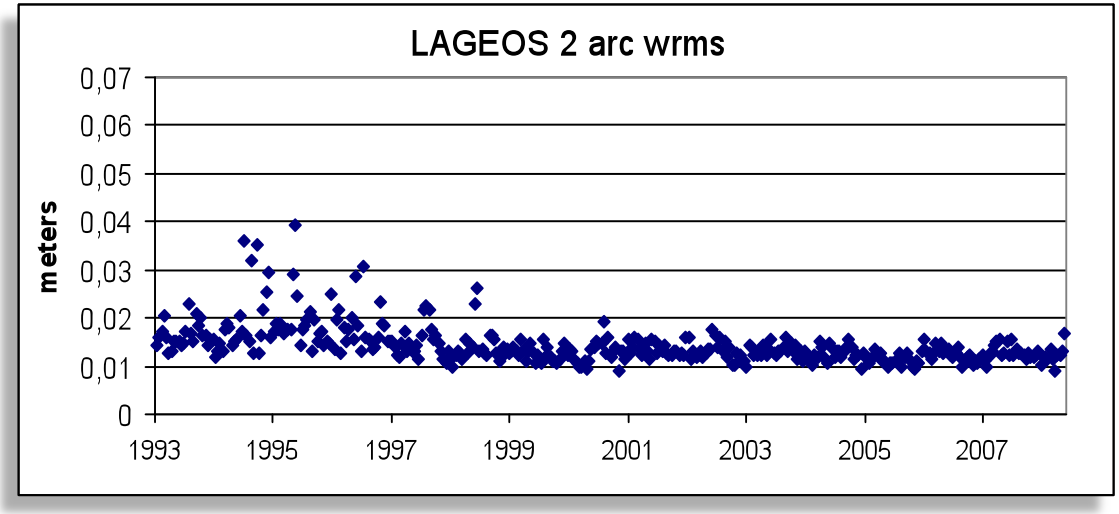
Main activities

- Routine production of daily and weekly solutions
- Station qualification
  - **Concepcion data validation and post-earthquake coordinate estimates**
  - **Simosato data validation**
- CRD format test

….. Under construction

- **New multi-year solution with updated models, ITRF2008 included**





ILRSA CC
ITRF2008/ITRF2008D evaluation

C. Sciarretta, V. Luceri
eGEOS S.p.A., CGS – Matera

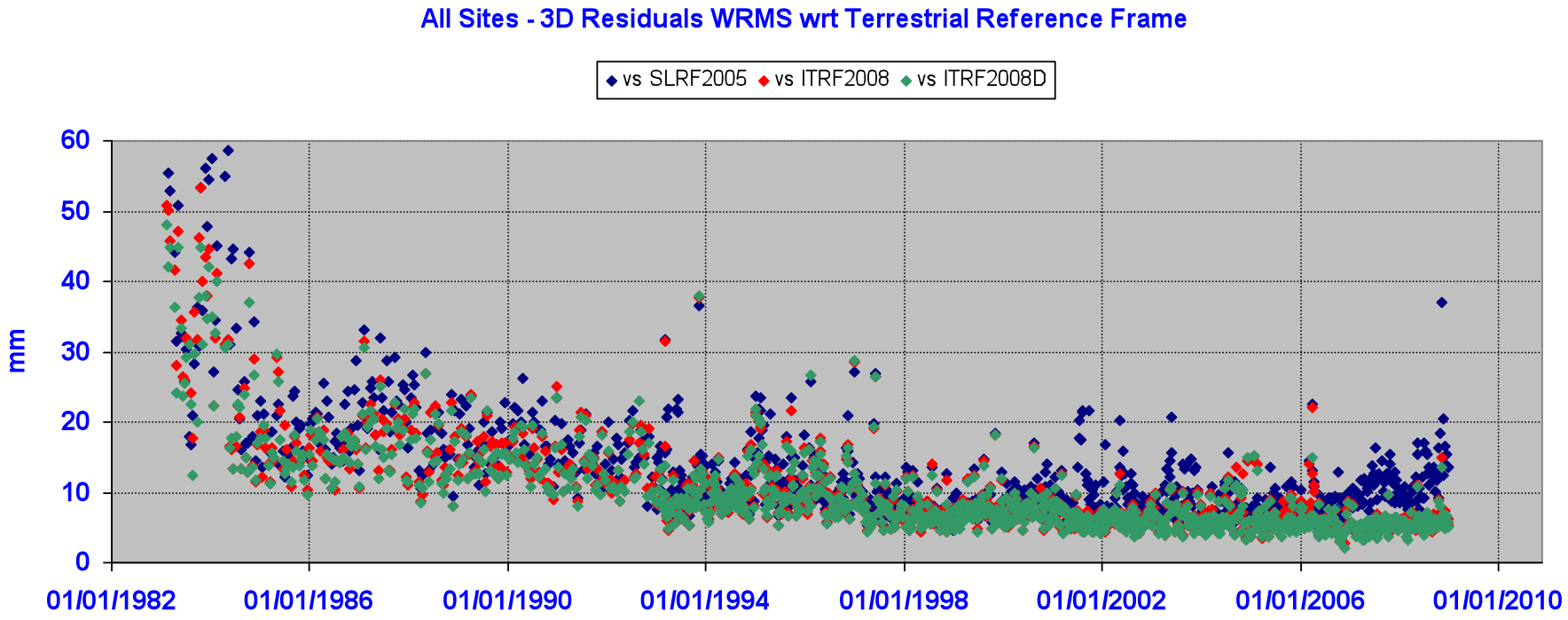
G. Bianco
Agenzia Spaziale Italiana, CGS - Matera

ILRS AWG Meeting, 1st October 2010, Paris

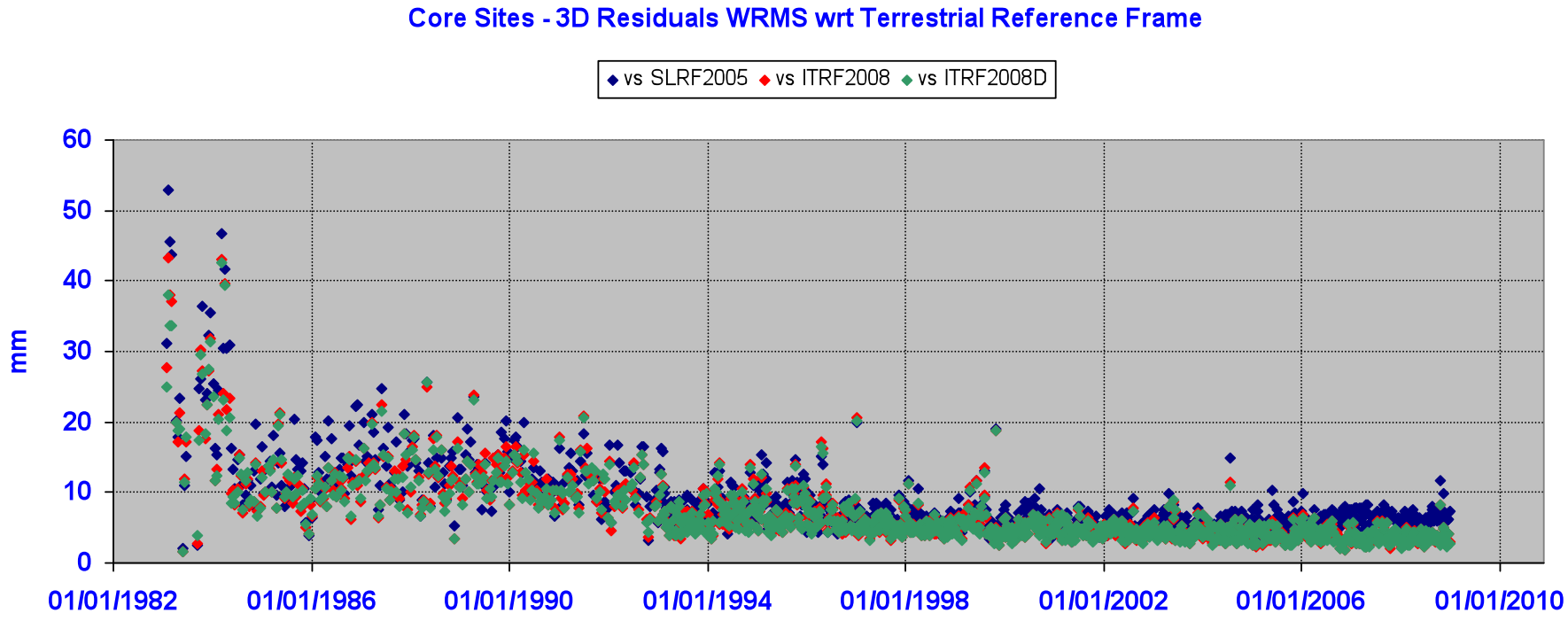
Contents

- 1983-2008 ILRSA v24 transformed into ITRF2008 and ITRF2008D
  (transformation into SLRF2005 already available)
- analysis of SSC residuals
- analysis of Helmert parameters (Translations&Scale)

Site Coordinate Residuals



Site Coordinate Residuals



Site Coordinate Residuals - Statistics

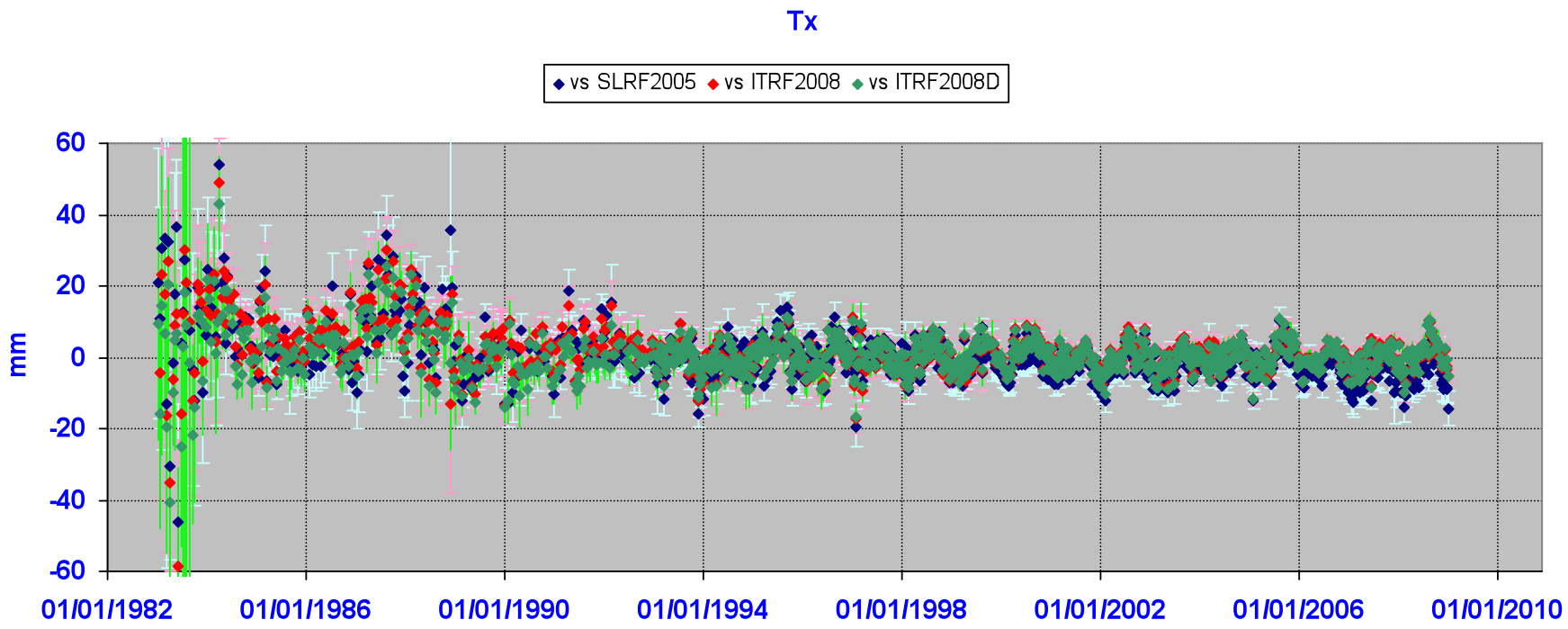
::

	vs SLRF2005		vs ITRF2008		vs ITRF2008D	
	<WRMS> [mm]	**σWRMS [mm]**	**<WRMS> [mm]**	**σWRMS [mm]**	**<WRMS> [mm]**	**σWRMS [mm]**
All Sites	**13.21**	***18.80***	**10.93**	***18.43***	**10.48**	***18.54***
Core Sites	**8.44**	***5.79***	**7.13**	***4.99***	**6.89**	***5.12***

ITRF2008/ITRF2008D Core sites:

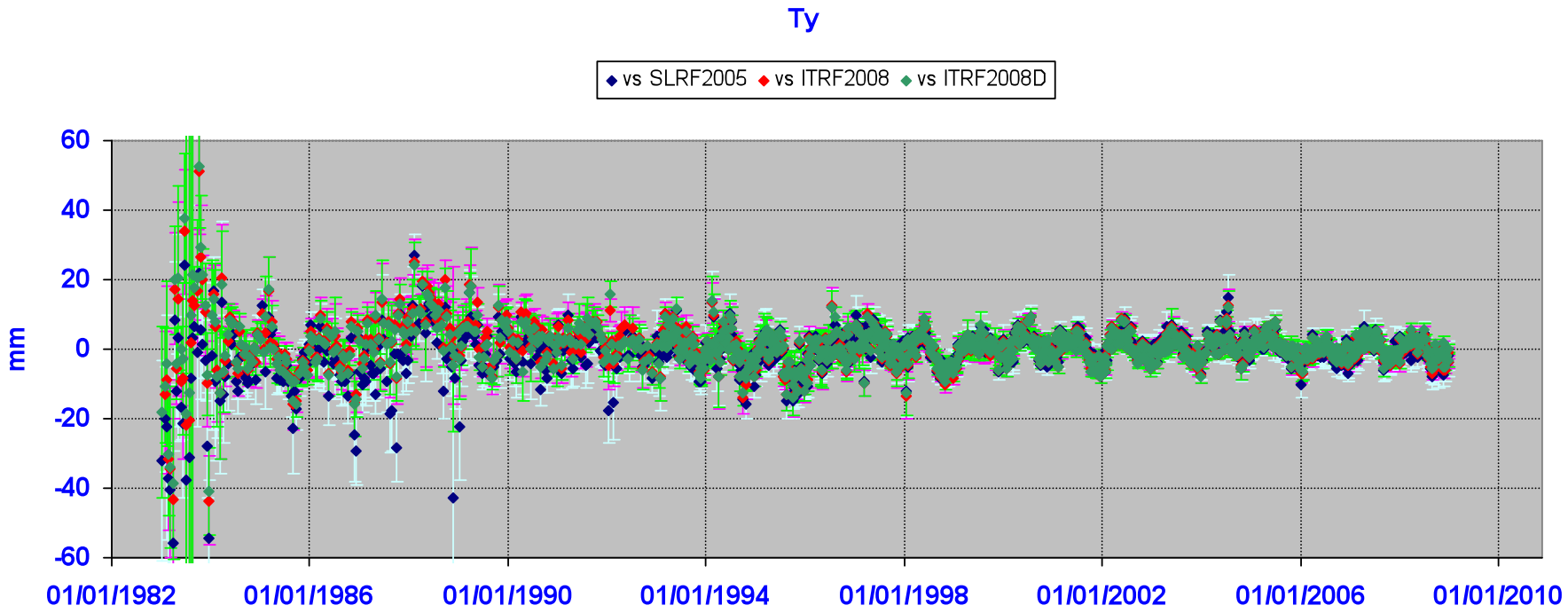
<WRMS> lower of about 20% wrt SLRF2005, ~7mm/11mm (Core/All)

Helmert Translations: Tx



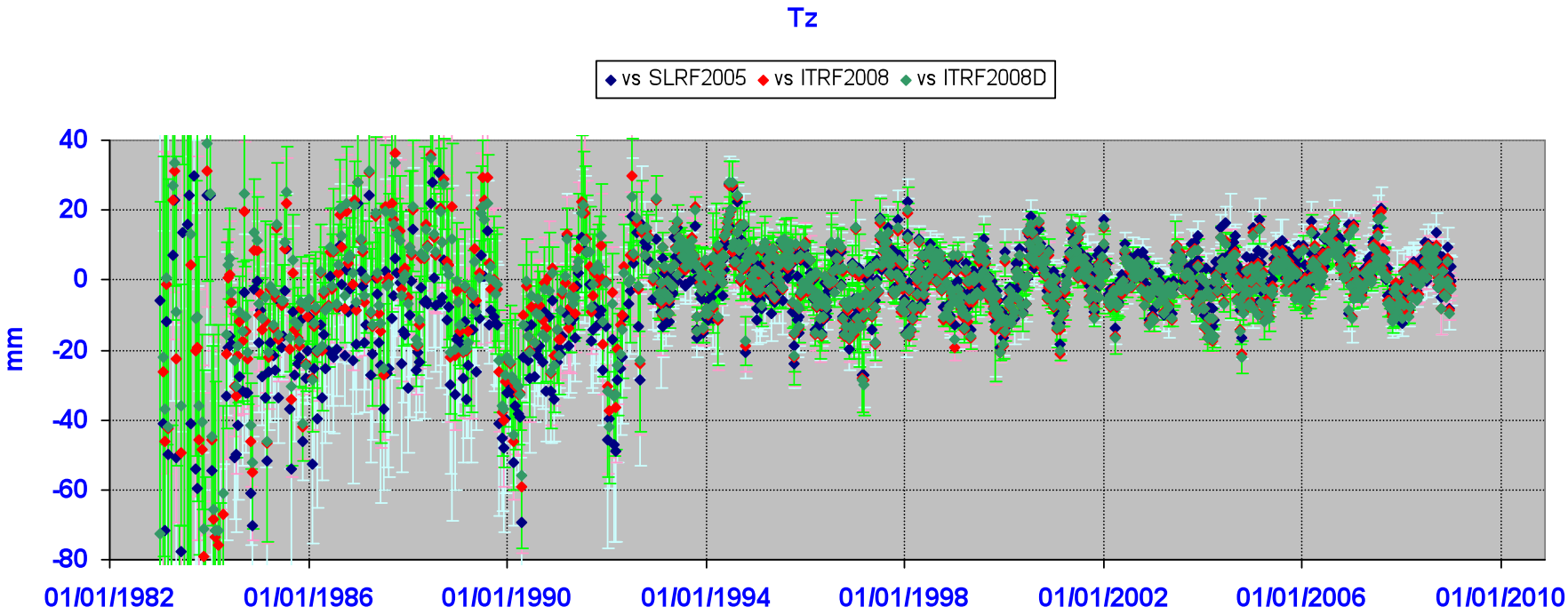
ITRF2008D-ITRF2008 ~ -0.2+/-2.7mm 1993-2008

Helmert Translations: Ty



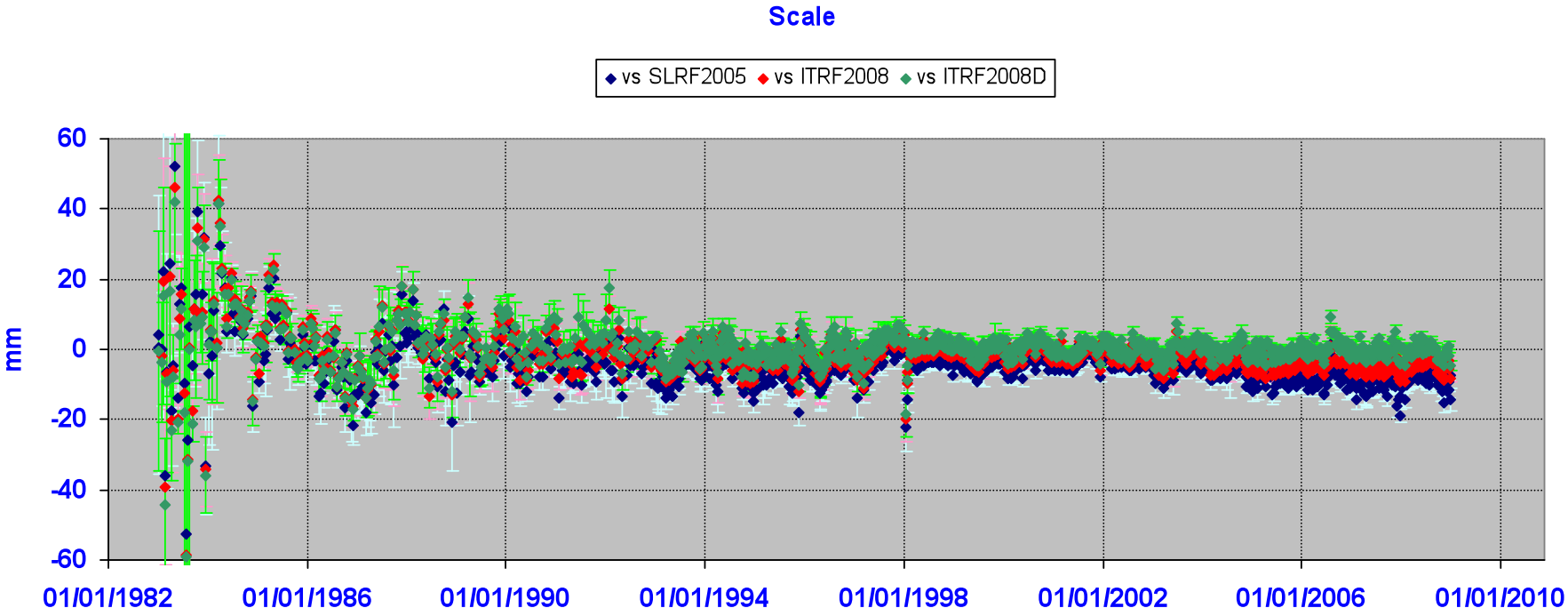
ITRF2008D-ITRF2008 ~ -0.0+/-2.1mm 1993-2008

Helmert Translations: Tz

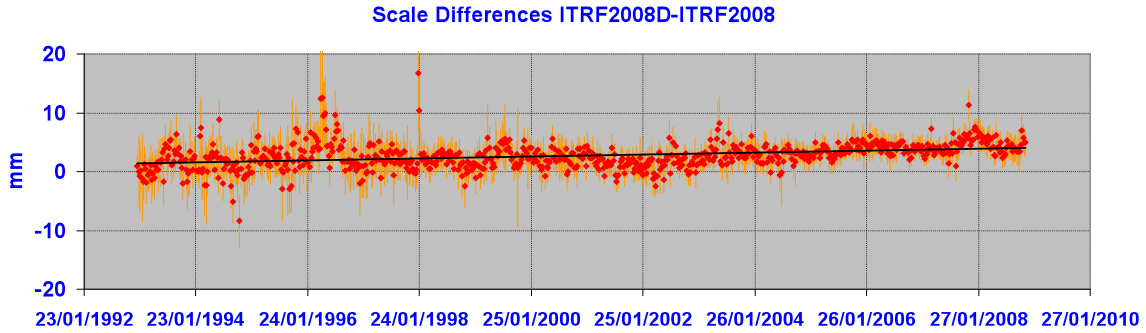


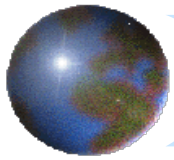
ITRF2008D-ITRF2008 ~ -0.2+/-2.2mm 1993-2008

Helmert ΔScale



ITRF2008D-ITRF2008
~ +2.7+/-2.2mm
1993-2008





Helmert Parameters comparison

::

vs SLRF2005 1983-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.29	*0.02*	+4.06	*0.33*	4.16
Ty	+0.06	*0.02*	-1.07	*0.32*	3.82
Tz	+0.38	*0.03*	-5.93	*0.62*	7.45
Sc	-0.30	*0.01*	+0.48	*0.26*	3.15

vs ITRF2008 1983-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.10	*0.01*	+1.91	*0.20*	3.71
Ty	-0.02	*0.01*	+0.58	*0.19*	3.63
Tz	-0.03	*0.01*	+1.31	*0.29*	6.80
Sc	-0.22	*0.01*	+1.15	*0.19*	2.80

vs ITRF2008D 1983-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.05	*0.01*	+0.88	*0.25*	3.71
Ty	+0.00	*0.01*	+0.20	*0.24*	3.42
Tz	+0.00	*0.02*	+0.24	*0.45*	7.05
Sc	-0.07	*0.01*	+1.27	*0.19*	2.52

::

vs SLRF2005 1993-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.26	*0.02*	+3.41	*0.42*	3.77
Ty	+0.04	*0.02*	-0.70	*0.41*	3.55
Tz	+0.21	*0.04*	-2.37	*0.67*	6.82
Sc	-0.30	*0.02*	+0.53	*0.31*	2.88

vs ITRF2008 1993-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.05	*0.01*	+0.93	*0.22*	3.56
Ty	+0.01	*0.01*	-0.02	*0.21*	3.51
Tz	-0.05	*0.02*	+1.79	*0.30*	6.65
Sc	-0.18	*0.01*	+0.44	*0.22*	2.55

vs ITRF2008D 1993-2008

	Slope [mm/yr]	σslope [mm/yr]	Tnot [mm]	σTnot [mm]	Res wrms [mm]
Tx	-0.02	*0.02*	+0.25	*0.30*	3.53
Ty	+0.04	*0.01*	-0.68	*0.30*	3.21
Tz	-0.05	*0.02*	+1.17	*0.49*	6.76
Sc	-0.04	*0.01*	+0.70	*0.22*	2.24

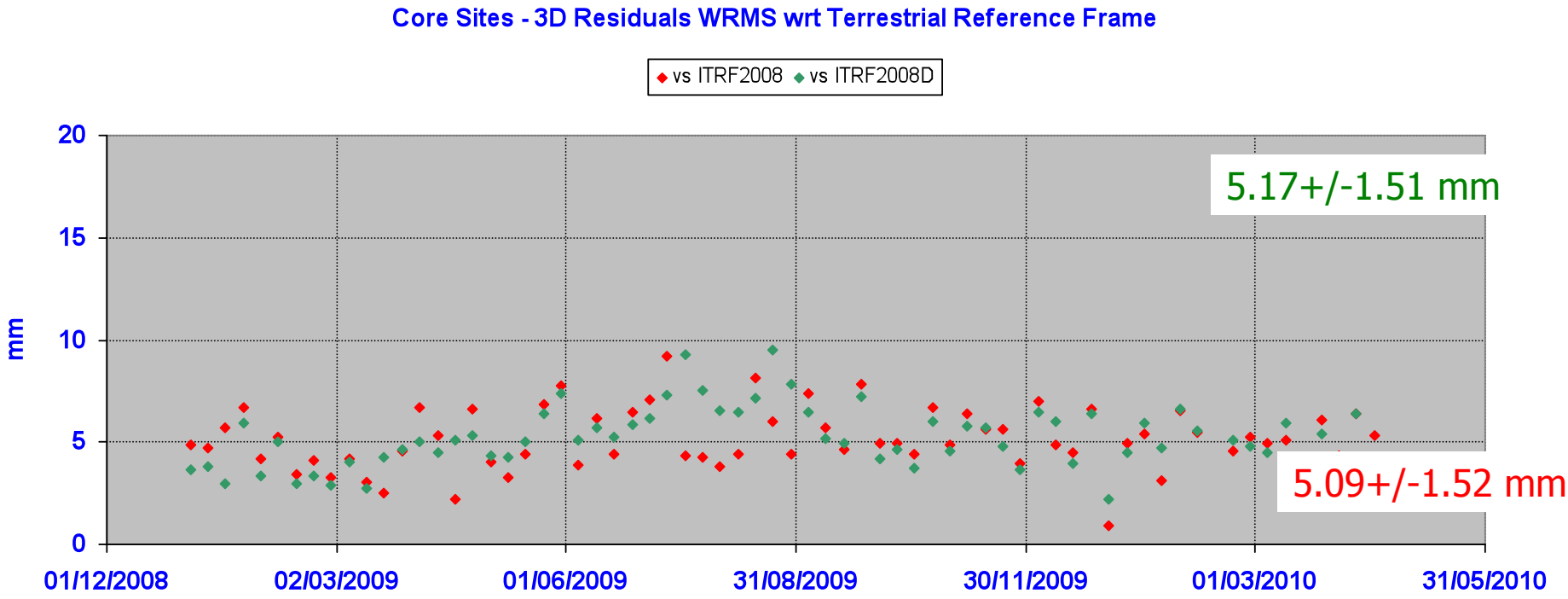
Helmert Parameters comparison

- ITRF2008 shows a scale slope of about -0.2mm/yr, also w/o 1983-1992 estimates; ITRF2008D shows a scale slope of less than -0.1 mm/yr

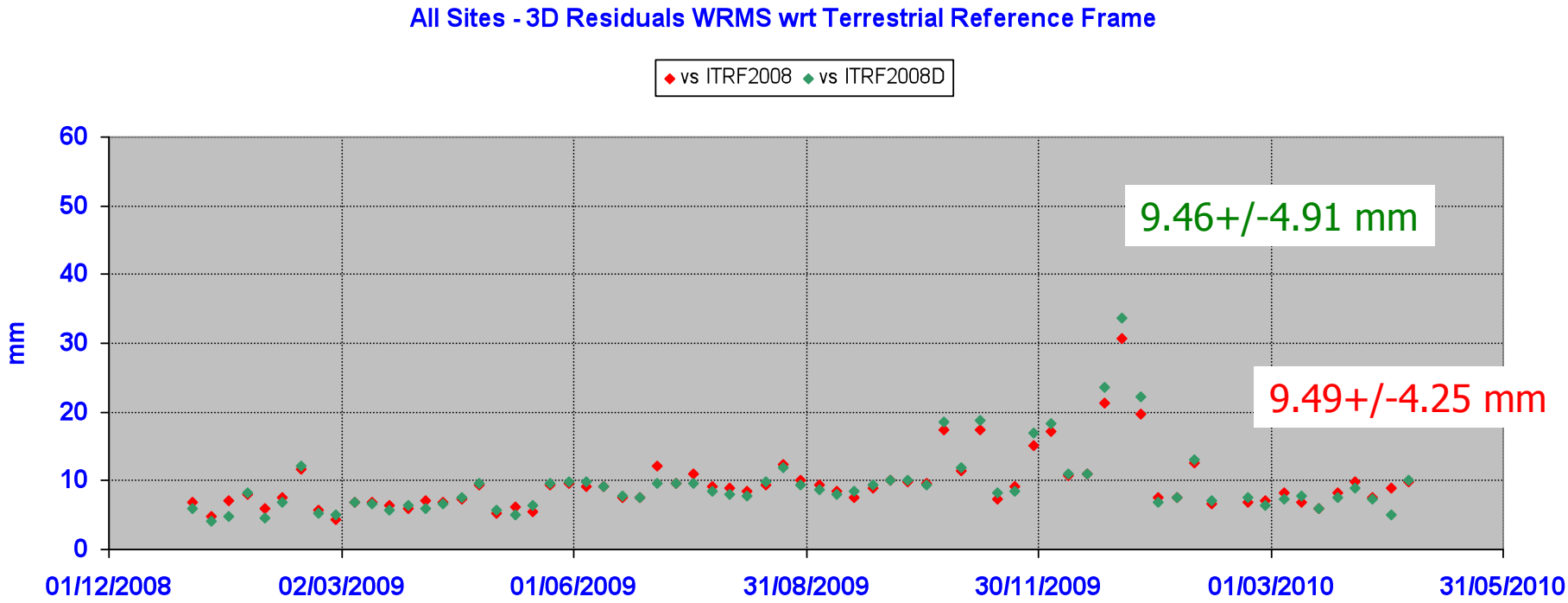
- ~3.7, 3.5, 7, 2.5 mm residuals for Tx, Ty, Tz, Scale for both ITRF2008 and ITRF2008D, 0.5mm decrease wrt SLRF2005 for the whole 1983-2008 period

- ~3.5, 3.3, 6.8, 2.2 mm residuals for Tx, Ty, Tz, Scale for both ITRF2008 and ITRF2008D, 0.2-0.5 mm decrease wrt SLRF2005 for the 1993-2008 period

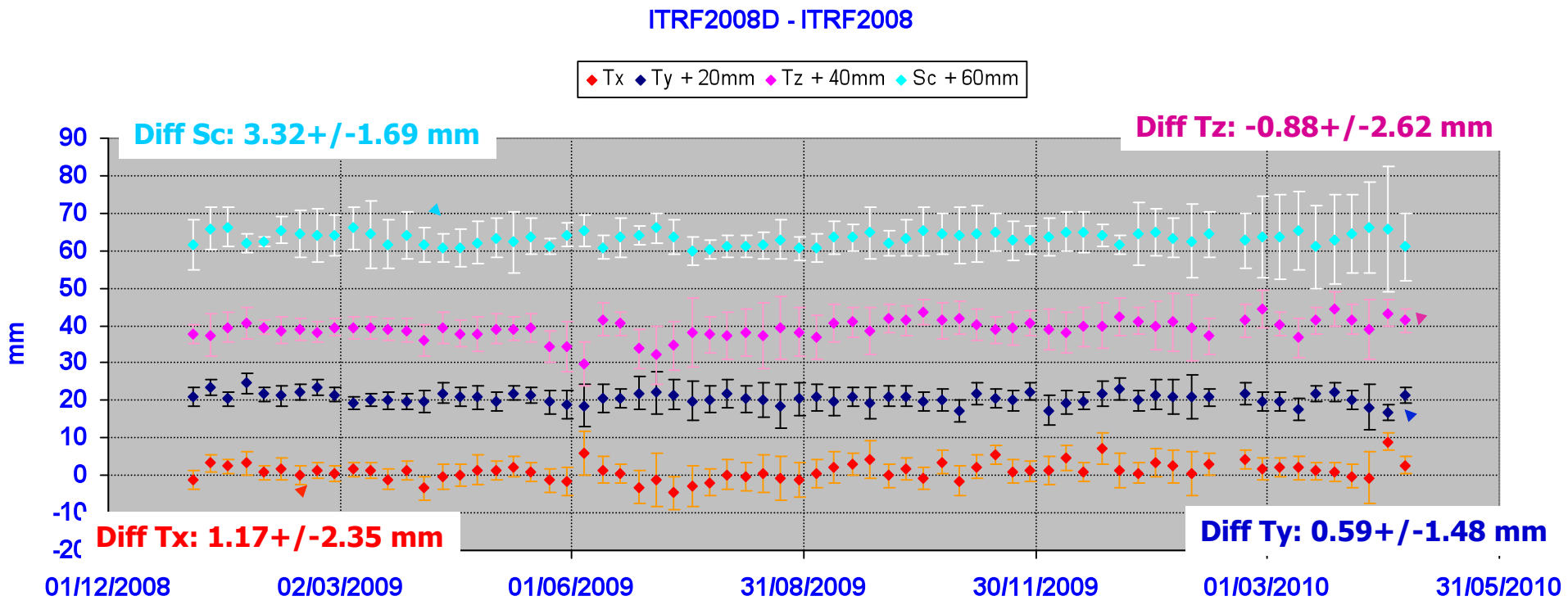
Weekly product: 2009-2010 performance



Weekly product: 2009-2010 performance



Weekly product: 2009-2010 performance



Report of DGFI/AC

Horst Müller

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

DGFI

Routine POS+EOP Solution

Delivery of weekly solution stopped

- Problem with high residuals

  own calculations show ~1 cm r.m.s.
- X and Y rotion not free (3-5 cm constraints)

100529 Rx: 0.0421775 Ry: 0.0429 Rz: 0.1019 (m)
100605 Rx: 0.0414928 Ry: 0.0393 Rz: 0.1088 (m)
100612 Rx: 0.0462859 Ry: 0.0470 Rz: 0.1196 (m)
100619 Rx: 0.0580013 Ry: 0.0533 Rz: 0.1198 (m)
100626 Rx: 0.0395798 Ry: 0.0363 Rz: 0.1142 (m)

Software upgrade until end of October

DGFI

New EDC Server (edc.dgfi.badw.de)

New Linux Server, Intel Core2 Duo, 3.0 Ghz

- 4 GByte ram
- 1.3 Tbyte disk.

- Second identical system as backup and mirror

- Operational, with minor problems, since September 14
- Old server still online, accessible only by ip-address (129.187.165.3) without data missing. Offline end of the year.
- The functionality of EDC will be kept, email exploders, SLRMAIL,SLREPORT and URGENT mail are available as until now

DGFI

Structure of FTP

/pub/slr
- /cpf_predicts
- /data
  - /frd
  - /frd_crd
  - /npt
  - /npt_crd
  - /npt_from_crd
  - /quar_crd
  - /test_crd
- /products
- /summaries

DGFI

Structure of FTP

/npt_crd

/satellite <lageos1>

/year <2010>

/station files

e.g.
/pub/slr/data/npt_crd/lageos1/2010/7845_lageos1_crd_20100312_01_00.npt

/npt

/satellite

/year

/hourly, daily, monthly and yearly files

e.g.
/pub/slr/data/npt/lageos1/2010/lageos1.20100924_1000.qlk

DGFI

Structure of FTP

/cpf_predicts

/2006 /2007 /2008 /2009 /2010 /CNE /COD /current /ESA /GFZ
/HTS /JAX /MCC /NRL /SGF /SHA /UTX

e.g.
/pub/slr/cpf_predicts/2010/lageos2/lageos2_cpf_100731_7121.hts

/products
/pos+eop
/year
/yymmdd
/daily
/year
/month

DGFI

Station Qualification

New stations since last AWG meeting in Vienna:

- Arequipa (7403)
- Beijing (7249) (? passes on quarantine dir. for Aug. 2010)
- Concepcion (7405)
- Haleakala (7119)
- Simosato (7838)
- Tanegashima (7358)
- Tokyo, Koganai (7308)
- Tokyo, Koganai (7328, no Lageos passes)

- Hartebeesthoeg and Tahiti(MOBLAS-8) no quarantine necessary

DGFI

Station Qualification

Actions:

daily check of the CDDIS quarantine directory
automatic report generation

First experiences:

Good cooperation
it takes sometimes longer to fulfil the
20 pass criteria (weather conditions,..)

Problems:

information flow, for new quarantine stations
Some stations have no Lageos capability (7328)

DGFI

Daily range– and time bias computation

On a daily basis for Lageos-1/2 and Etalon-1/2 processing of range- and time biases for all stations

Contact with stations in case of abnormal high values

Soon Leo's included

Summary available fromCODE

Simosato report

year	mm	dd	hh	mm		range-bias [cm]	sigma [cm]	prec.est. [cm]	no of observations	edit.	satellite
2010	5	17	11	27	:	6.55	2.16	1.45	4	0	lageos2
2010	5	26	01	35	:	1.05	1.19	4.26	5	0	lageos2
2010	5	26	09	23	:	-0.59	2.84	0.48	11	0	lageos1
2010	5	26	09	57	:	4.93	0.43	1.36	20	0	lageos2
2010	5	27	08	17	:	3.42	0.94	2.69	11	0	lageos2
2010	5	27	11	14	:	13.46	2.50	0.60	17	0	lageos1
2010	5	27	12	14	:	10.16	1.42	3.46	5	0	lageos2
2010	5	27	14	47	:	-2.60	3.92	0.73	3	0	lageos1
2010	5	28	01	39	:	2.07	0.55	1.68	13	0	lageos2
2010	6	2	00	16	:	1.75	0.90	1.74	9	0	lageos2
2010	6	2	08	43	:	1.64	0.38	2.13	17	0	lageos2
2010	6	2	10	03	:	4.72	1.90	0.35	34	0	lageos1
2010	6	2	16	48	:	7.46	3.47	0.94	14	0	lageos1
2010	6	3	06	58	:	2.44	0.86	2.38	7	0	lageos2
2010	6	3	08	50	:	2.85	1.68	0.88	8	0	lageos1
2010	6	3	10	49	:	6.51	1.28	2.05	8	0	lageos2
2010	6	3	12	20	:	10.46	2.93	0.38	9	0	lageos1
2010	6	3	15	36	:	8.24	4.15	0.46	10	0	lageos1
2010	6	4	00	24	:	3.29	0.79	2.28	13	0	lageos2
2010	6	8	12	30	:	12.09	4.00	0.75	8	0	lageos1
2010	6	8	15	47	:	12.25	4.86	0.50	12	0	lageos1
2010	6	9	07	26	:	7.34	1.45	2.56	10	0	lageos2
2010	6	9	07	59	:	-7.06	5.95	5.31	8	0	lageos1
2010	6	9	11	06	:	9.33	5.29	0.41	17	0	lageos1

Haleakala report

year	mm	dd	hh	mm		range-bias [cm]	sigma [cm]	prec.est. [cm]	no of observations	edit.	satellite
2010	8	15	00	51	:	-18.08	4.13	0.50	14	0	Lageos1
2010	8	18	00	16	:	-13.86	5.16	0.66	3	0	Lageos1
2010	8	19	02	20	:	-10.19	5.26	1.37	12	0	Lageos1
2010	8	19	08	55	:	-16.68	4.60	1.60	10	0	Lageos1
2010	8	20	09	21	:	-19.87	1.49	0.57	2	0	Lageos2
2010	8	21	07	37	:	-16.79	1.14	0.37	17	0	Lageos2
2010	8	23	20	22	:	-20.94	0.43	0.71	18	0	Lageos2
2010	8	25	20	33	:	-21.00	0.53	0.39	26	0	Lageos2
2010	8	26	18	51	:	-17.60	0.72	0.55	20	0	Lageos2
2010	8	27	20	53	:	-20.33	0.77	0.59	20	0	Lageos2
2010	8	28	18	52	:	-19.61	0.45	0.36	25	0	Lageos2
2010	8	30	19	35	:	4.09	0.81	0.47	11	0	Lageos2
2010	8	31	21	18	:	0.57	0.97	0.55	15	0	Lageos2
2010	9	1	19	21	:	3.69	0.42	0.85	25	0	Lageos2
2010	9	5	00	10	:	1.91	0.57	0.41	23	0	Lageos1
2010	9	8	18	05	:	2.34	0.60	0.43	26	0	Lageos2
2010	9	8	22	15	:	1.12	0.93	0.34	21	0	Lageos1
2010	9	9	01	47	:	1.47	1.14	0.39	15	0	Lageos1
2010	9	10	18	22	:	3.10	0.70	0.62	21	0	Lageos2
2010	9	19	04	57	:	-5.22	4.06	0.60	16	0	Lageos2
2010	9	21	04	59	:	1.96	3.56	0.40	22	0	Lageos2
2010	9	21	09	07	:	-1.53	2.81	0.82	9	0	Lageos2
2010	9	22	01	45	:	-1.31	1.65	0.37	16	0	Lageos1
2010	9	23	23	06	:	-1.39	0.65	0.53	10	0	Lageos1
2010	9	24	02	35	:	1.85	2.44	0.32	10	0	Lageos1

SLR-Discontinuities, Data-Handling

Status

2 File available updated regularly:

- ILRS_Data_Handling_File.snx
- ILRS_Discontinuities_File.snx

Problems

- Update
- Content, which kind of biases, edited data, ... to include
- Handling of 1999 CDDIS data

Files are available from DGFI ILRS pages.

http://ilrs.dgfi.badw.de/fileadmin/data_handling/ILRS_Data_Handling_File.snx
http://ilrs.dgfi.badw.de/fileadmin/data_handling/ILRS_Discontinuities_File.snx

DGFI

SLR-Discontinuities, Data-Handling

Blocks in the "ILRS Data Handling File"

- Data records to be deleted in CDDIS data sets of 1999
- Data corrections converted from CDDIS (Van Husson tables)
- List of stations with mandatory range biases to be estimated
- List of station dependent range biases adopted by the ILRS/AWG
- List of known uncorrected station biases

```
7941 --- mm   A 07:047:00000 07:053:00000 R      -14.00    0.00 engineering bias
7941 --- mm   A 07:053:00000 07:187:39600 R      -28.00    2.00 engineering bias
7941 --- mm   A 07:187:39600 07:241:28800 R      -22.00    2.00 engineering bias
7941 --- mm   A 07:242:00000 07:295:50400 R      -25.00    3.00 engineering bias
7941 --- ms   A 10:221:61200 10:223:43200 T     -100.00         uncorrected time bias
```

Large biases are not a problem for analysis
but constant biases in cm resp. 0.1 msec. level are critical
e.g Simeiz or Shanghai

DGFI

ILRS Analysis Working Group Meeting, Paris, October 1, 2010
Large Lageos-1 biases 2009/2010

1893	3103.41608	101820.30	10182.03	0.00	0.84	1487
7821	3104.20529	-132549.00	-13254.90	0.00	0.98	1487
1824	3136.44421	-110320.00	-11032.00	0.00	1.23	1490
1824	3146.30243	201087.60	20108.76	0.00	0.01	1492
1824	3146.46155	-2.92	102.97	-108985.00	77.06	1492
1873	3172.45638	-244738.00	-24473.80	0.00	0.52	1496
1873	3173.25509	-308736.00	-30873.60	0.00	0.01	1496
1873	3227.26204	1376822.00	137682.20	0.00	1.39	1503
1879	3245.11105	51.97	19.32	-295186.00	24.76	1506
1893	3254.21188	200.30	314.83	153242.10	130.99	1507
7249	3254.17589	-53156.90	150.61	1684.30	54.84	1507
1873	3300.37605	394.31	16.79	-100140.00	9.76	1514
1873	3308.22190	54.65	13.43	-99987.00	9.53	1515
1873	3308.36007	-154.54	18.89	-99999.00	8.84	1515
1868	3368.00973	671778.10	67177.81	0.00	1.93	1524
1824	3381.46211	130892.90	13089.29	0.00	1.21	1525
1824	3385.23152	96.16	120.27	-105913.00	72.39	1526
1824	3385.37880	57.56	40.07	-105937.00	23.86	1526
1824	3400.28153	-5.58	4.68	13530.10	2.83	1528
7249	3397.12893	-53.30	13.51	969291.20	21.77	1528
7105	3467.30622	-99152.90	-9915.29	0.00	0.20	1538
7406	3483.52233	278097.20	27809.72	0.00	0.99	1540
7406	3483.67095	115160.30	11516.03	0.00	0.10	1540
7406	3483.94697	252170.10	25217.01	0.00	0.00	1540
7308	3688.39662	-1032.17	31.21	11029.50	16.53	1569
7308	3688.54399	-1011.89	22.59	13593.20	15.82	1569
7810	3727.70403	-500.78	24.82	32497.70	3710.66	1575
7941	3873.34851	-8.19	8.99	100003.80	4.15	1596
7941	3873.46950	5.18	41.33	99998.80	16.63	1596
7941	3874.14193	23.59	7.18	99976.60	4.76	1596
7941	3874.29445	23.99	8.05	99989.20	3.06	1596
7941	3874.43439	1.24	14.29	99989.70	8.19	1596
7941	3874.57481	25.96	7.70	100004.00	4.59	1596
7941	3875.08641	-87.25	5.73	99962.10	3.55	1596

DGFI

Helmert parameters, station positions, Earth Orientation Parameters, and a priori residual time series.

New GRGS AC solution.

09/30/2010

I - Analyses for the ILRS combined v24 solution over the time period 1993.0 - 2008.9

* Computation of transformations between ILRS solution and ITRF2005/ITRF2008

* For each computation
  - Projection of the variance-covariance matrix
  - Raw residuals rejected at 10 cm and then normalized residuals at 4
  - For the statistics after transformation, all the position residuals are considered

Weekly Helmert transformations (1/3)

w.r.t. ITRF2005

Results for TX translation (mm)

Weighted mean = -0.83
Weighted standard deviation = 3.97
WRMS = 4.05

Results for TY translation (mm)

Weighted mean = -0.13
Weighted standard deviation = 3.76
WRMS = 3.76

Results for TZ translation (mm)

Weighted mean = 1.29
Weighted standard deviation = 7.35
WRMS = 7.46

Results for scale (ppb)

Weighted mean = -1.91
Weighted standard deviation = 0.69
WRMS = 2.03

w.r.t. ITRF2008

Results for TX translation (mm)

Weighted mean = -0.01
Weighted standard deviation = 3.53
WRMS = 3.53

Results for TY translation (mm)

Weighted mean = 0.06
Weighted standard deviation = 3.36
WRMS = 3.36

Results for TZ translation (mm)

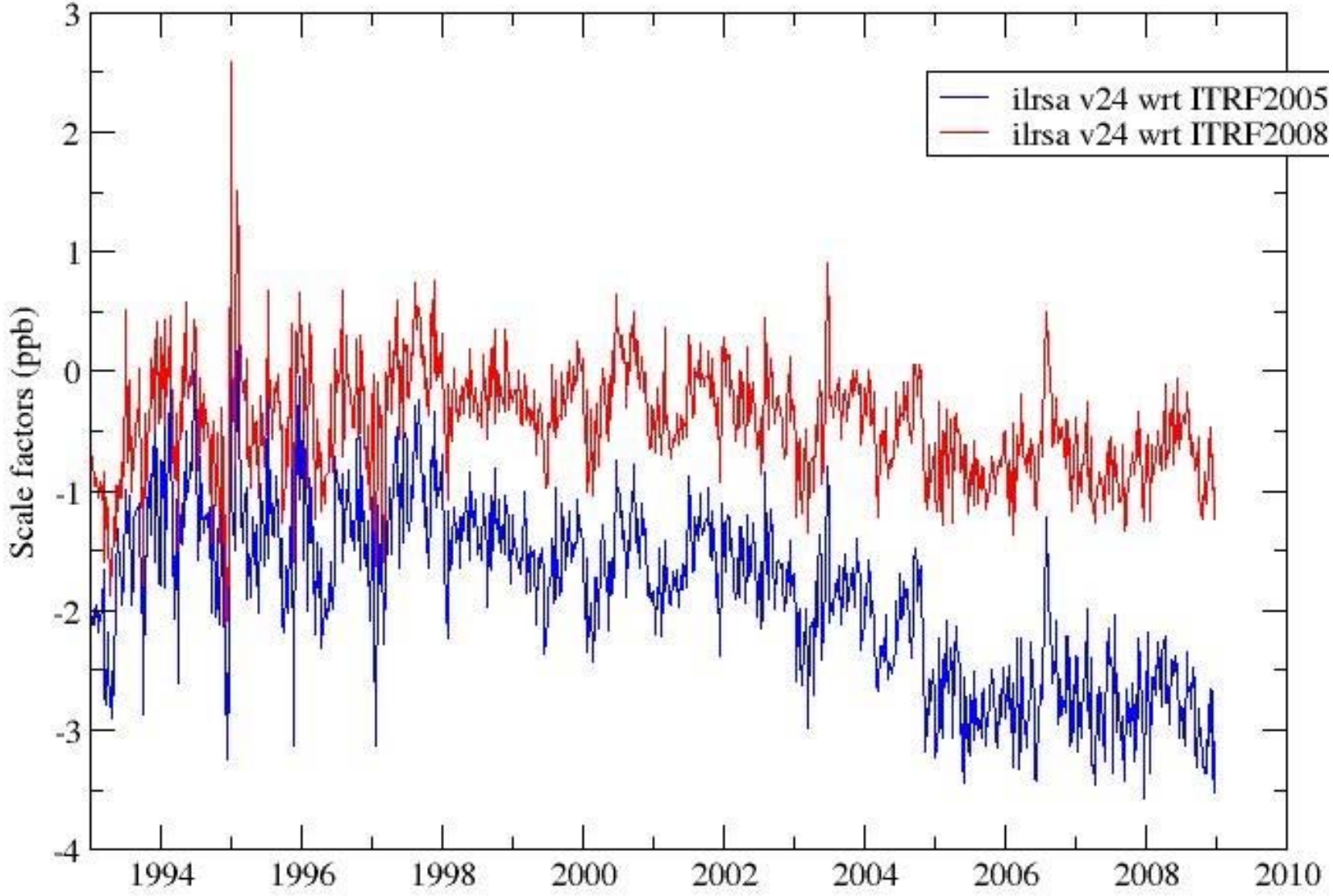
Weighted mean = 0.76
Weighted standard deviation = 7.02
WRMS = 7.06

Results for scale (ppb)

Weighted mean = -0.47
Weighted standard deviation = 0.41
WRMS = 0.63

Reduction of all biases and WRMS → better consistency with ITRF2008

Scale factor



Daily polar motion series (2/3)

w.r.t. ITRF2005

Results for Xp (µas)

Weighted mean = 40
Weighted standard deviation = 228
WRMS = 232

Results for Yp (µas)

Weighted mean = 43
Weighted standard deviation = 222
WRMS = 226

w.r.t. ITRF2008

Results for Xp (µas)

Weighted mean = 6
Weighted standard deviation = 203
WRMS = 203

Results for Yp (µas)

Weighted mean = -35
Weighted standard deviation = 203
WRMS = 206

Better stability of the series achieved with ITRF2008

Weekly station position series WRMS (3/3)

Comparison between ITRF2005 and ITRF2008

All stations (mm)

East component
Median values = 11.87 / 11.14

North component
Median values = 14.33 / 10.77

Up component
Median values = 13.93 / 8.74

20 core stations (mm)

East component
Median values = 7.23 / 6.56

North component
Median values = 8.09 / 7.53

Up component
Median values = 7.61 / 5.65

Better stability of the series for the three components achieved with ITRF2008

II - Analyses for the ILRS combined v24 solution over the time period 1982.9 - 1993.0

* Computation of transformations between ILRS solution and SLRF2005/ITRF2008

* For each computation
  - Projection of the variance-covariance matrix
  - Raw residuals rejected at 10 cm and then normalized residuals at 4
  - For the statistics after transformation, all the position residuals are considered

Helmert transformations (1/3)

w.r.t. SLRF2005

Results for TX translation (mm)

Weighted mean = 4.92
Weighted standard deviation = 8.65
WRMS = 9.95

Results for TY translation (mm)

Weighted mean = 0.31
Weighted standard deviation = 7.79
WRMS = 7.80

Results for TZ translation (mm)

Weighted mean = -14.55
Weighted standard deviation = 21.39
WRMS = 25.88

Results for scale (ppb)

Weighted mean = -0.15
Weighted standard deviation = 1.23
WRMS = 1.24

w.r.t. ITRF2008

Results for TX translation (mm)

Weighted mean = 3.99
Weighted standard deviation = 6.60
WRMS = 7.72

Results for TY translation (mm)

Weighted mean = 2.36
Weighted standard deviation = 6.51
WRMS = 6.93

Results for TZ translation (mm)

Weighted mean = -4.06
Weighted standard deviation = 19.93
WRMS = 20.34

Results for scale (ppb)

Weighted mean = 0.06
Weighted standard deviation = 1.11
WRMS = 1.11

Better WRMS and reduction of the TZ bias with ITRF2008

Polar motion series (2/3)

w.r.t. SLRF2005

Results for Xp (µas)

Weighted mean = 348
Weighted standard deviation = 700
WRMS = 782

Results for Yp (µas)

Weighted mean = 84
Weighted standard deviation = 738
WRMS = 743

w.r.t. ITRF2008

Results for Xp (µas)

Weighted mean = 304
Weighted standard deviation = 679
WRMS = 744

Results for Yp (µas)

Weighted mean = -223
Weighted standard deviation = 689
WRMS = 724

Better stability of the series achieved with ITRF2008 in spite of the larger bias for Yp

Weekly station position series WRMS (3/3)

Comparison between SLRF2005 and ITRF2008

All stations (mm)

East component
Median values = 19.44 / 13.59

North component
Median values = 21.00 / 18.98

Up component
Median values = 21.29 / 12.91

16 core stations (mm)

East component
Median values = 15.22 / 14.02

North component
Median values = 18.23 / 16.75

Up component
Median values = 13.47 / 11.82

Better stability of the series for the three components achieved with ITRF2008

III - Computations with the MATLO software over the time period 1995.0 - 2010.3

* MATLO software computes the SLR a priori residuals (Observed minus Computed)

* Two computations are carried out :
    - LAGEOS orbits computed with SLRF2005 and SLRF2005 as a priori TRF
    - LAGEOS orbits computed with ITRF2008 and ITRF2008 as a priori TRF

* The first solution is called 'GRGS V05' and the second one 'GRGS V08'

* For both computations, only the TRF changes. All the models, the EOP a priori series, the measurement corrections (range biases, etc.) and the eccentricities are the same

A priori residual RMS values per satellite (1/1)

Comparison between the GRGS V05 and V08 solutions

All stations (mm)

LAGEOS-1
Median values = 30.19 / 24.14

LAGEOS-2
Median values = 26.66 / 25.30

20 core stations (mm)

LAGEOS-1
Median values = 17.80 / 17.16

LAGEOS-2
Median values = 15.73 / 14.33

Improvement of a priori residuals with ITRF2008

IV – New GRGS AC solution over the time period 1995.0 - 2010.3

* GINS and MATLO software used

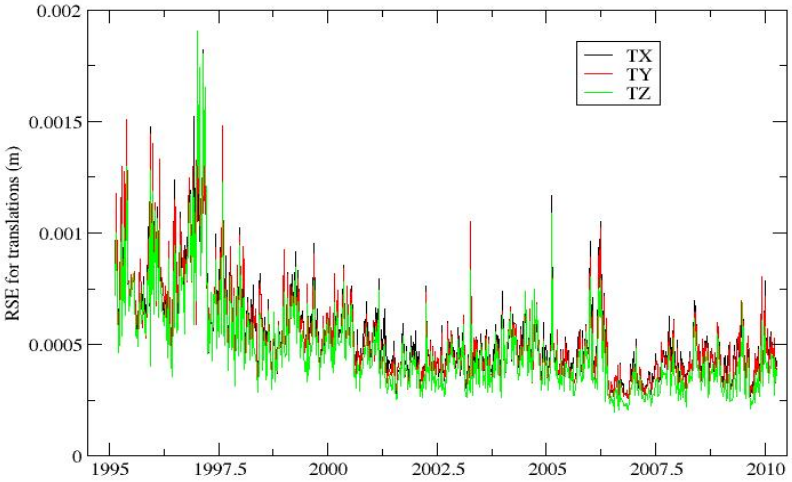
* Two LAGEOS orbits computed with ITRF2008

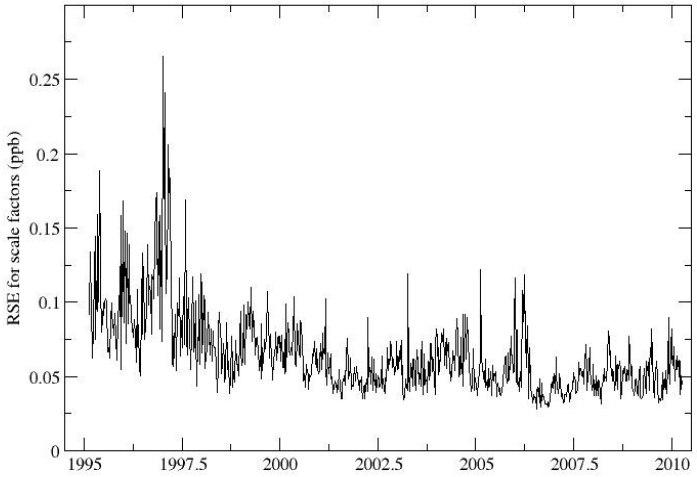
* Loose constrained weekly solutions for station positions, EOP and possible range biases

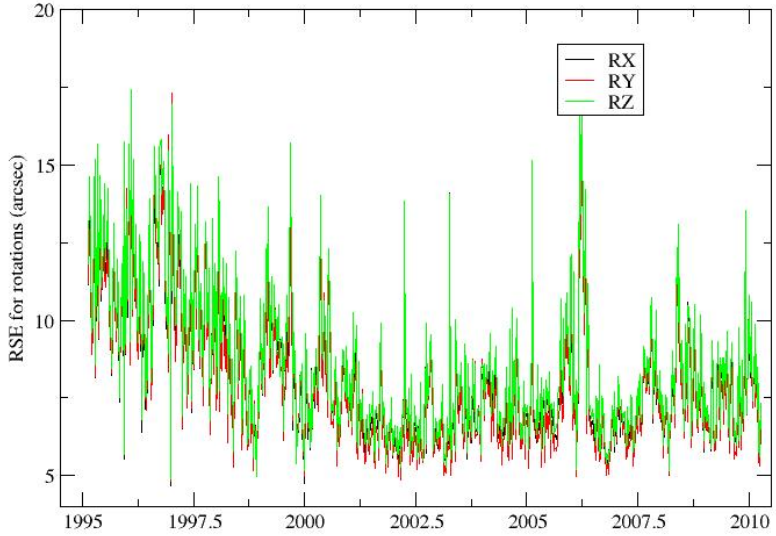
* Weekly transformation parameters computed w.r.t. ITRF2008

Reference System Effects (1/7)

Strong value = corresponding parameter loosely defined







Median values

Translations (mm)
- TX = 0.49
- TY = 0.47
- TZ = 0.42

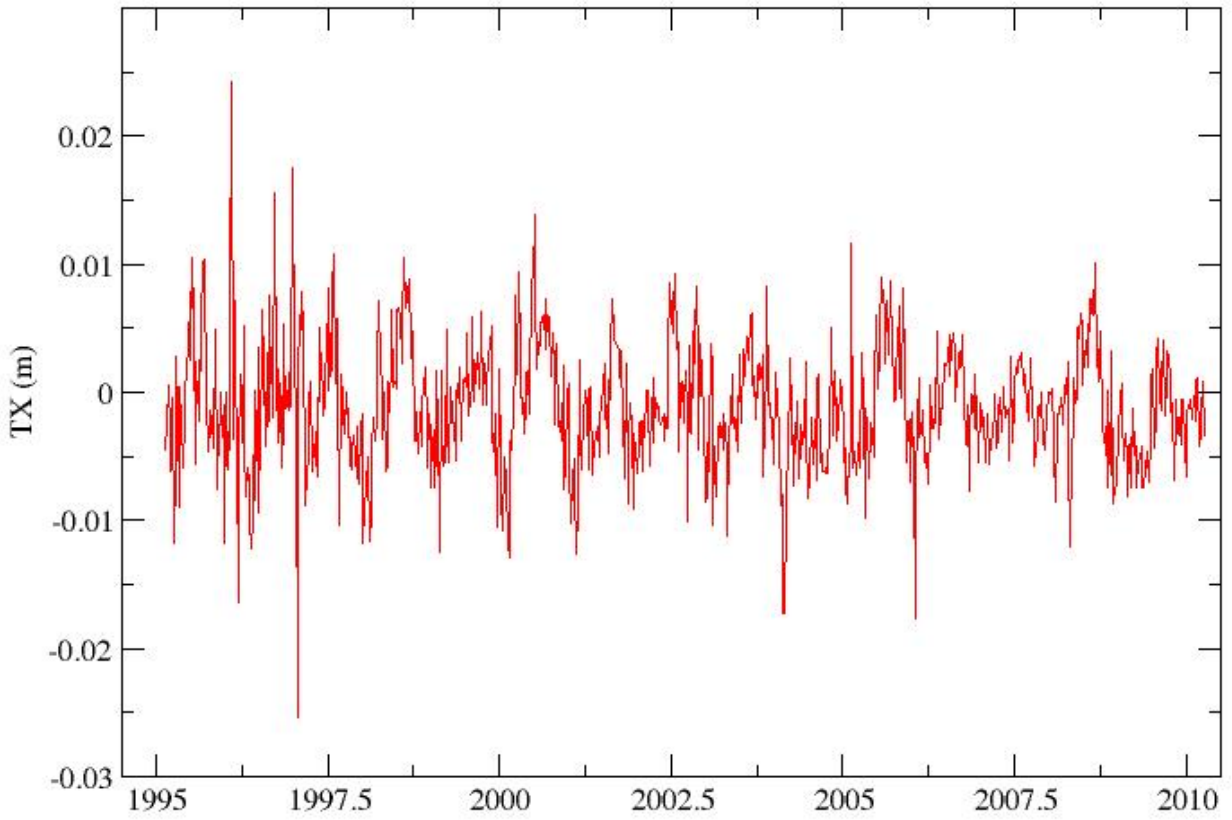
Scale factors (ppb)
- D = 0.06 (~ 0.36 mm)

Rotations (mas)
- RX = 7 662
- RY = 7 498
- RZ = 7 914

Orientation of the weekly Terrestrial Frames not defined

Transformation Parameters (2/7)

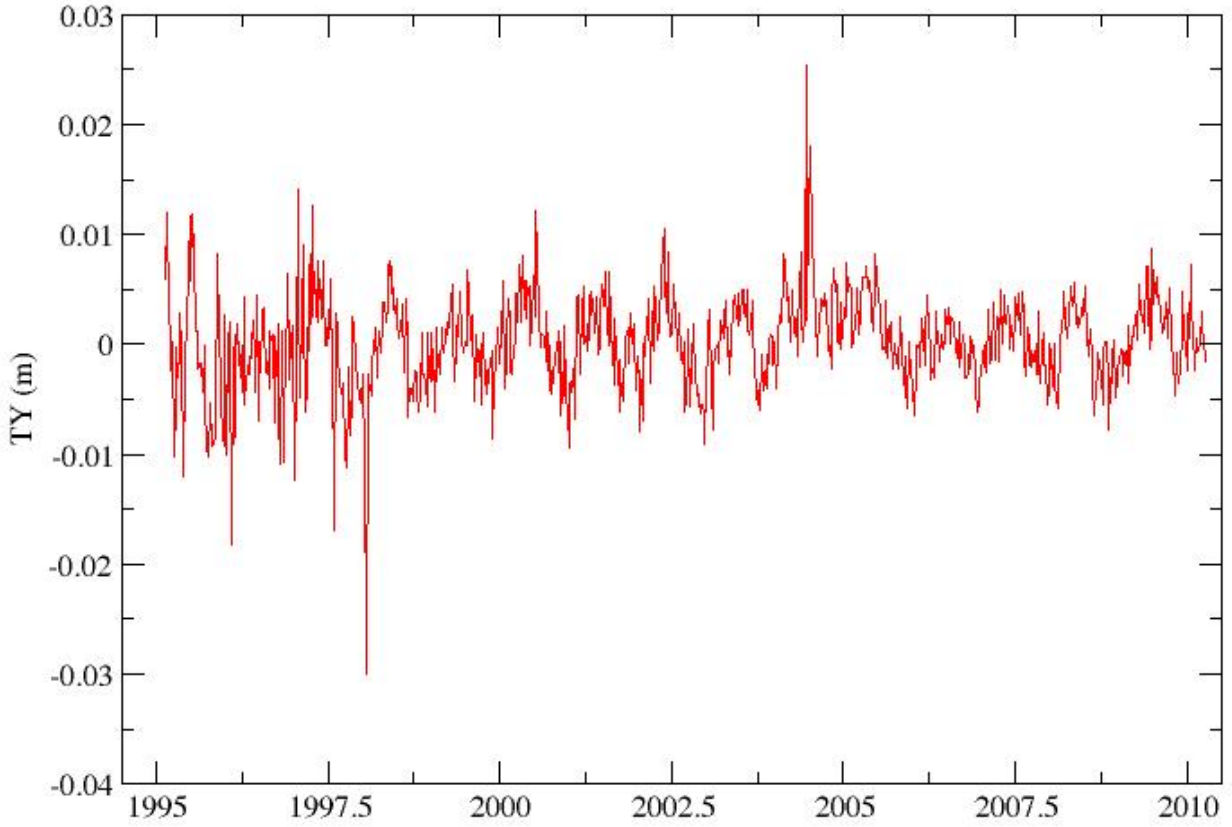
TX translations (mm)



Weighted mean = -0.86
Weighted standard deviation = 4.22
WRMS = 4.31

Transformation Parameters (3/7)

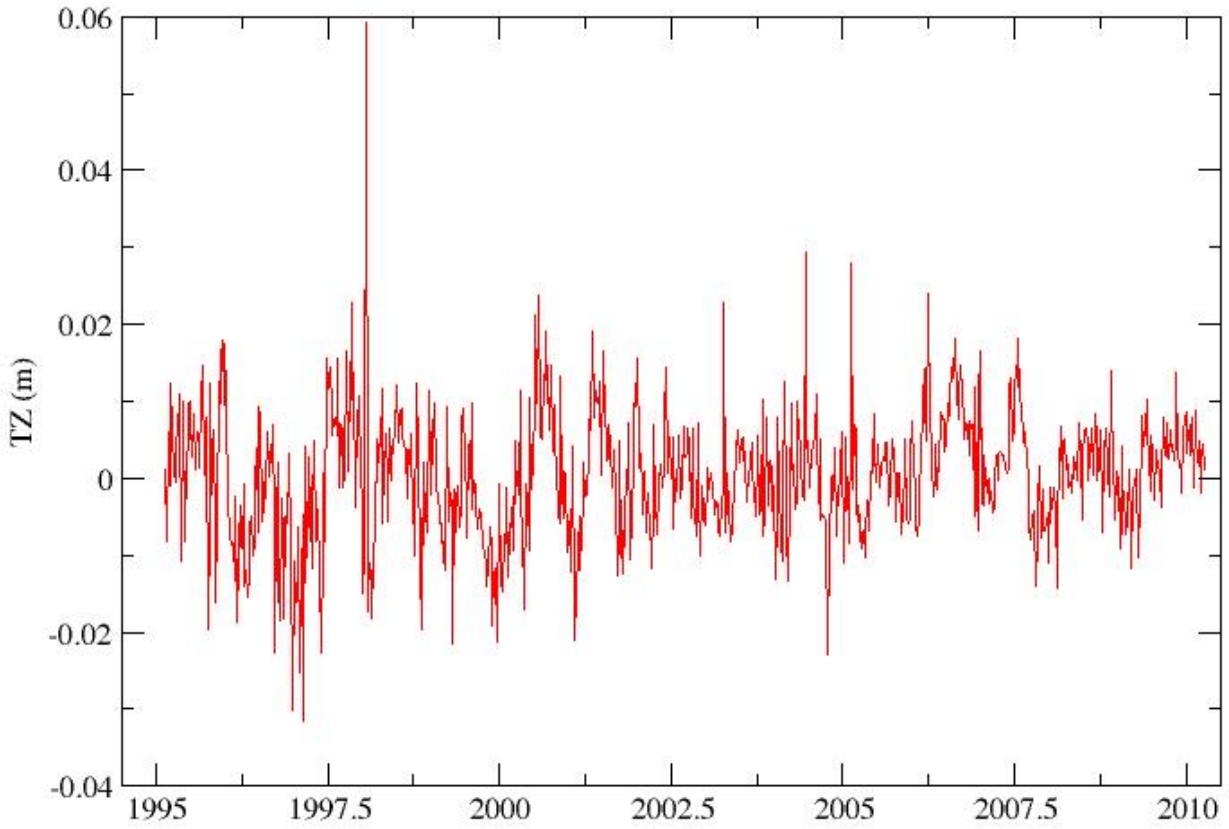
TY translations (mm)



Weighted mean = 0.34
Weighted standard deviation = 3.51
WRMS = 3.52

Transformation Parameters (4/7)

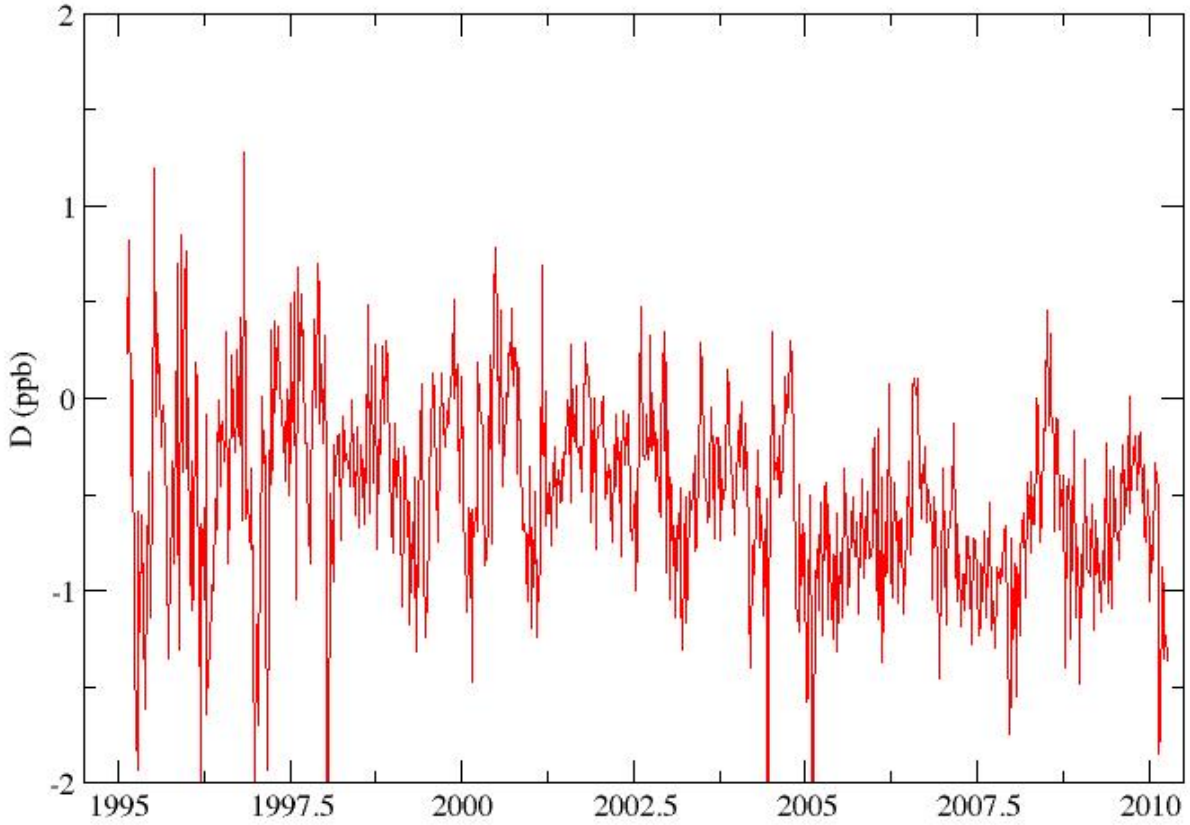
TZ translations (mm)



Weighted mean = 1.14
Weighted standard deviation = 7.07
WRMS = 7.16

Transformation Parameters (5/7)

Scale factors (ppb)



Weighted mean = -0.54
Weighted standard deviation = 0.43
WRMS = 0.69

Polar motion series (6/7)

Results for Xp (μas)

Weighted mean = 40
Weighted standard deviation = 213
WRMS = 217

Results for Yp (μas)

Weighted mean = -68
Weighted standard deviation = 222
WRMS = 232

Weekly station position series WRMS (7/7)

All stations (mm)

East component
Median values = 12.28

North component
Median values = 13.88

Up component
Median values = 11.51

20 core stations (mm)

East component
Median values = 6.63

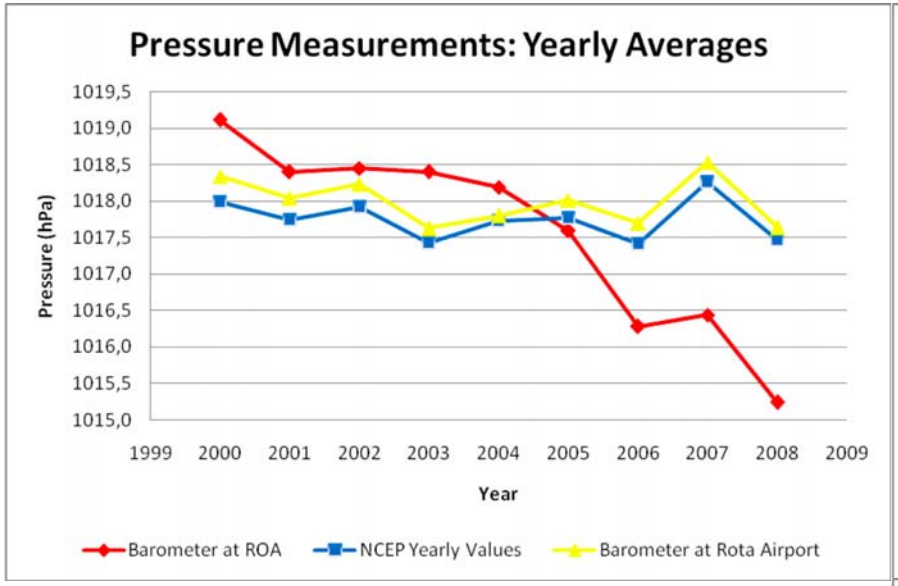
North component
Median values = 7.07

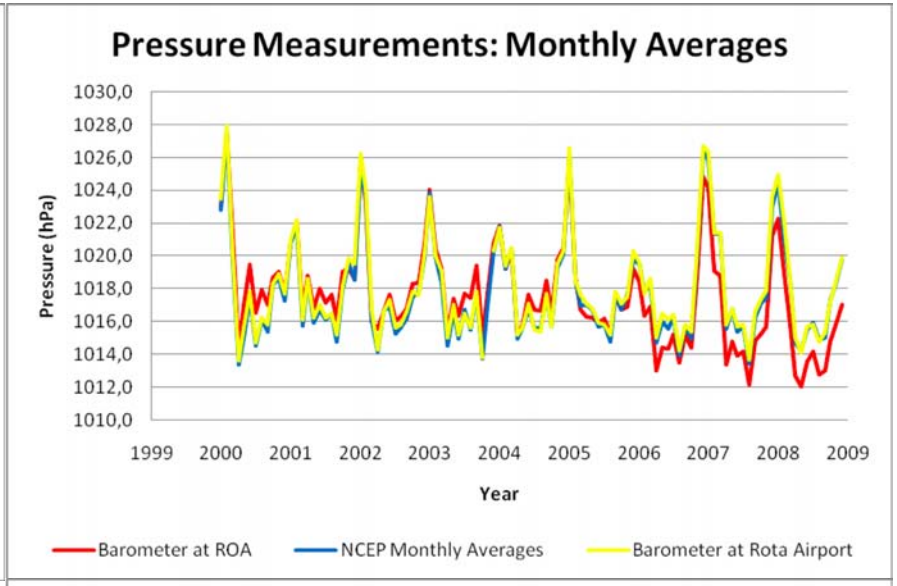
Up component
Median values = 5.84

Activities since last AWG

- Completed ESA benchmark (thank you Cecilia!)
- Verified pressure correction formulae for San Fernando
- Station validation for Simosato, Concepcion, Koganei (7308 & 7328), Tanegashima and Haleakala (thank you Horst!)
- CRD validation for several stations
- Daily EOP process review with USNO
- ITRF2008 validation (all years 1983 – now)
- Response to GB on new NP formulation
- Site log compilation (Excel spreadsheets & SCH-SCI database)
- Updated version of ILRS AWG Products website
- Atmospheric dealiasing application tests and test-file generation
- BLITS data analysis
- Implementation of ILRS-B s/w, hosting of DGFI CC at JCET after AWG
- ORBEX follow-up with IGS

San Fernando pressure error





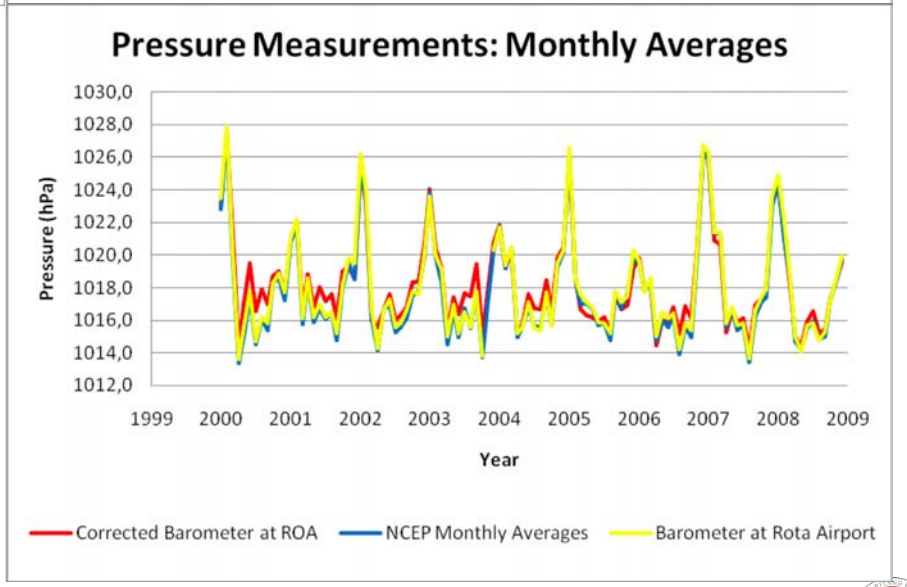
- First period: Since January 1st, 2006 to December 31st 2008

  Correction formula: F(T) = 0.40402 * (T – 2006) + 1.38412 (r.m.s. = +/- 0.45)

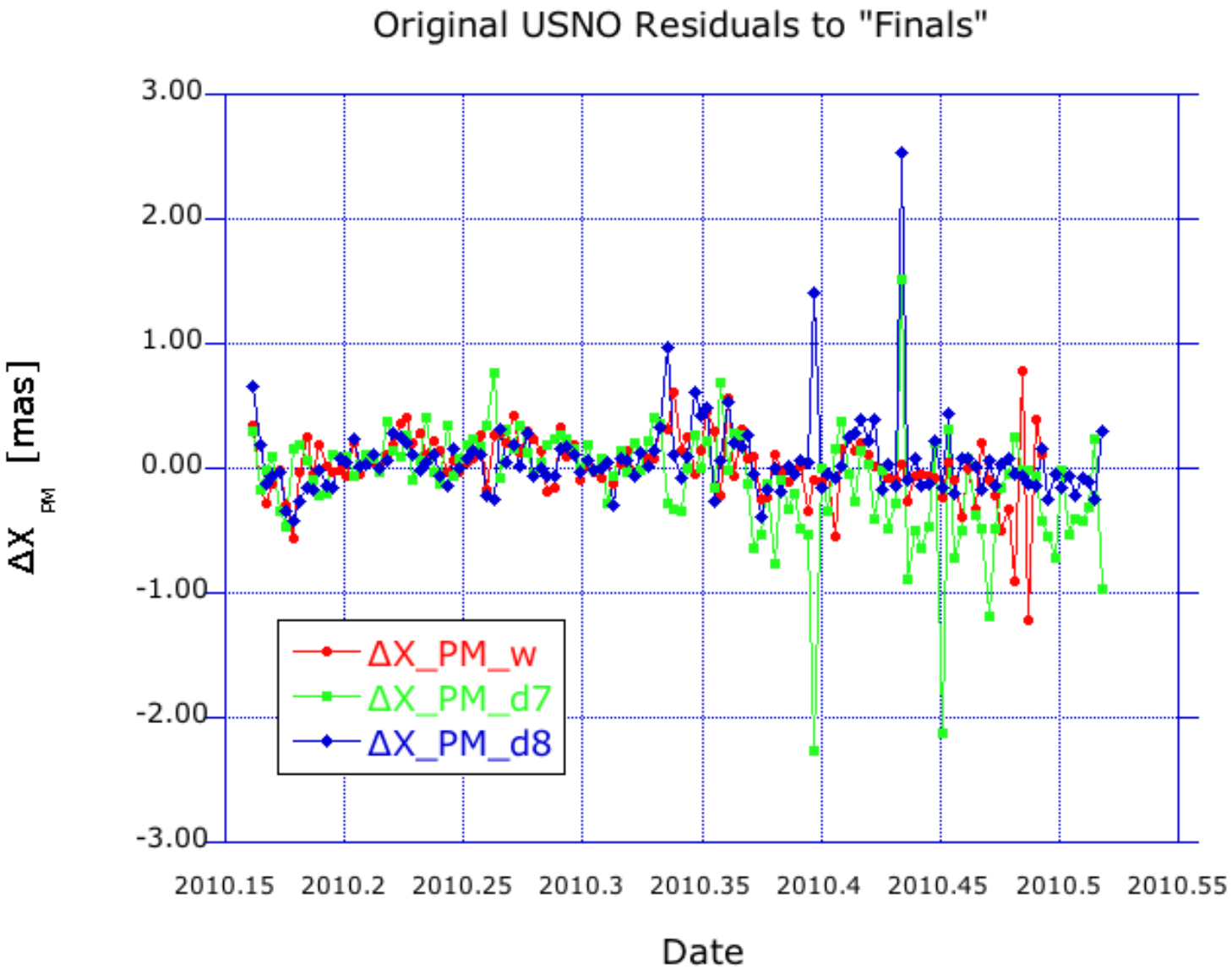
- Second period: Since January 1st, 2009 to December 10th 2009

  Correction formula: F(T) = 1.2685 * (T – 2009) + 3.0078 (r.m.s. = +/- 0.45)

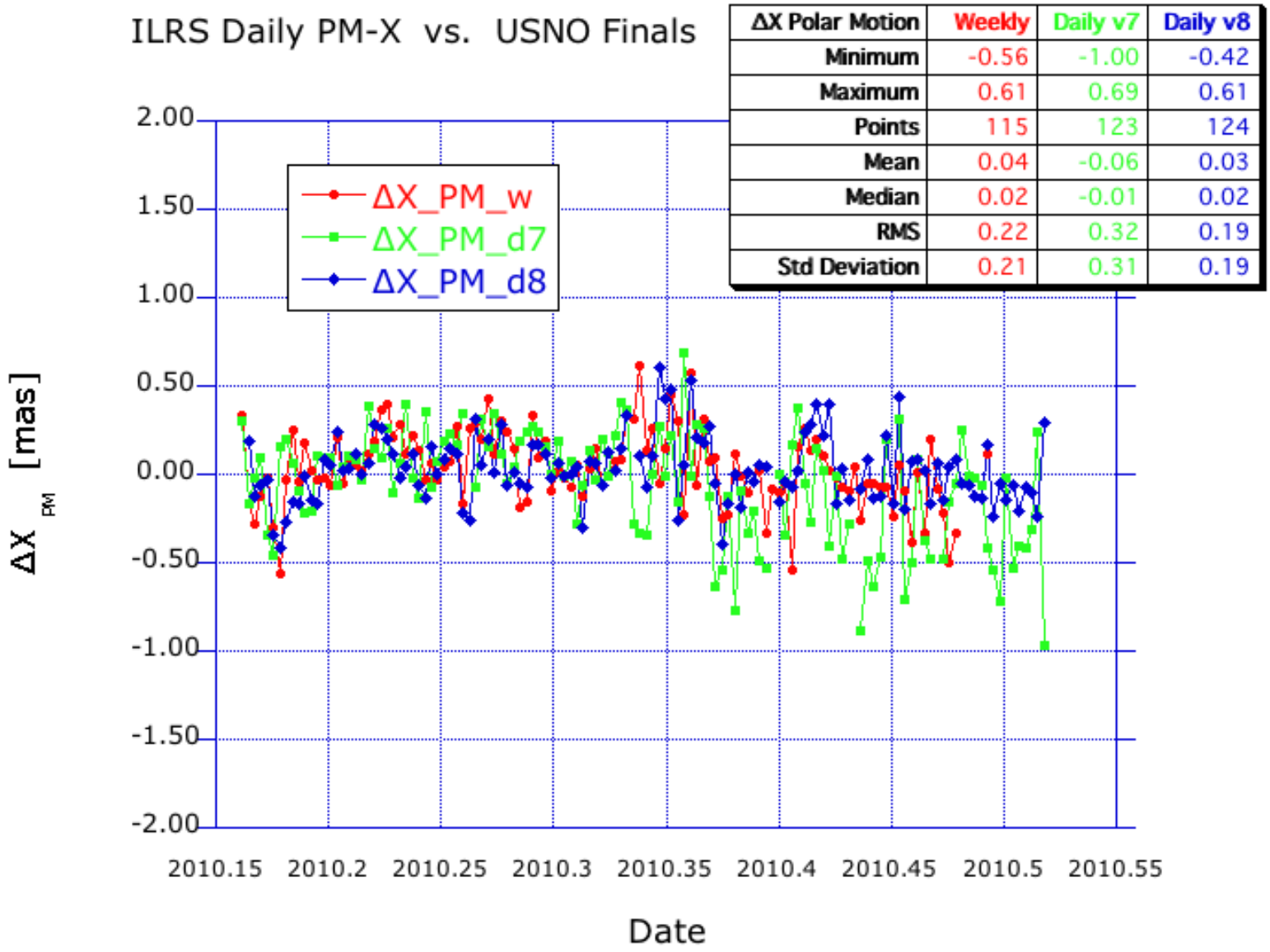
In both cases T = year + day of the year [1..365]/365, except for 2008 where 365 should be replaced by 366.



Daily EOP Product for USNO

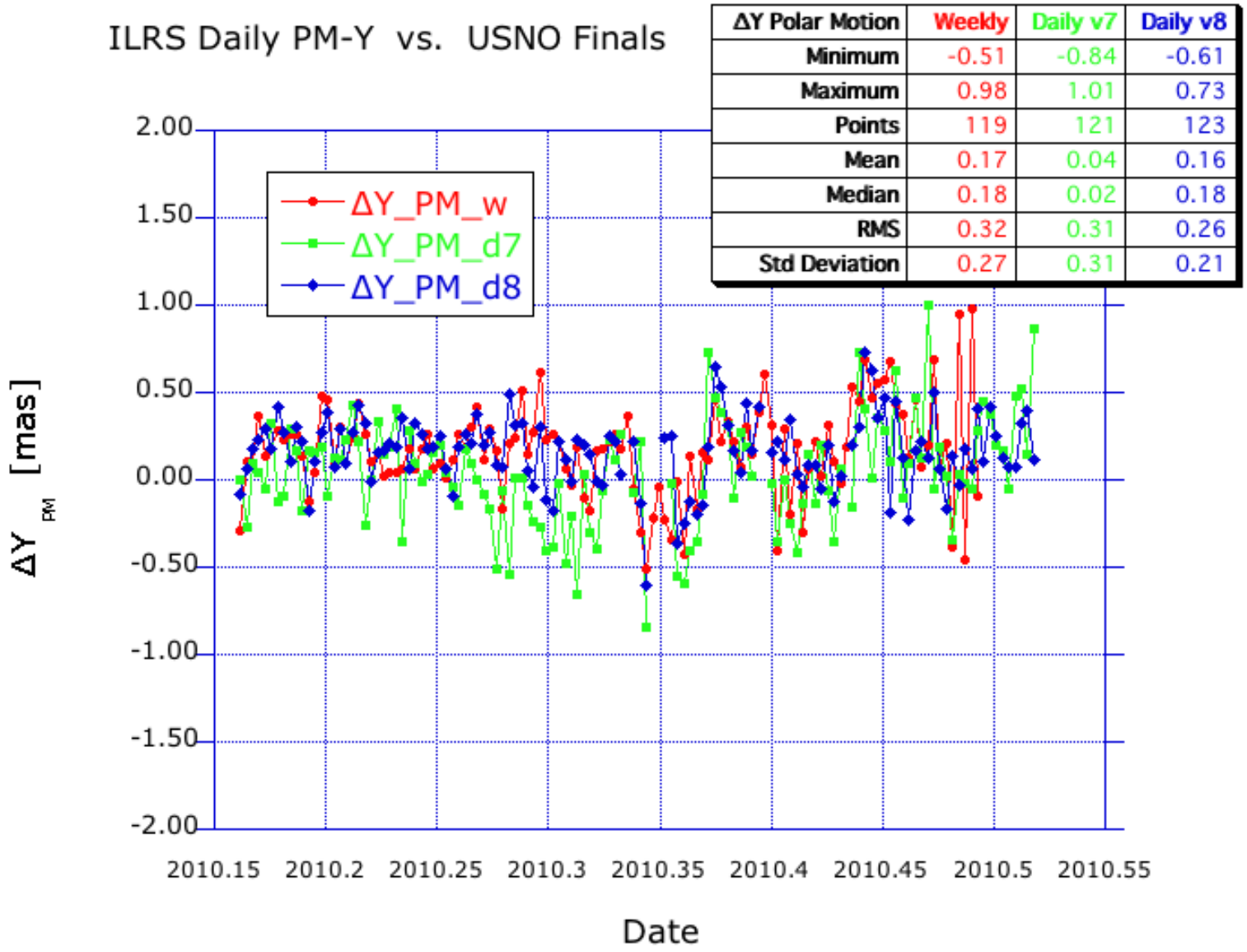


Daily EOP Product - 1

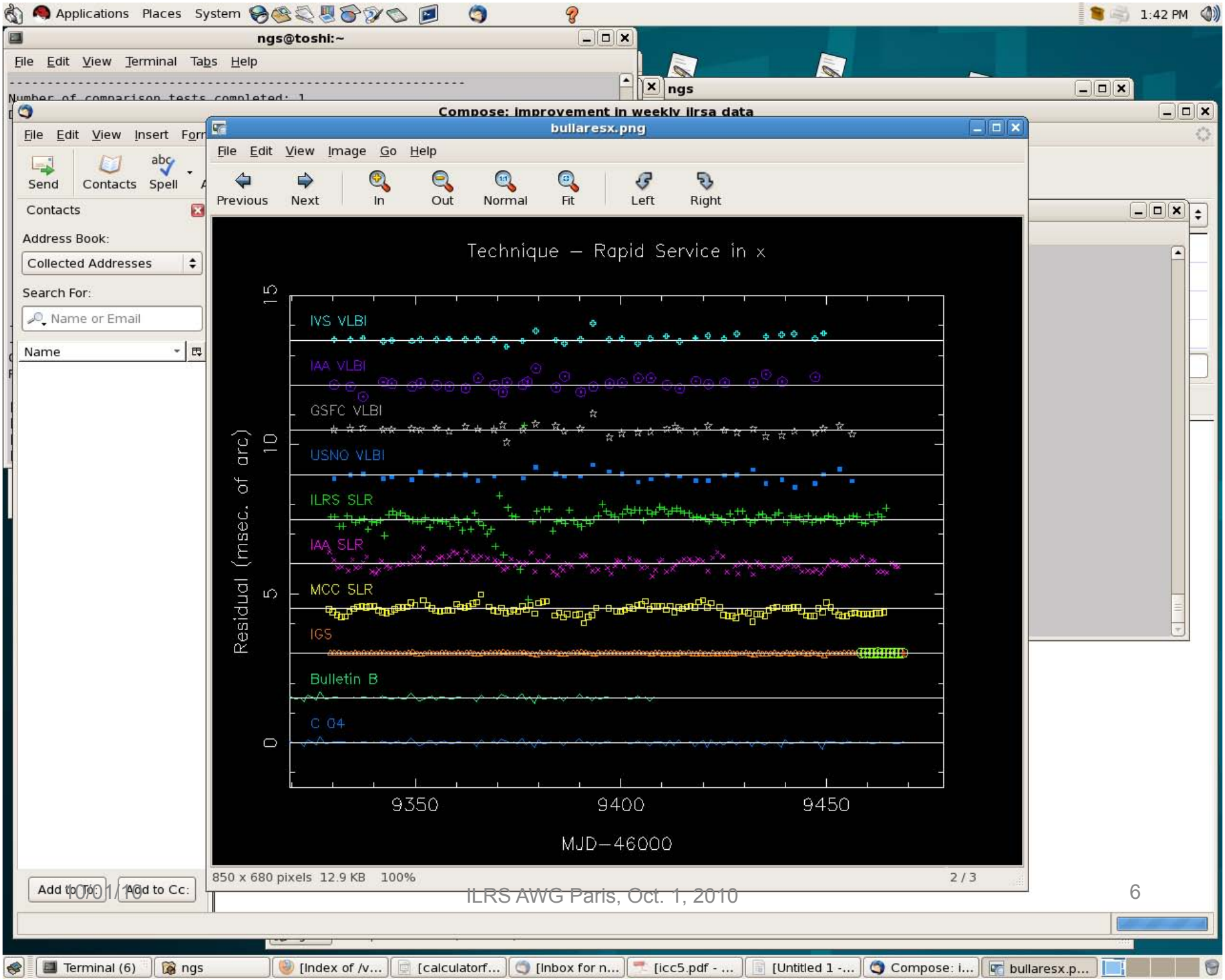


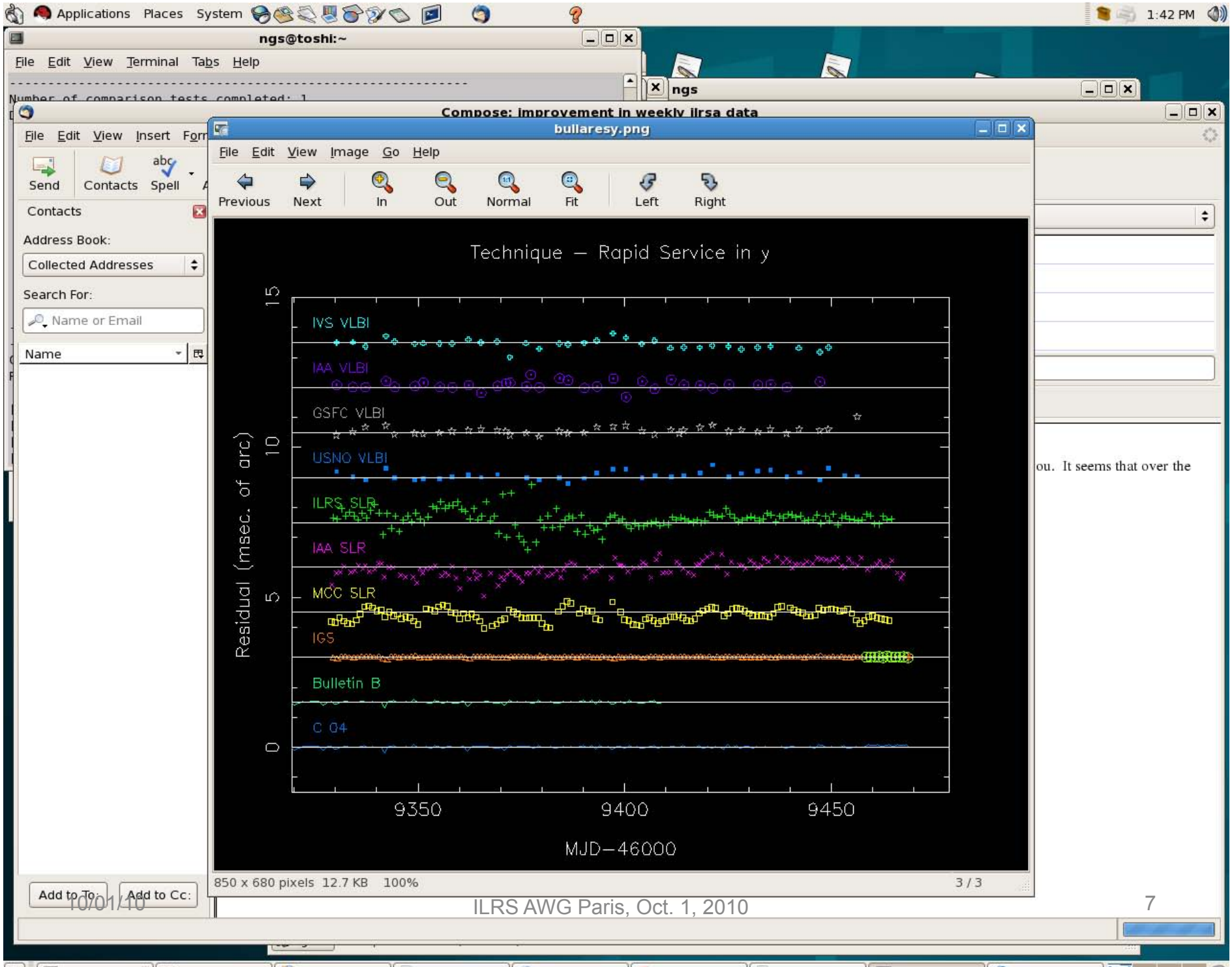
ΔX Polar Motion	Weekly	Daily v7	Daily v8
Minimum	-0.56	-1.00	-0.42
Maximum	0.61	0.69	0.61
Points	115	123	124
Mean	0.04	-0.06	0.03
Median	0.02	-0.01	0.02
RMS	0.22	0.32	0.19
Std Deviation	0.21	0.31	0.19

Daily EOP Product - 2



ΔY Polar Motion	Weekly	Daily v7	Daily v8
Minimum	-0.51	-0.84	-0.61
Maximum	0.98	1.01	0.73
Points	119	121	123
Mean	0.17	0.04	0.16
Median	0.18	0.02	0.18
RMS	0.32	0.31	0.26
Std Deviation	0.27	0.31	0.21


Applications Places System
1:42 PM
ngs@toshi:~
File Edit View Terminal Tabs Help
Number of comparison tests completed: 1
ngs
Compose: improvement in weekly ilrsa data
File Edit View Insert Form
Send
Contacts
Spell
Contacts
Address Book:
Collected Addresses
Search For:
Name or Email
Name
Add to To:
Add to Cc:
bullaresx.png
File Edit View Image Go Help
Previous
Next
In
Out
Normal
Fit
Left
Right
Technique – Rapid Service in x
Residual (msec. of arc)
0
5
10
15
IVS VLBI
IAA VLBI
GSFC VLBI
USNO VLBI
ILRS SLR
IAA SLR
MCC SLR
IGS
Bulletin B
C 04
9350
9400
9450
MJD−46000
850 x 680 pixels 12.9 KB 100%
2 / 3
Terminal (6)
ngs
[Index of /v...
[calculatorf...
[Inbox for n...
[icc5.pdf - ...
[Untitled 1 -...
Compose: i...
bullaresx.p...


Applications Places System
1:42 PM
ngs@toshi:~
File Edit View Terminal Tabs Help
Number of comparison tests completed: 1
ngs
Compose: improvement in weekly ilrsa data
File Edit View Insert Forr
Send
Contacts
Spell
Contacts
Address Book:
Collected Addresses
Search For:
Name or Email
Name
Add to To:
Add to Cc:
bullaresy.png
File Edit View Image Go Help
Previous
Next
In
Out
Normal
Fit
Left
Right
Technique — Rapid Service in y
IVS VLBI
IAA VLBI
GSFC VLBI
USNO VLBI
ILRS SLR
IAA SLR
MCC SLR
IGS
Bulletin B
C 04
Residual (msec. of arc)
0
5
10
15
9350
9400
9450
MJD−46000
850 x 680 pixels 12.7 KB 100%
3 / 3
ou. It seems that over the
Terminal (6)
ngs
[Index of /v...
[calculatorf...
[Inbox for n...
[icc5.pdf - ...
[Untitled 1 -...
bullaresy.p...
Compose: i...

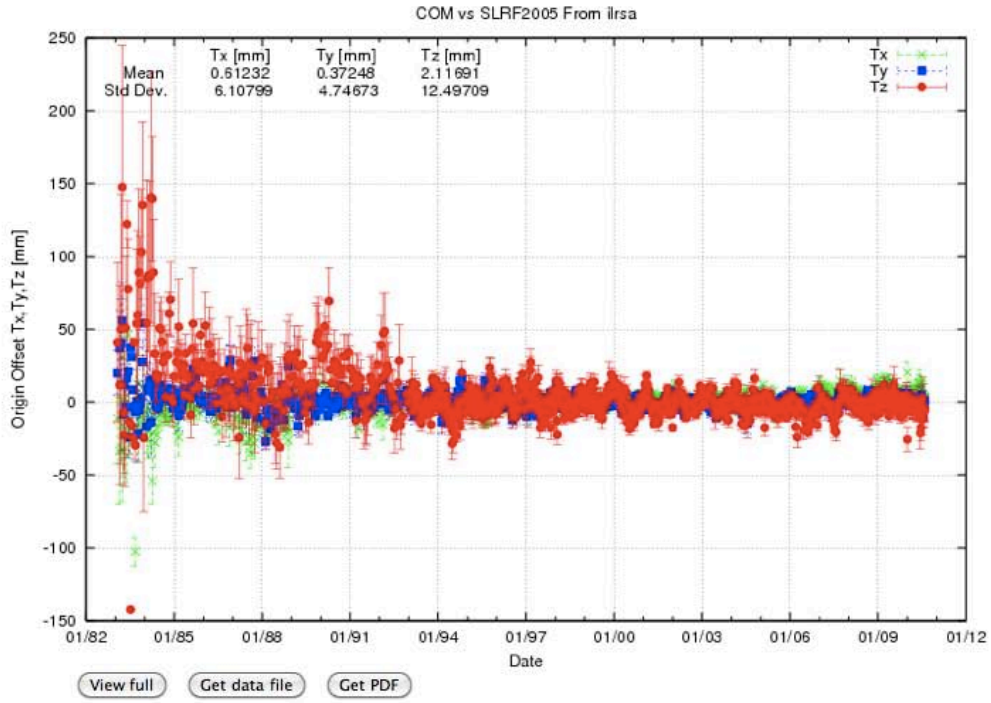
Updated JCET Website

EVALUATION, VALIDATION AND MONITORING OF ILRS COMBINATION PRODUCTS

http://geodesy.jcet.umbc.edu/ILRS_QCQA/

EVALUATION, VALIDATION AND ...

EVALUATION AND MONITORING OF ILRS AWG PRODUCTS



Combination Center: ILRSA / ILRSB

Analysis Center: COM

Start (MM-DD-YYYY): 1-1-1983

End (MM-DD-YYYY): 8-8-2010

Group of results: HELMERT TRANS.

Quantities to display: ORIGIN OFFSETS w.r.t SLRF2005

Station: N/A

Tx	Green	X
Ty	Blue	Filled Square
Tz	Red	Filled Circle

Plot Size — Minimum — Maximum

Y axis

Submit

http://geodesy.jcet.umbc.edu/ILRS_QCQA/

UMBC AN HONORS UNIVERSITY IN MARYLAND

International Laser Ranging Service

Responsible JCET Official: Dr. Erricos Pavlis

Last modified 2010-08-05

Created by: Sunil Venkatesh
Maintained by: Magda Kuzmicz-Cieslak

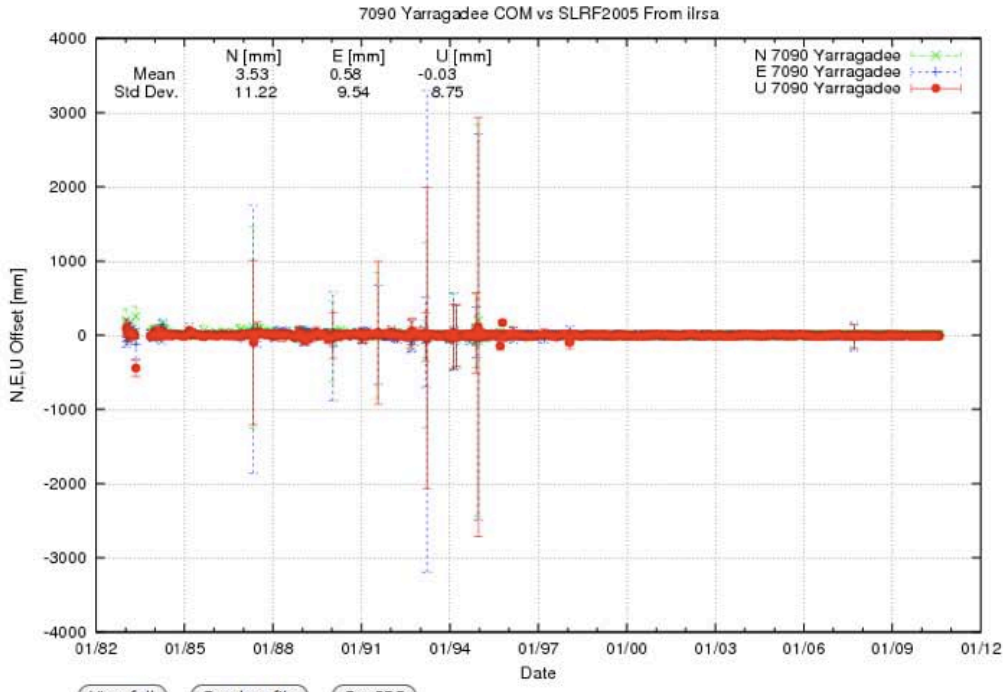
Updated JCET Website

EVALUATION, VALIDATION AND MONITORING OF ILRS COMBINATION PRODUCTS

http://geodesy.jcet.umbc.edu/ILRS_QCQA/

EVALUATION, VALIDATION AND ...

EVALUATION AND MONITORING OF ILRS AWG PRODUCTS



View full | Get data file | Get PDF

Combination Center: ILRSA / ILRSB

Analysis Center: COM

Start (MM-DD-YYYY): 1-1-1983

End (MM-DD-YYYY): 8-8-2010

Group of results: SITE COORDINATES

Quantities to display: N-E-U OFFSETS

Station: 7090 Yarragadee

N	Green	X
E	Blue	Cross
U	Red	Filled Circle

Plot Size Minimum Maximum

Y axis

Submit

UMBC AN HONORS UNIVERSITY IN MARYLAND

International Laser Ranging Service

Responsible JCET Official: Dr. Erricos Pavlis

Last modified 2010-08-05

Created by: Sunil Venkatesh

Maintained by: Magda Kuzmicz-Cieslak

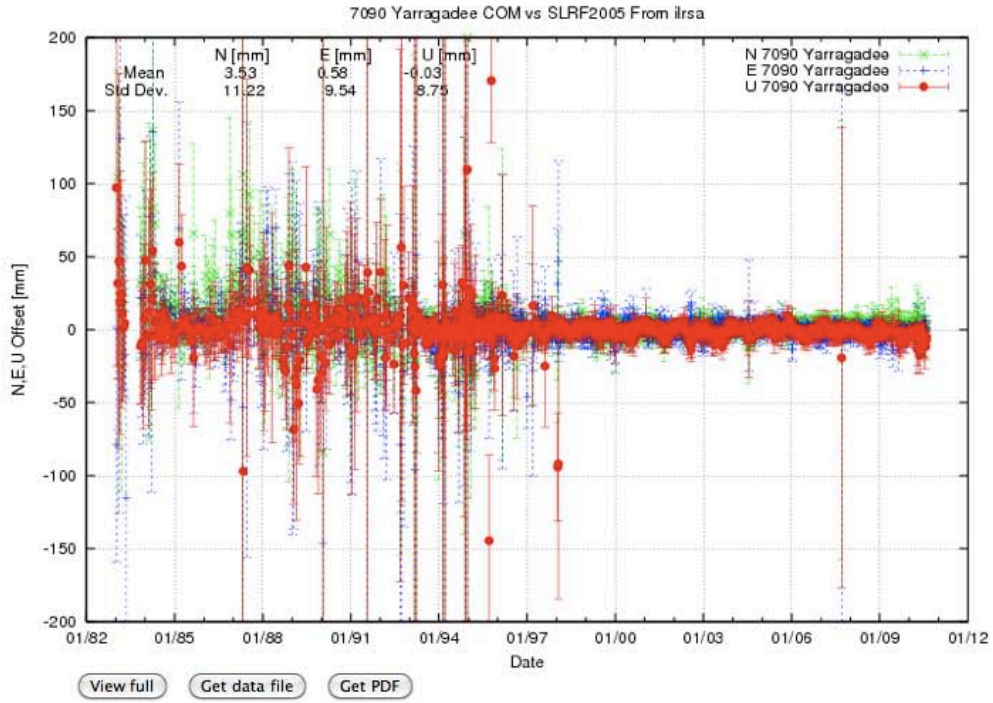
Updated JCET Website – cont.

EVALUATION, VALIDATION AND MONITORING OF ILRS COMBINATION PRODUCTS

http://geodesy.jcet.umbc.edu/ILRS_QCQA/

EVALUATION, VALIDATION AND ...

EVALUATION AND MONITORING OF ILRS AWG PRODUCTS



Combination Center: ILRSA / ILRSB

Analysis Center: COM

Start (MM-DD-YYYY): 1-1-1983

End (MM-DD-YYYY): 8-8-2010

Group of results: SITE COORDINATES

Quantities to display: N-E-U OFFSETS

Station: 7090 Yarragadee

N	Green	X
E	Blue	Cross
U	Red	Filled Circle

Plot Size	Minimum	Maximum
Y axis	-200	200

Submit

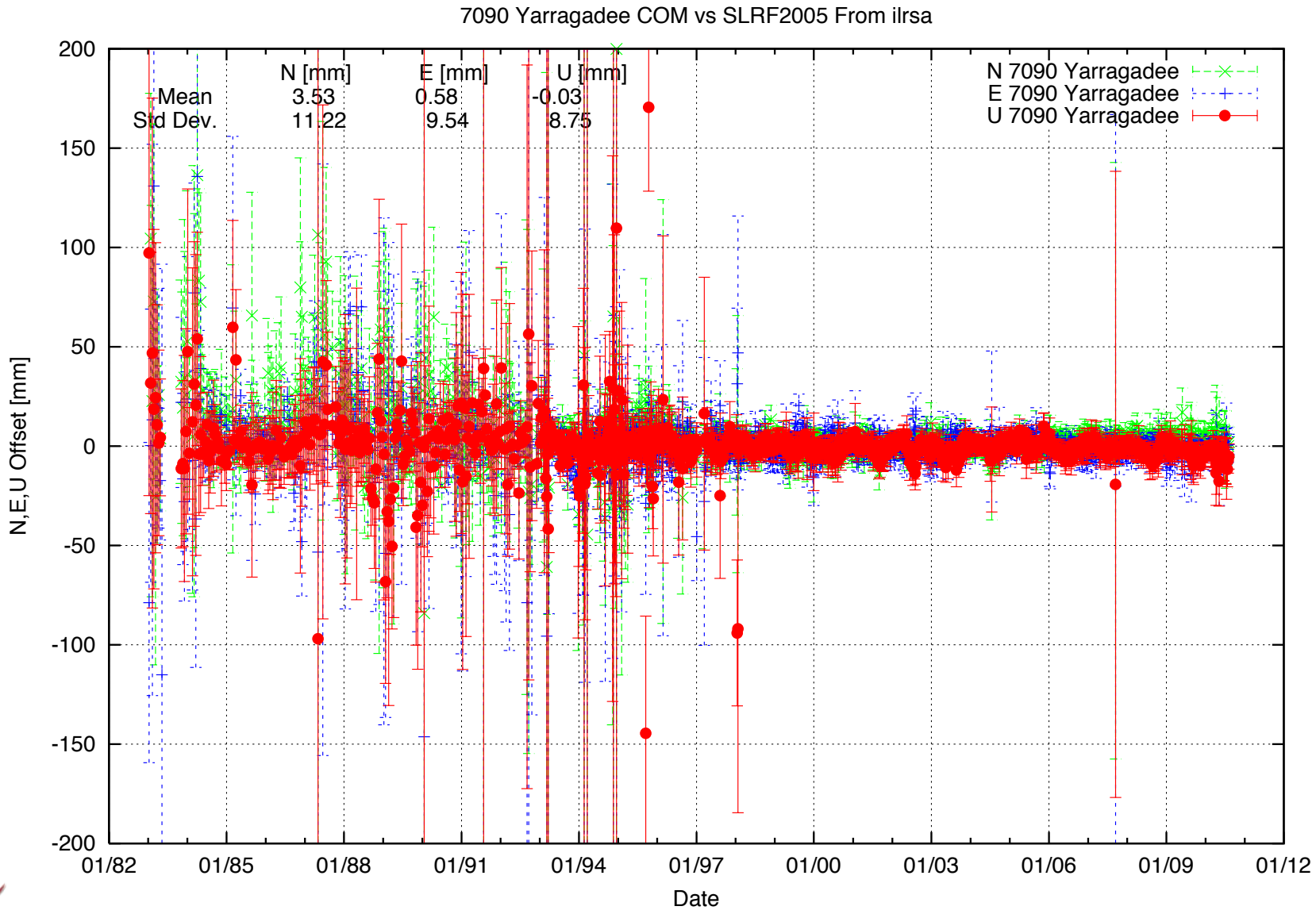
UMBC AN HONORS UNIVERSITY IN MARYLAND

Responsible JCET Official: Dr. Erricos Pavlis

Last modified 2010-08-05 © Copyright JCET/UMBC

Created by: Suhi Venkatesh
Maintained by: Magda Kuzmicz-Cieslak

Updated JCET Website: PDF output

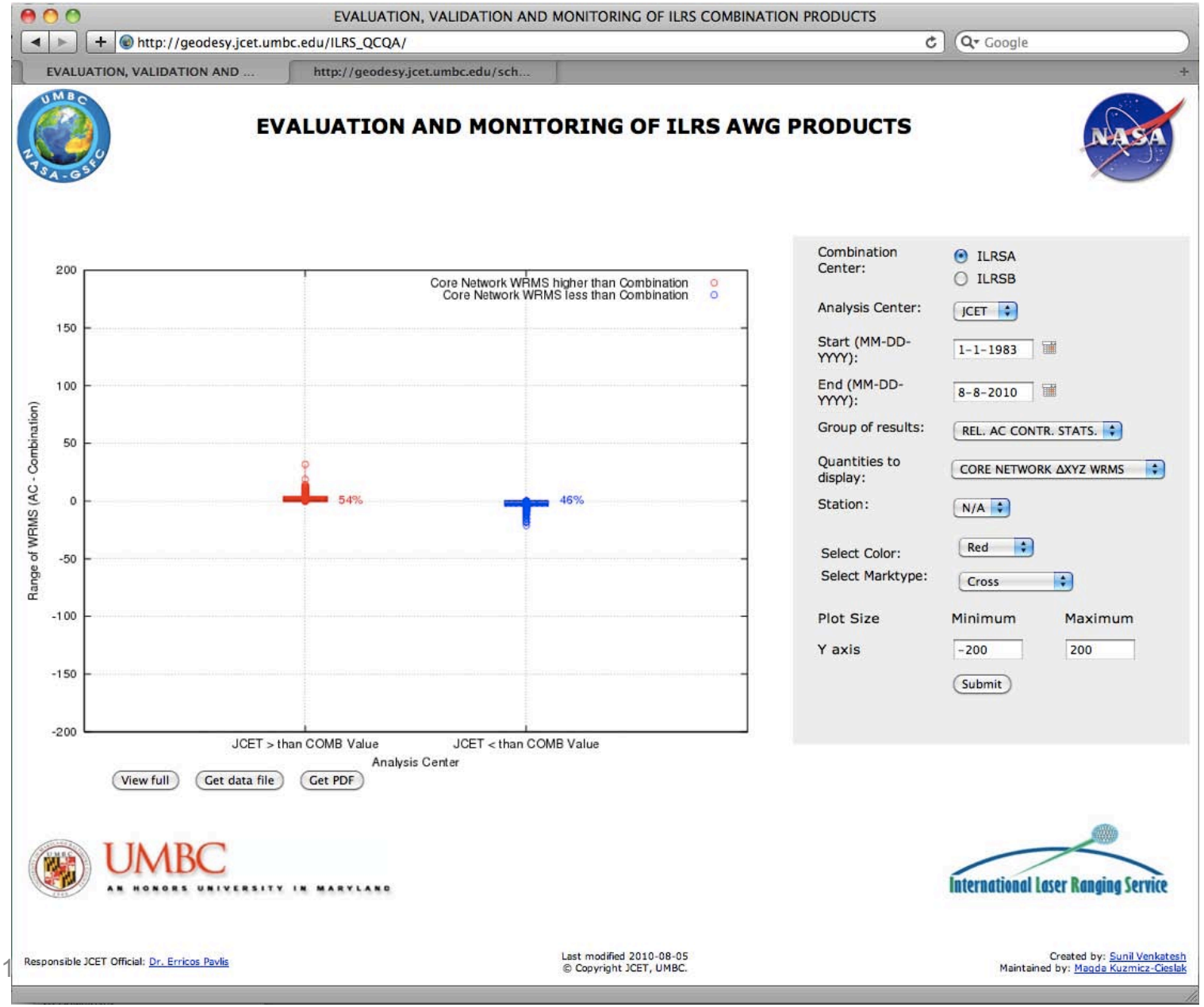


Update JCET Website – cont.

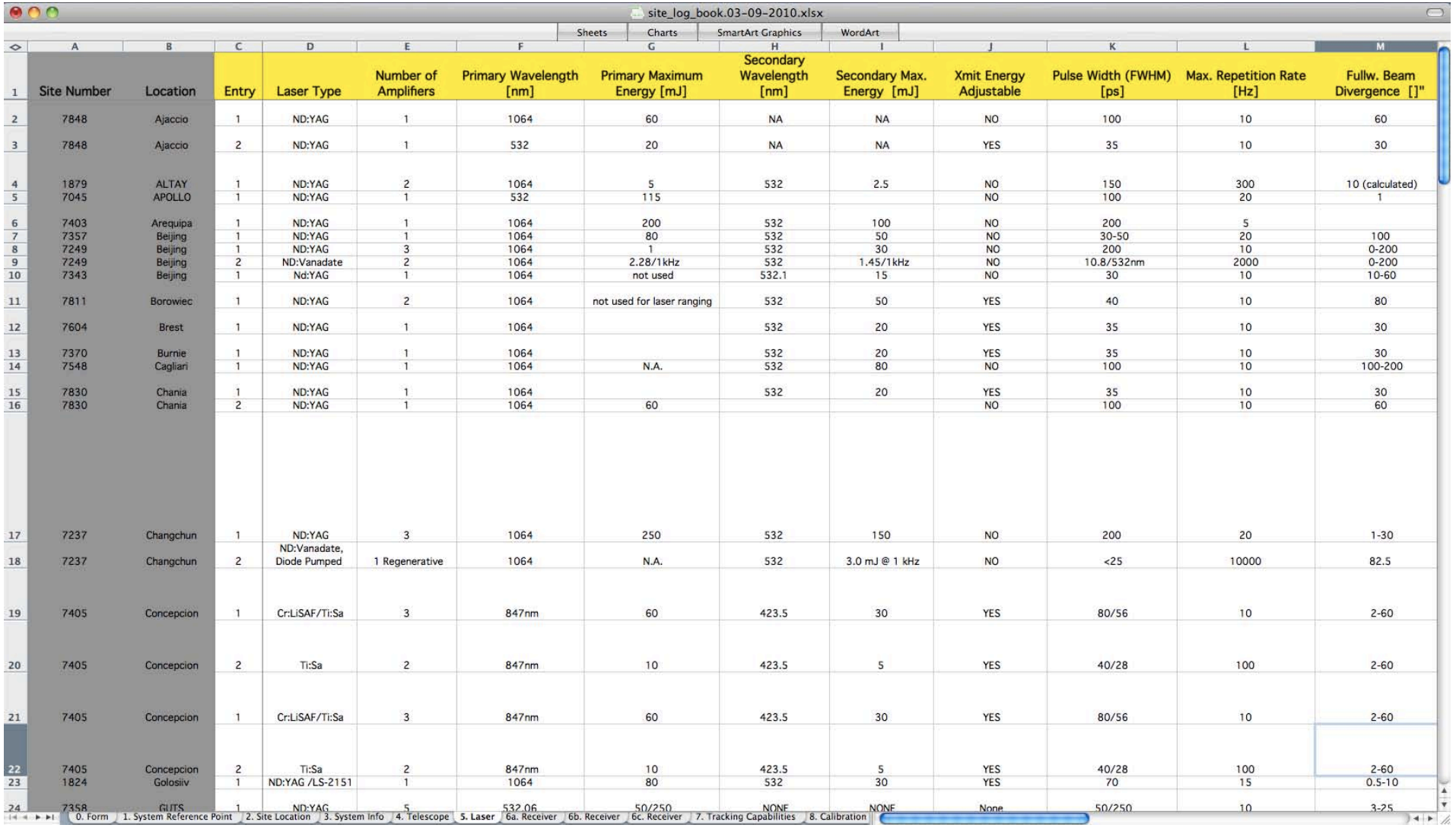
NEU 7090 data.txt

observation_date	n	e	u
1983-01-10	206.91	-78.76	97.2
1983-01-25	104.44	0.24	31.74
1983-02-09	22.69	13.23	46.84
1983-02-24	72.79	130.91	18.61
1983-03-11	-25.48	20.23	24.35
1983-03-26	15	19.32	10.74
1983-04-10	25.72	19.08	1.62
1983-04-25	3.92	-17.32	4.38
1983-05-10	253.06	-115.11	-442.14
1983-11-06	32.41	22	-11.27
1983-11-21	19.36	-16.51	-8.81
1983-12-06	34.47	-27.94	-11.25
1983-12-21	25.75	-7.78	7.43
1984-01-05	52.74	23.71	47.6
1984-01-20	12.06	-16.76	-3.63
1984-02-19	4.71	-7.24	12.19
1984-03-05	32.68	77.14	31.24
1984-03-20	32.99	-36.63	20.69
1984-04-04	136.37	135.71	54
1984-04-19	83.28	23.6	-4.1
1984-05-04	72.55	39.1	5.83
1984-05-19	28	7.48	-3.14
1984-06-03	27.88	3.71	-3.35
1984-06-18	7.92	-8.33	2.1
1984-07-03	17.41	-2.57	10.96
1984-07-18	8.85	11.41	-7.34
1984-08-02	9.94	12.08	-2.9
1984-08-17	16.4	19.9	0.28
1984-09-01	6.5	6.05	9.03
1984-09-16	17.08	-1.15	5.84
1984-10-01	19.31	4.33	0.99
1984-10-16	3.02	6.6	2.15
1984-10-31	13.47	14.47	-1.28

Update JCET Website – cont.



Site Log Book @ CDDIS



site_log_book.03-09-2010.xlsx

Sheets | Charts | SmartArt Graphics | WordArt

Site Number	Location	Entry	Laser Type	Number of Amplifiers	Primary Wavelength [nm]	Primary Maximum Energy [mJ]	Secondary Wavelength [nm]	Secondary Max. Energy [mJ]	Xmit Energy Adjustable	Pulse Width (FWHM) [ps]	Max. Repetition Rate [Hz]	Fullw. Beam Divergence []"
7848	Ajaccio	1	ND:YAG	1	1064	60	NA	NA	NO	100	10	60
7848	Ajaccio	2	ND:YAG	1	532	20	NA	NA	YES	35	10	30
1879	ALTAY	1	ND:YAG	2	1064	5	532	2.5	NO	150	300	10 (calculated)
7045	APOLLO	1	ND:YAG	1	532	115			NO	100	20	1
7403	Arequipa	1	ND:YAG	1	1064	200	532	100	NO	200	5	
7357	Beijing	1	ND:YAG	1	1064	80	532	50	NO	30-50	20	100
7249	Beijing	1	ND:YAG	3	1064	1	532	30	NO	200	10	0-200
7249	Beijing	2	ND:Vanadate	2	1064	2.28/1kHz	532	1.45/1kHz	NO	10.8/532nm	2000	0-200
7343	Beijing	1	Nd:YAG	1	1064	not used	532.1	15	NO	30	10	10-60
7811	Borowiec	1	ND:YAG	2	1064	not used for laser ranging	532	50	YES	40	10	80
7604	Brest	1	ND:YAG	1	1064		532	20	YES	35	10	30
7370	Burnie	1	ND:YAG	1	1064		532	20	YES	35	10	30
7548	Cagliari	1	ND:YAG	1	1064	N.A.	532	80	NO	100	10	100-200
7830	Chania	1	ND:YAG	1	1064		532	20	YES	35	10	30
7830	Chania	2	ND:YAG	1	1064	60			NO	100	10	60
7237	Changchun	1	ND:YAG	3	1064	250	532	150	NO	200	20	1-30
7237	Changchun	2	ND:Vanadate, Diode Pumped	1 Regenerative	1064	N.A.	532	3.0 mJ @ 1 kHz	NO	<25	10000	82.5
7405	Concepcion	1	Cr:LiSAF/Ti:Sa	3	847nm	60	423.5	30	YES	80/56	10	2-60
7405	Concepcion	2	Ti:Sa	2	847nm	10	423.5	5	YES	40/28	100	2-60
7405	Concepcion	1	Cr:LiSAF/Ti:Sa	3	847nm	60	423.5	30	YES	80/56	10	2-60
7405	Concepcion	2	Ti:Sa	2	847nm	10	423.5	5	YES	40/28	100	2-60
1824	Golosiiv	1	ND:YAG /LS-2151	1	1064	80	532	30	YES	70	15	0.5-10
7358	GUTS	1	ND:YAG	5	532.06	50/250	NONE	NONE	None	50/250	10	3-25

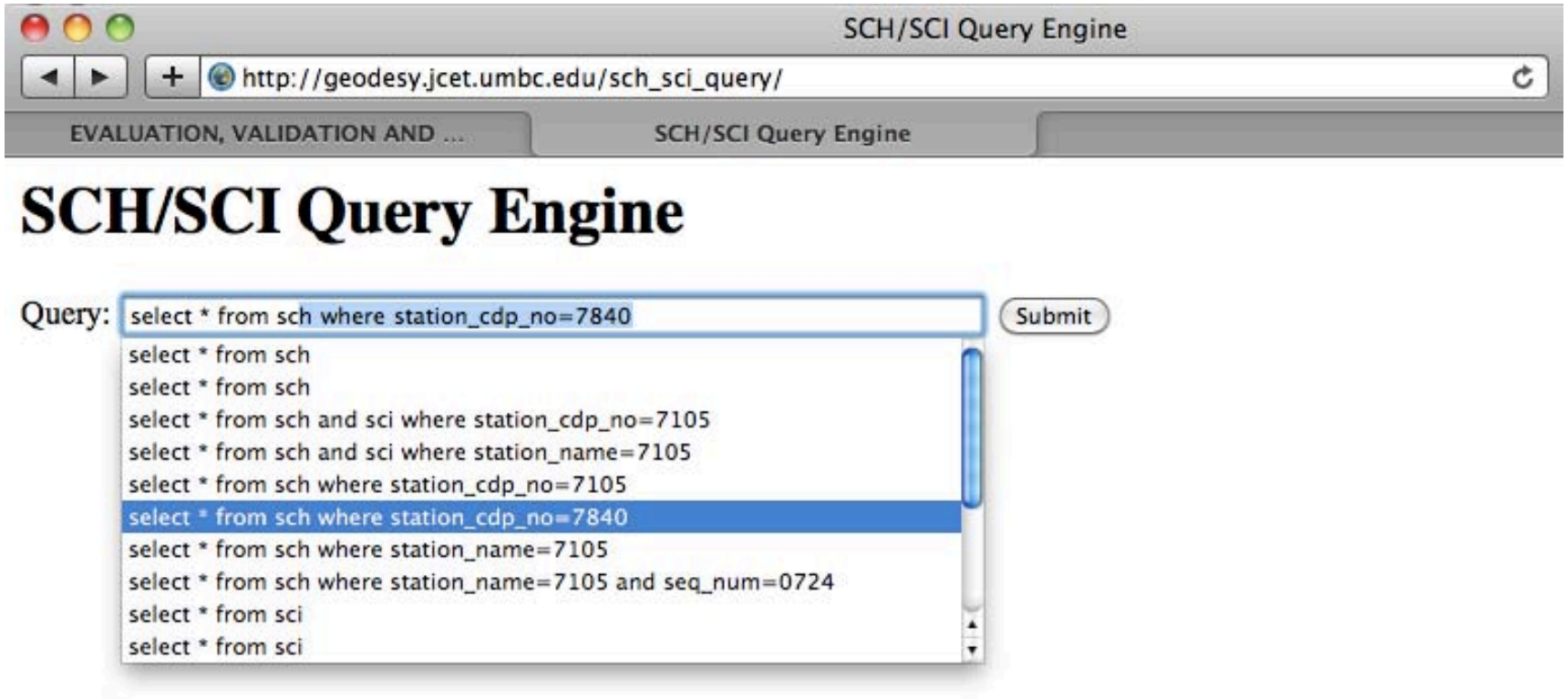
0. Form | 1. System Reference Point | 2. Site Location | 3. System Info | 4. Telescope | 5. Laser | 6a. Receiver | 6b. Receiver | 6c. Receiver | 7. Tracking Capabilities | 8. Calibration

Past Site Logs Compilation

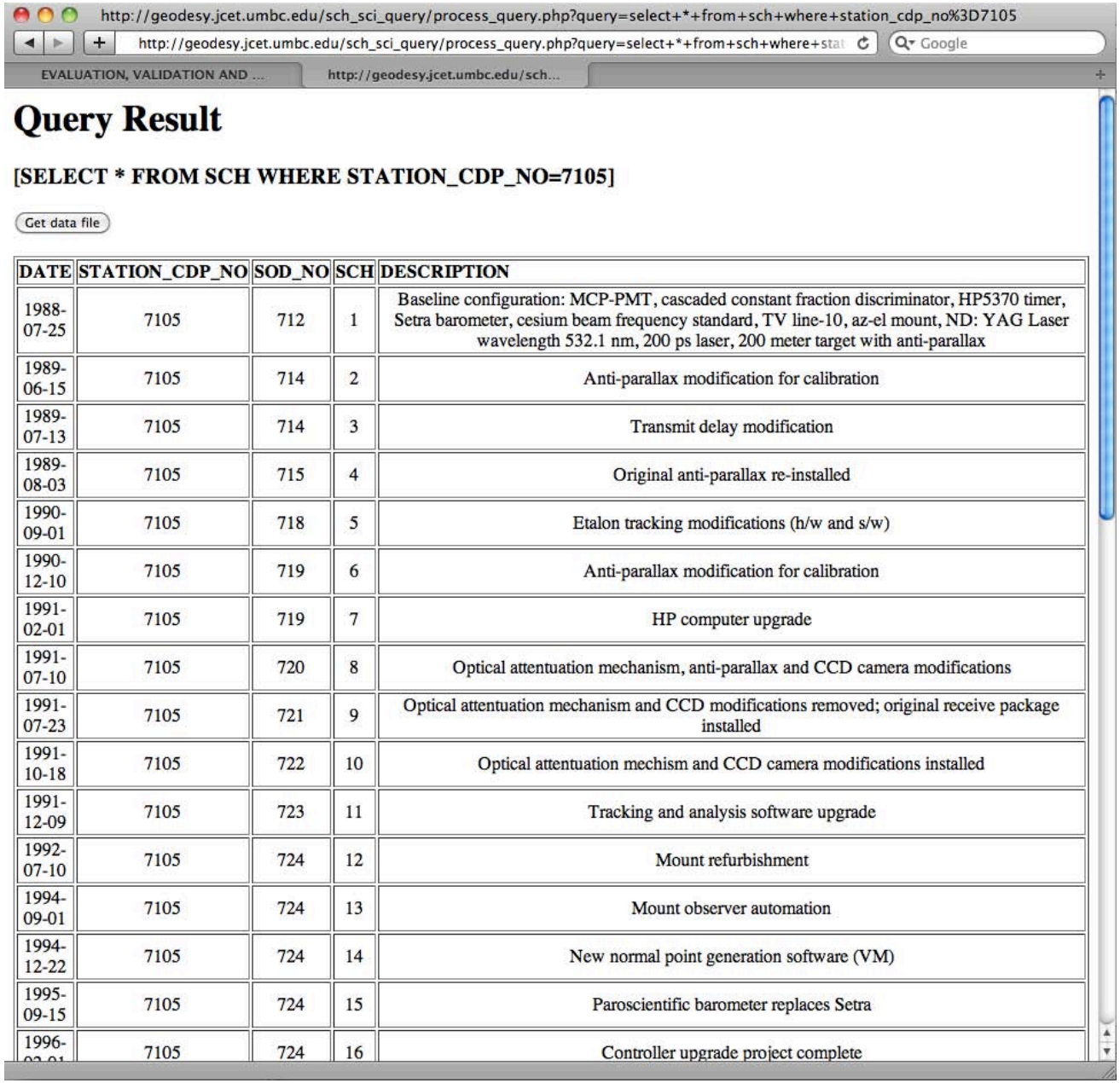
- All past site logs were compiled into a new Excel spreadsheet, collecting information that is useful for characterizing the mode of operation of each site over time
- The information from the Site Configuration and Site Change files were also “mined” and put in an online data base
- Users can query the data base to collect information for all sites, a particular site or group of sites, etc.
- Location:

  http://geodesy.jcet.umbc.edu/sch_sci_query/

SCH/SCI Query Engine



SCH/SCI Query Engine



http://geodesy.jcet.umbc.edu/sch_sci_query/process_query.php?query=select+*+from+sch+where+station_cdp_no%3D7105

http://geodesy.jcet.umbc.edu/sch_sci_query/process_query.php?query=select+*+from+sch+where+stat

EVALUATION, VALIDATION AND ...

http://geodesy.jcet.umbc.edu/sch...

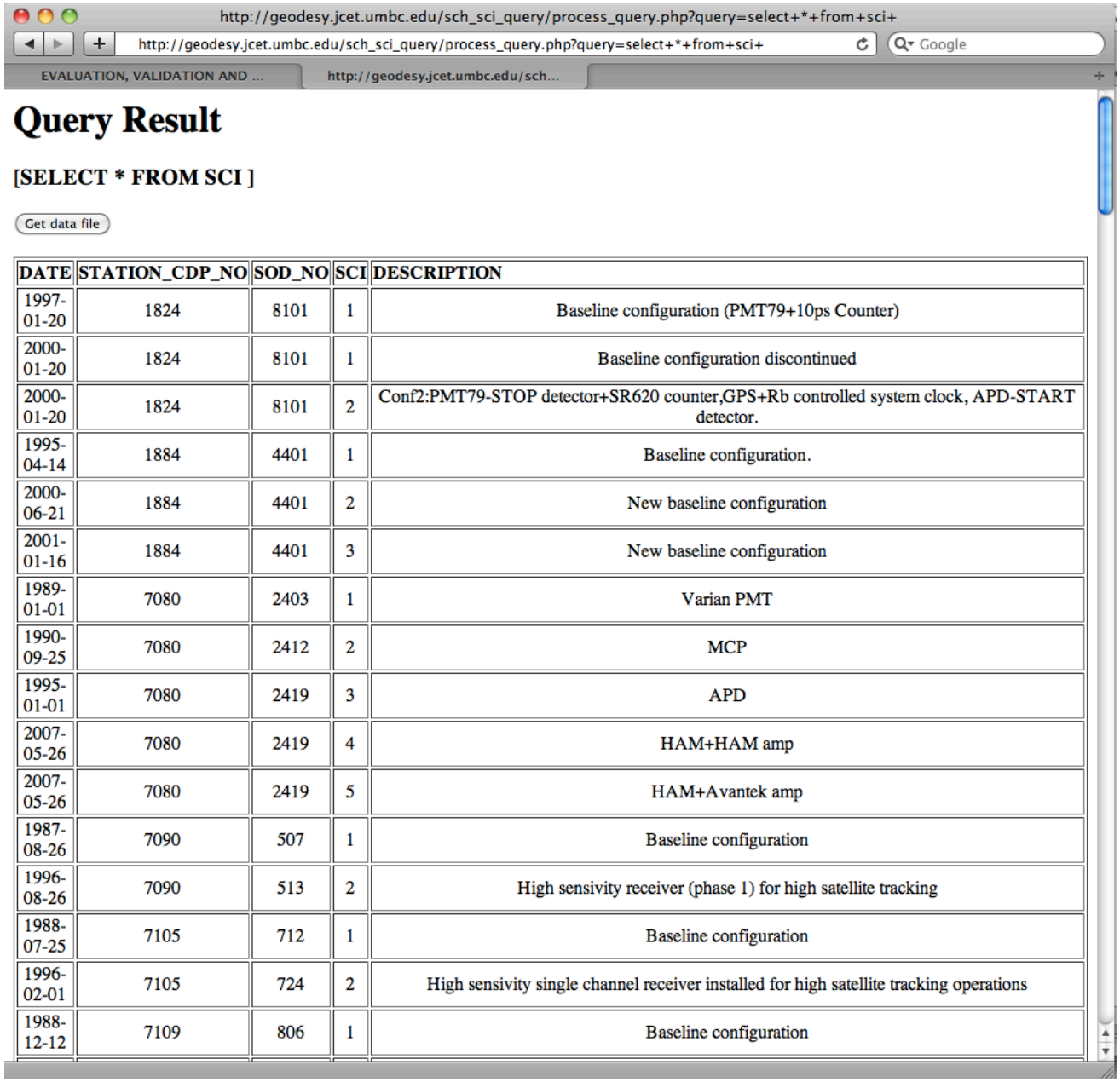
Query Result

[SELECT * FROM SCH WHERE STATION_CDP_NO=7105]

Get data file

DATE	STATION_CDP_NO	SOD_NO	SCH	DESCRIPTION
1988-07-25	7105	712	1	Baseline configuration: MCP-PMT, cascaded constant fraction discriminator, HP5370 timer, Setra barometer, cesium beam frequency standard, TV line-10, az-el mount, ND: YAG Laser wavelength 532.1 nm, 200 ps laser, 200 meter target with anti-parallax
1989-06-15	7105	714	2	Anti-parallax modification for calibration
1989-07-13	7105	714	3	Transmit delay modification
1989-08-03	7105	715	4	Original anti-parallax re-installed
1990-09-01	7105	718	5	Etalon tracking modifications (h/w and s/w)
1990-12-10	7105	719	6	Anti-parallax modification for calibration
1991-02-01	7105	719	7	HP computer upgrade
1991-07-10	7105	720	8	Optical attentuation mechanism, anti-parallax and CCD camera modifications
1991-07-23	7105	721	9	Optical attentuation mechanism and CCD modifications removed; original receive package installed
1991-10-18	7105	722	10	Optical attentuation mechism and CCD camera modifications installed
1991-12-09	7105	723	11	Tracking and analysis software upgrade
1992-07-10	7105	724	12	Mount refurbishment
1994-09-01	7105	724	13	Mount observer automation
1994-12-22	7105	724	14	New normal point generation software (VM)
1995-09-15	7105	724	15	Paroscientific barometer replaces Setra
1996-[illegible]	7105	724	16	Controller upgrade project complete

SCH/SCI Query Engine



http://geodesy.jcet.umbc.edu/sch_sci_query/process_query.php?query=select+*+from+sci+

http://geodesy.jcet.umbc.edu/sch_sci_query/process_query.php?query=select+*+from+sci+

EVALUATION, VALIDATION AND ... | http://geodesy.jcet.umbc.edu/sch...

Query Result

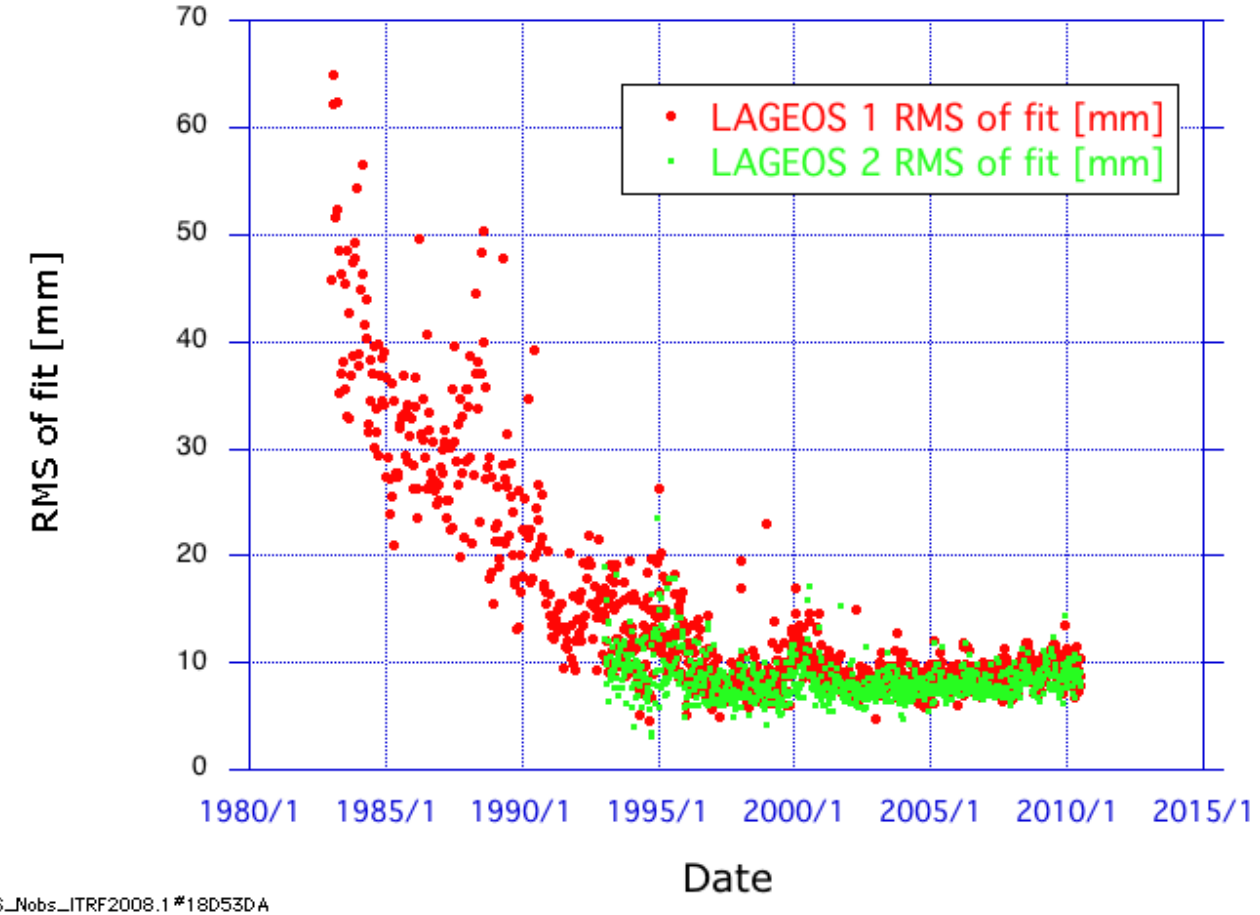
[SELECT * FROM SCI]

Get data file

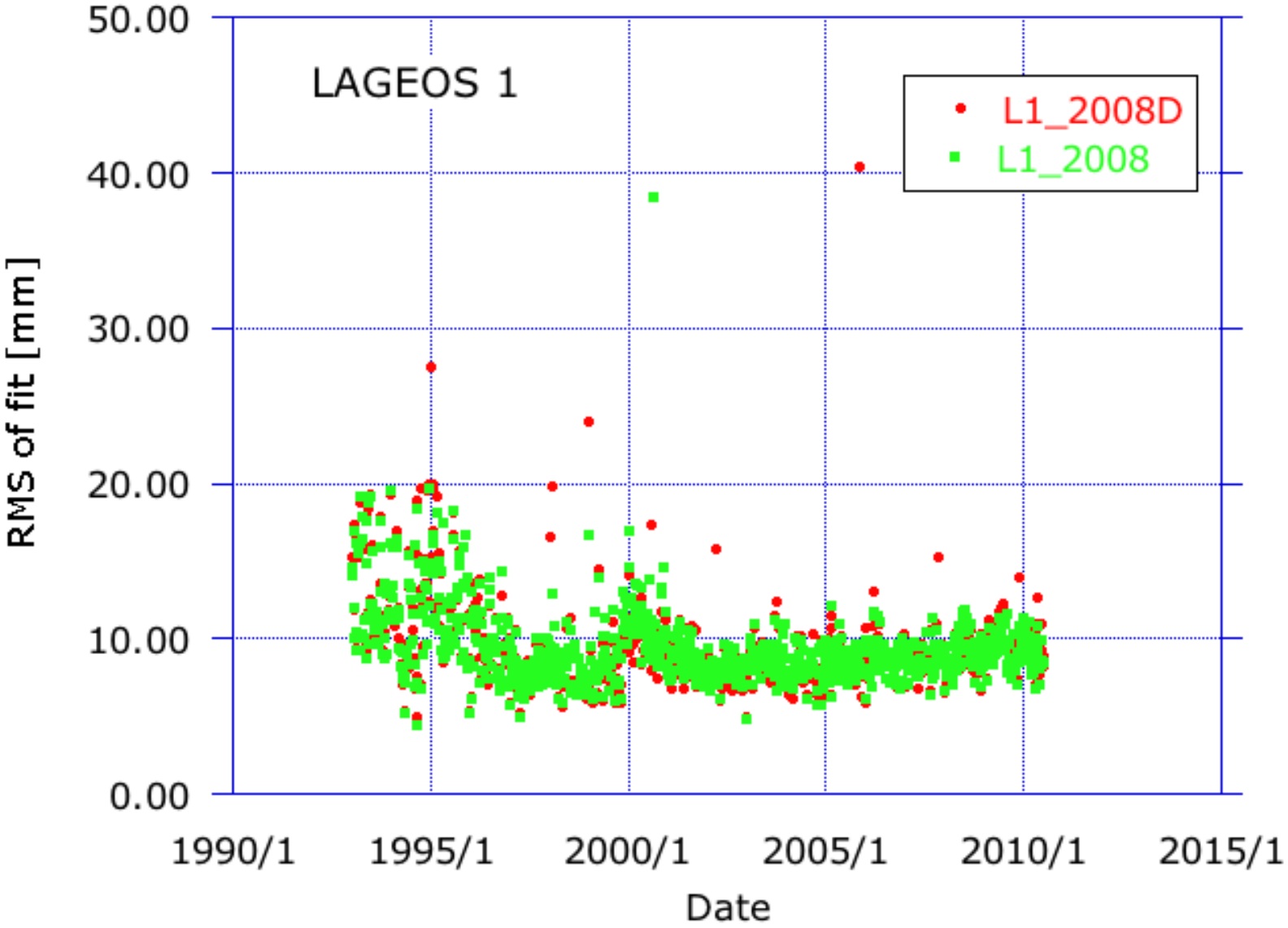
DATE	STATION_CDP_NO	SOD_NO	SCI	DESCRIPTION
1997-01-20	1824	8101	1	Baseline configuration (PMT79+10ps Counter)
2000-01-20	1824	8101	1	Baseline configuration discontinued
2000-01-20	1824	8101	2	Conf2:PMT79-STOP detector+SR620 counter,GPS+Rb controlled system clock, APD-START detector.
1995-04-14	1884	4401	1	Baseline configuration.
2000-06-21	1884	4401	2	New baseline configuration
2001-01-16	1884	4401	3	New baseline configuration
1989-01-01	7080	2403	1	Varian PMT
1990-09-25	7080	2412	2	MCP
1995-01-01	7080	2419	3	APD
2007-05-26	7080	2419	4	HAM+HAM amp
2007-05-26	7080	2419	5	HAM+Avantek amp
1987-08-26	7090	507	1	Baseline configuration
1996-08-26	7090	513	2	High sensivity receiver (phase 1) for high satellite tracking
1988-07-25	7105	712	1	Baseline configuration
1996-02-01	7105	724	2	High sensivity single channel receiver installed for high satellite tracking operations
1988-12-12	7109	806	1	Baseline configuration

ITRF2008 Validation

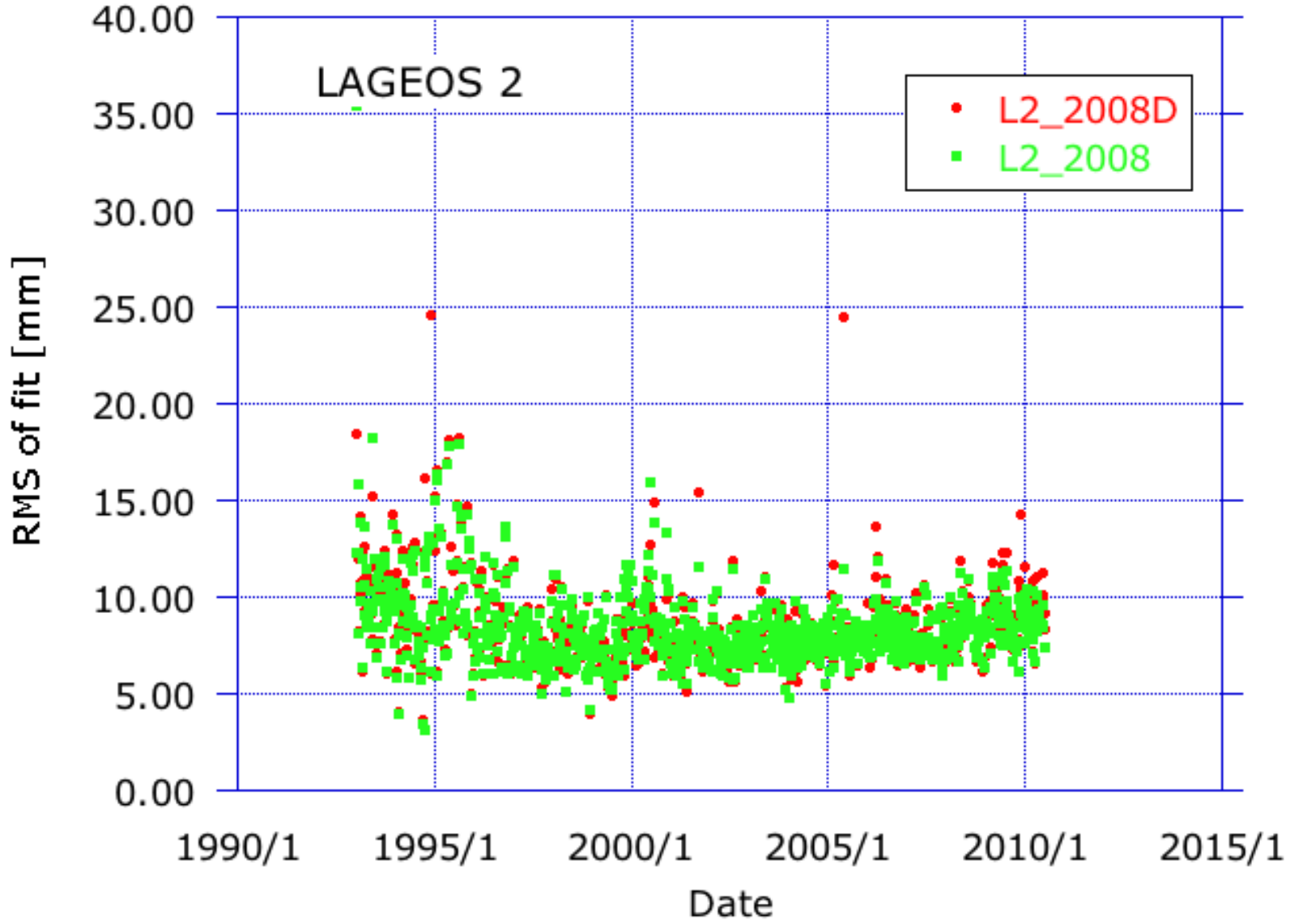
- Re-analyzed all LAGEOS 1 & 2 data from 1983 to present, using ITRF2008 and ITRF2008D as *a priori*



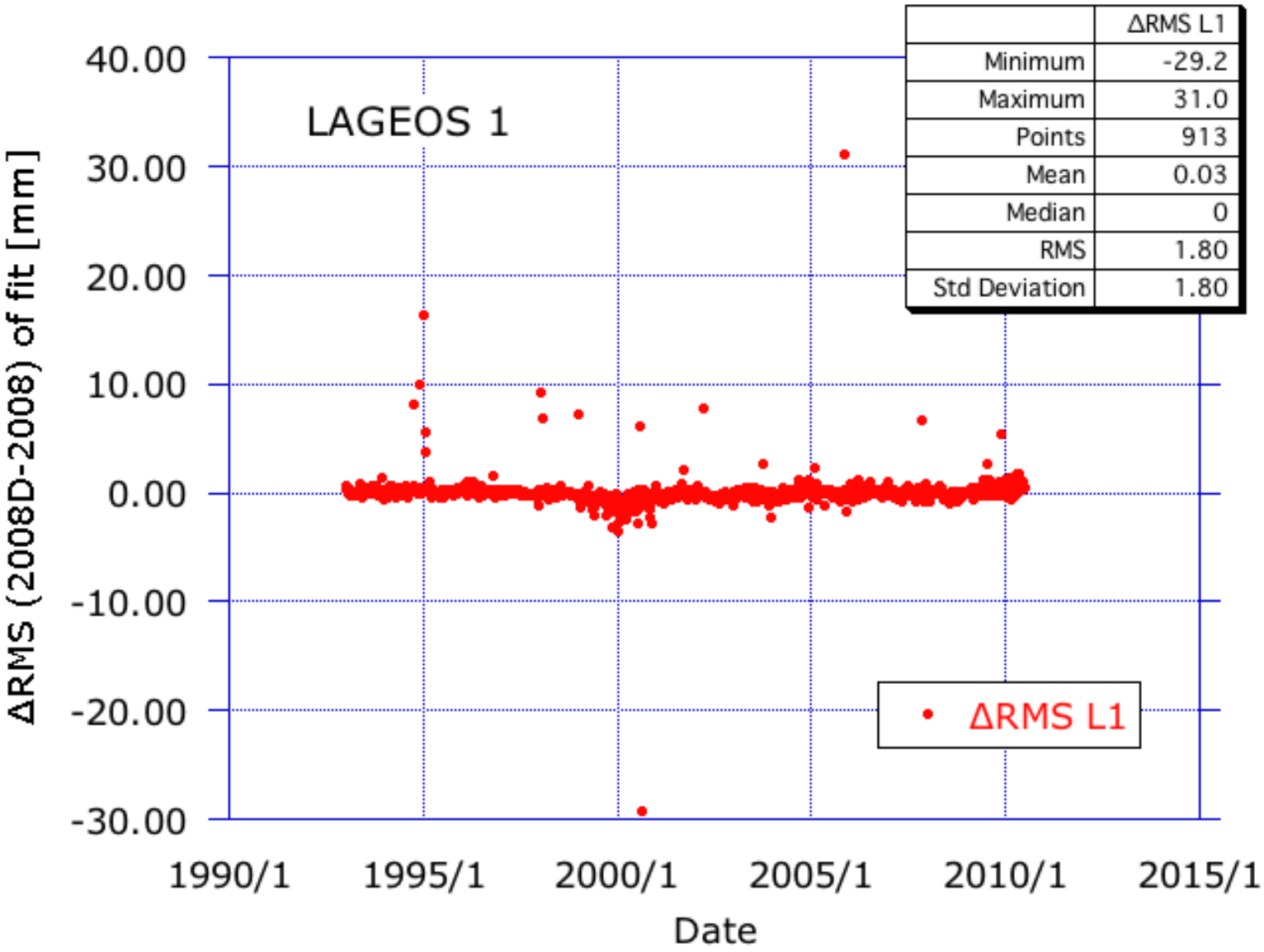
ITRF2008 & D Validation



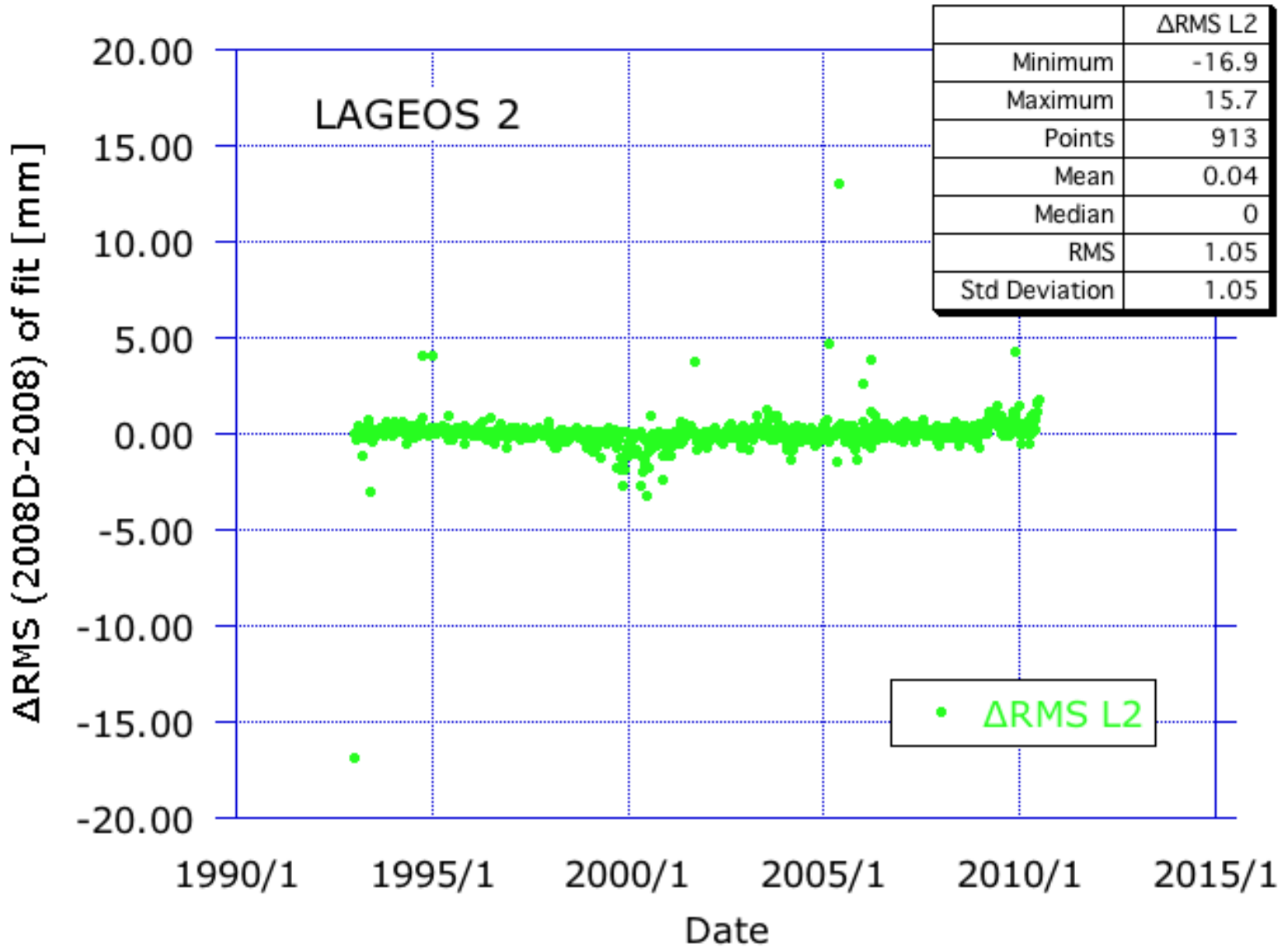
ITRF2008 & D Validation



ITRF2008 & D Validation

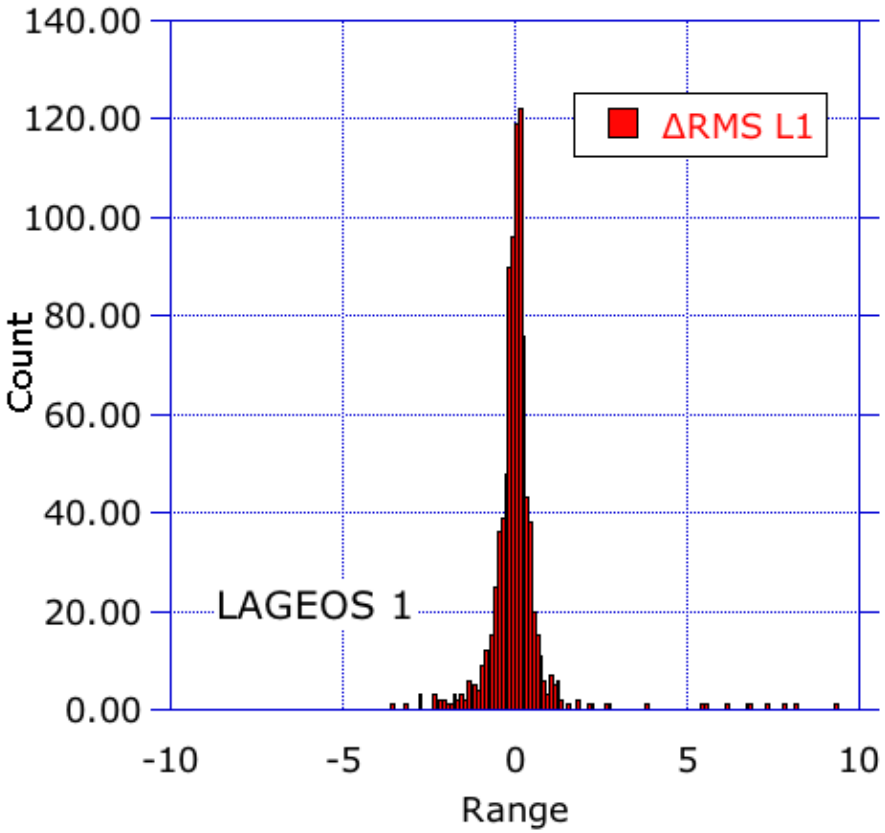


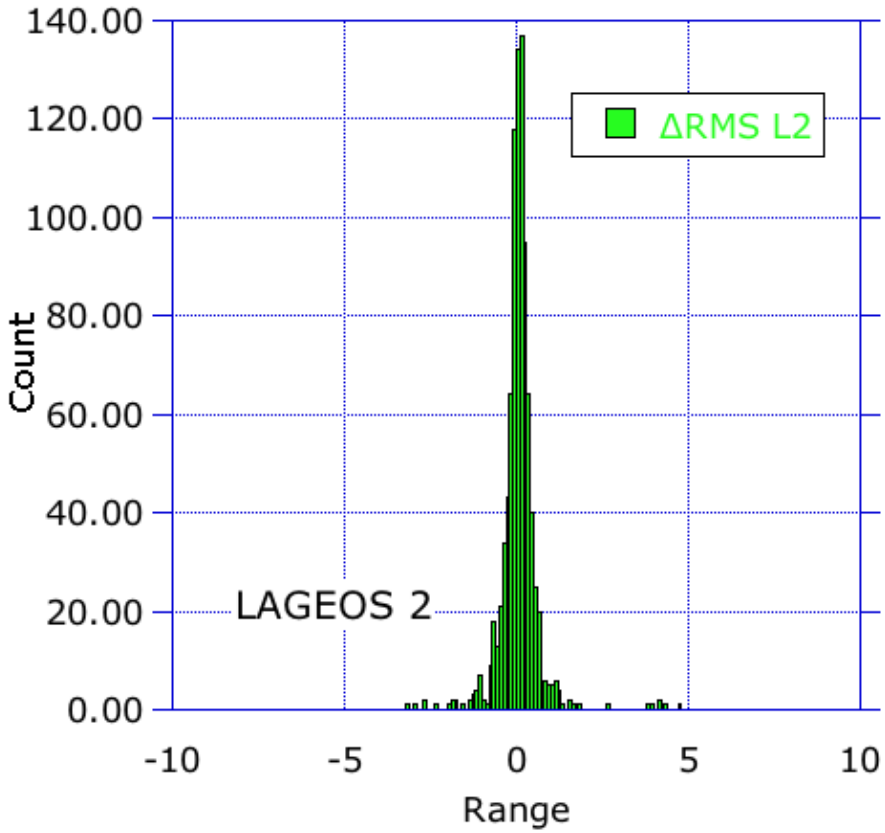
ITRF2008 & D Validation



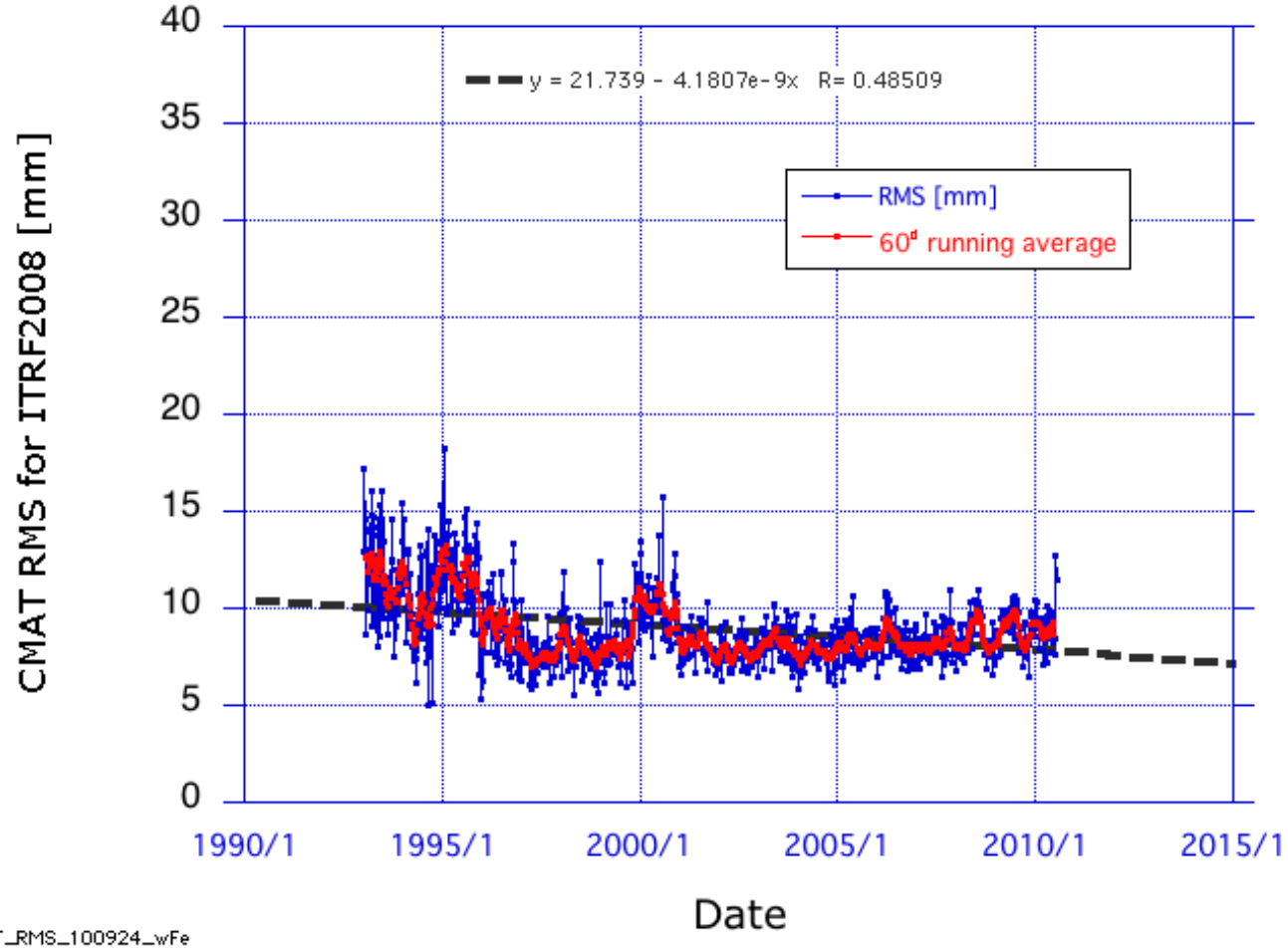
ITRF2008 & D Validation

$\Delta RMS : RMS_{2008D} - RMS_{2008}$ if $\Delta RMS > 0 \rightarrow RMS_{2008} < RMS_{2008D}$



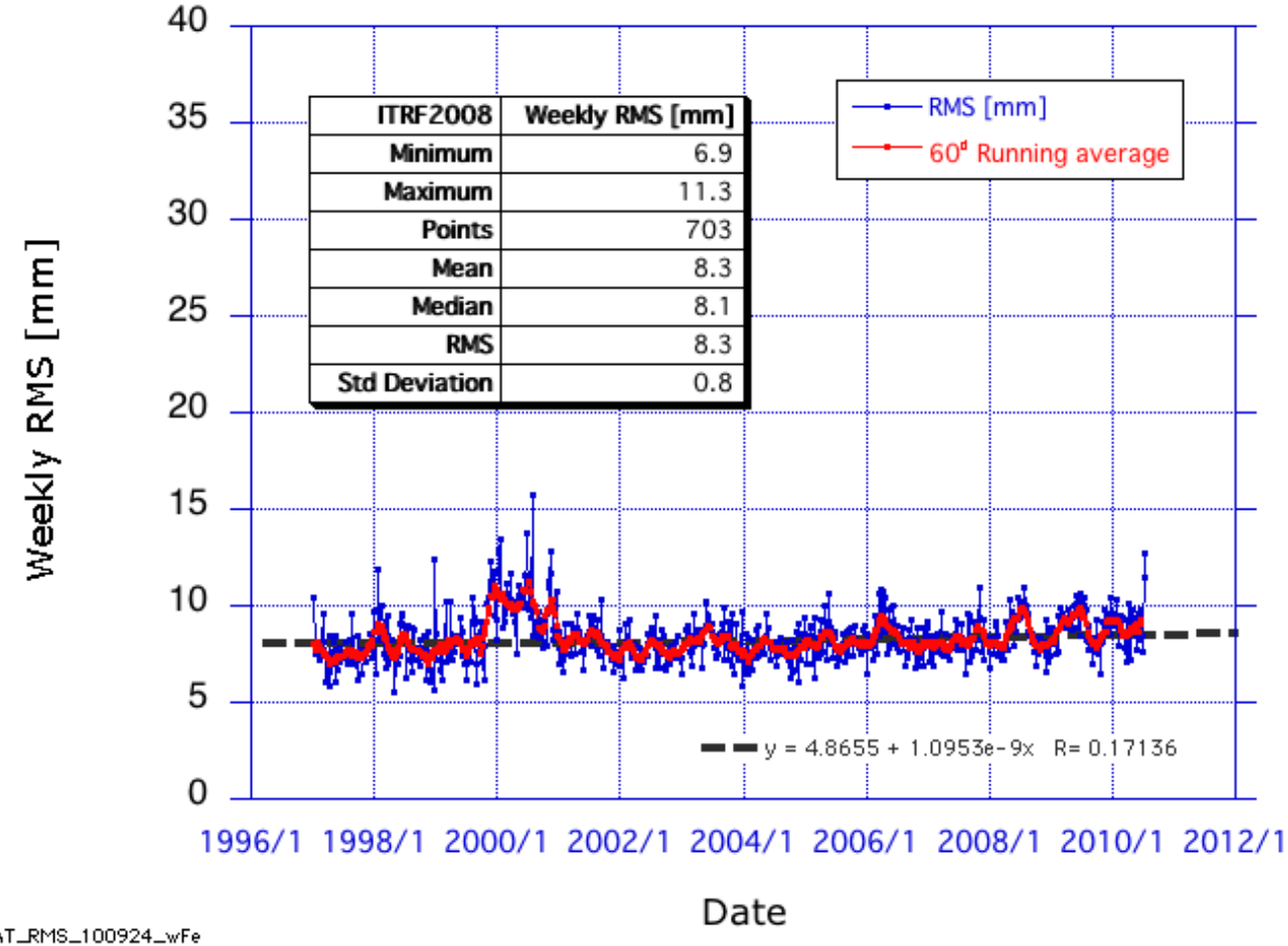


ITRF2008 – cont.



CMAT_RMS_100924_wFe

ITRF2008 – cont.

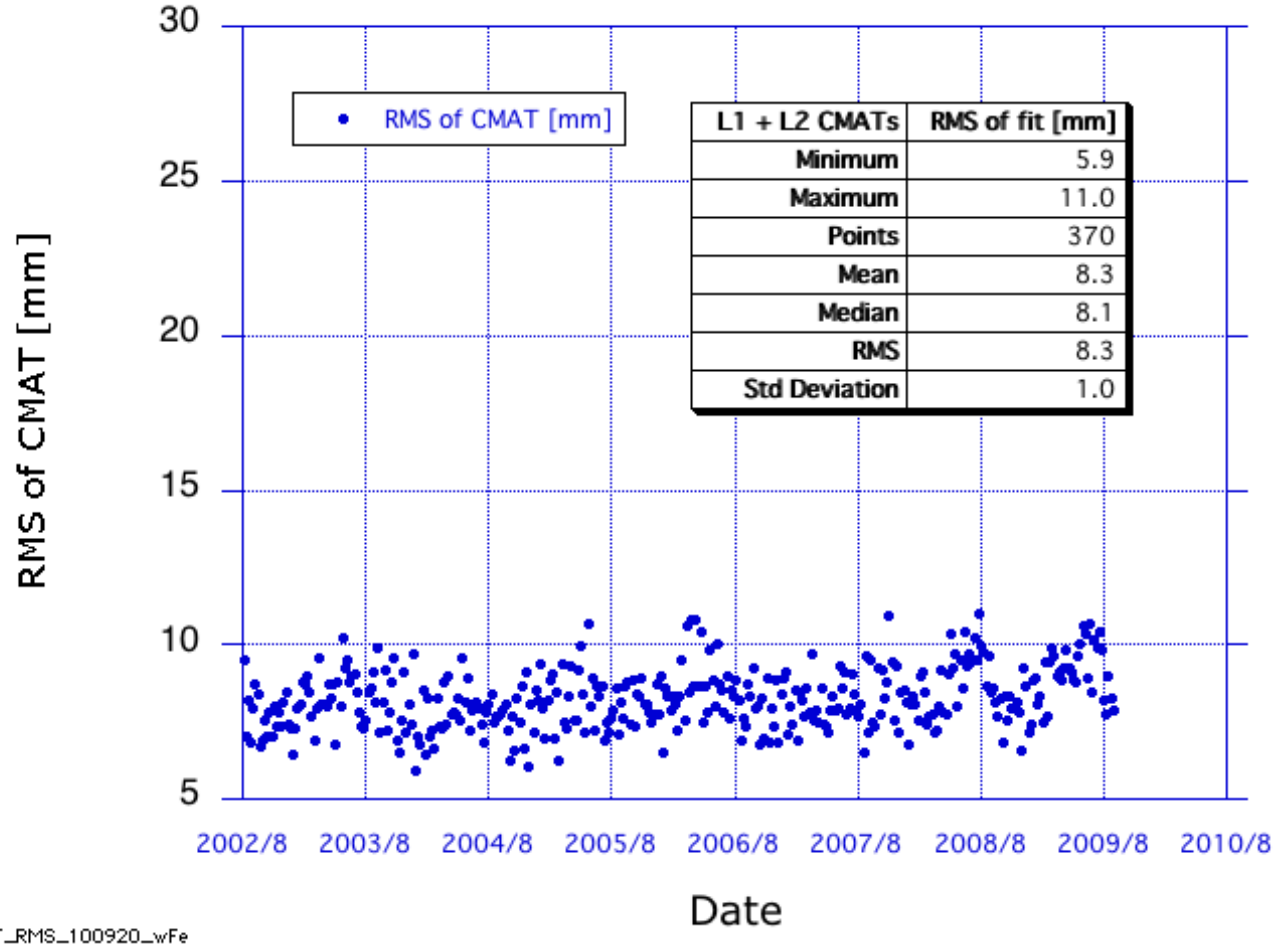


CMAT_RMS_100924_wFe

De-aliasing product test

Tested ITG (Univ. Bonn) GRACE model and GRACE-based daily de-aliasing product for 2002/08 to 2009/08

ITRF2008 No De-aliasing Correction

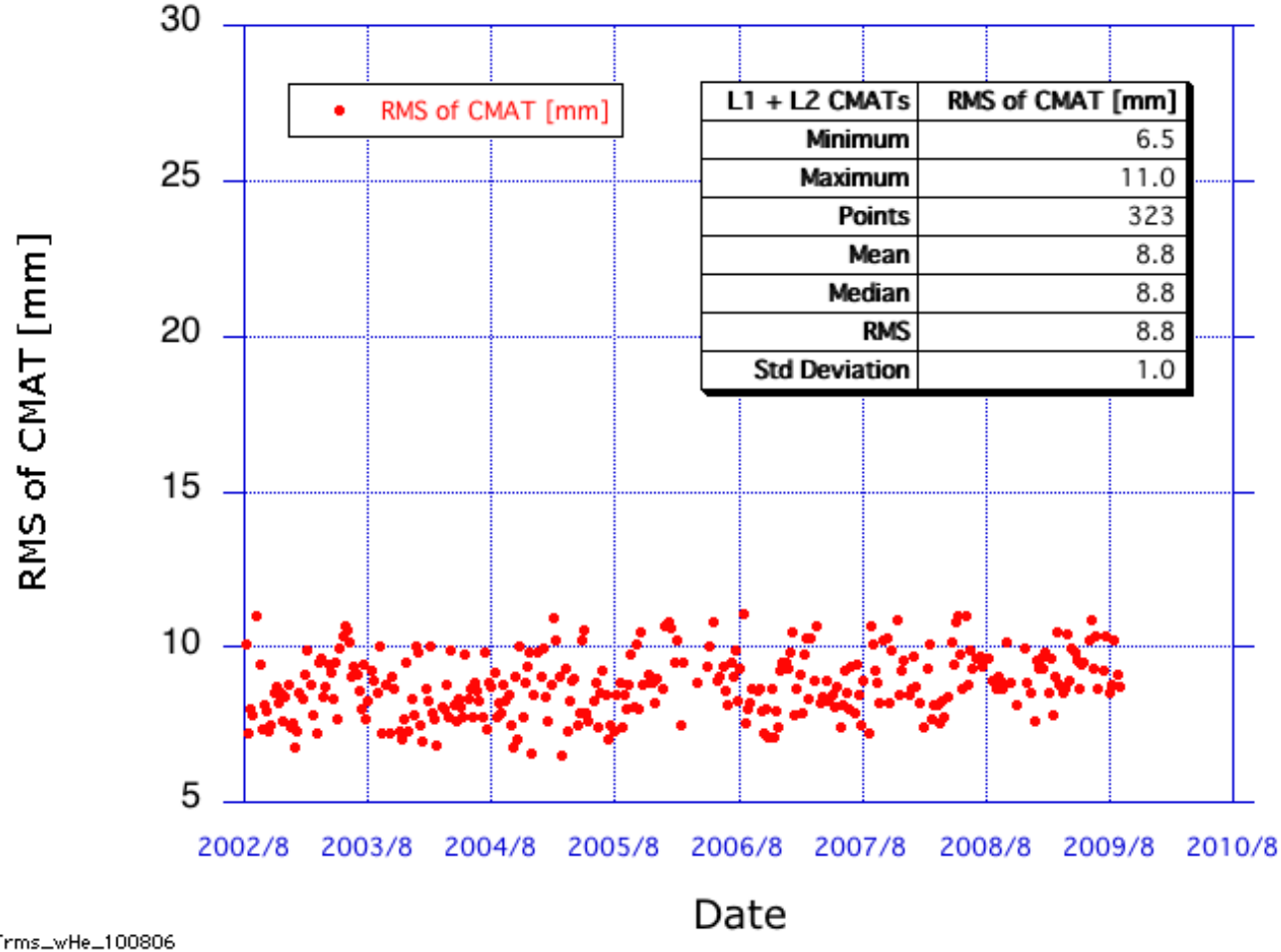


CMAT_RMS_100920_wFe

De-aliasing product test – cont.

Tested ITG (Univ. Bonn) GRACE model and GRACE-based daily de-aliasing product for 2002/08 to 2009/08

ITRF2008 with ITG De-aliasing Correction

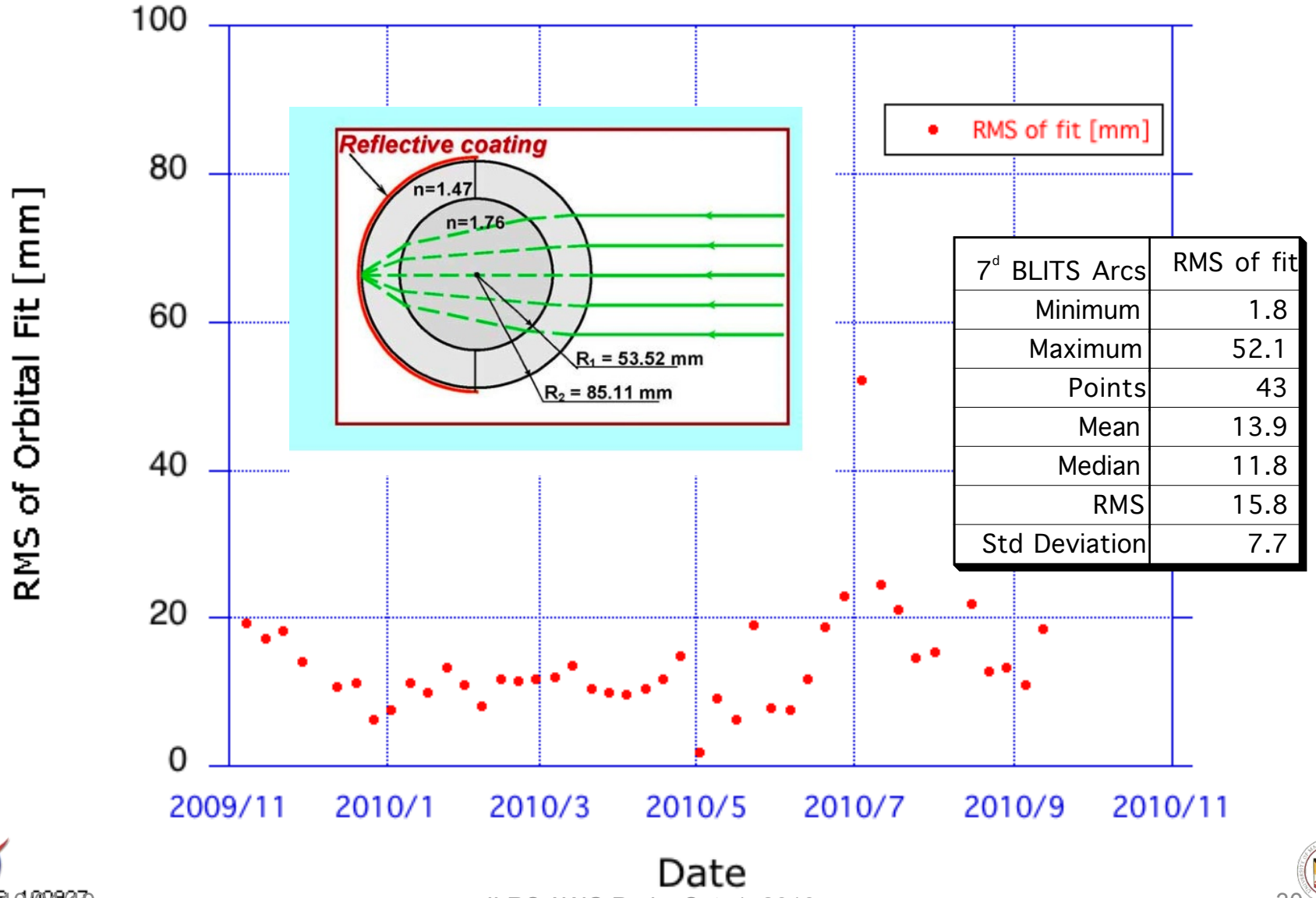


CMATrms_wHe_100806

De-aliasing product test – cont.

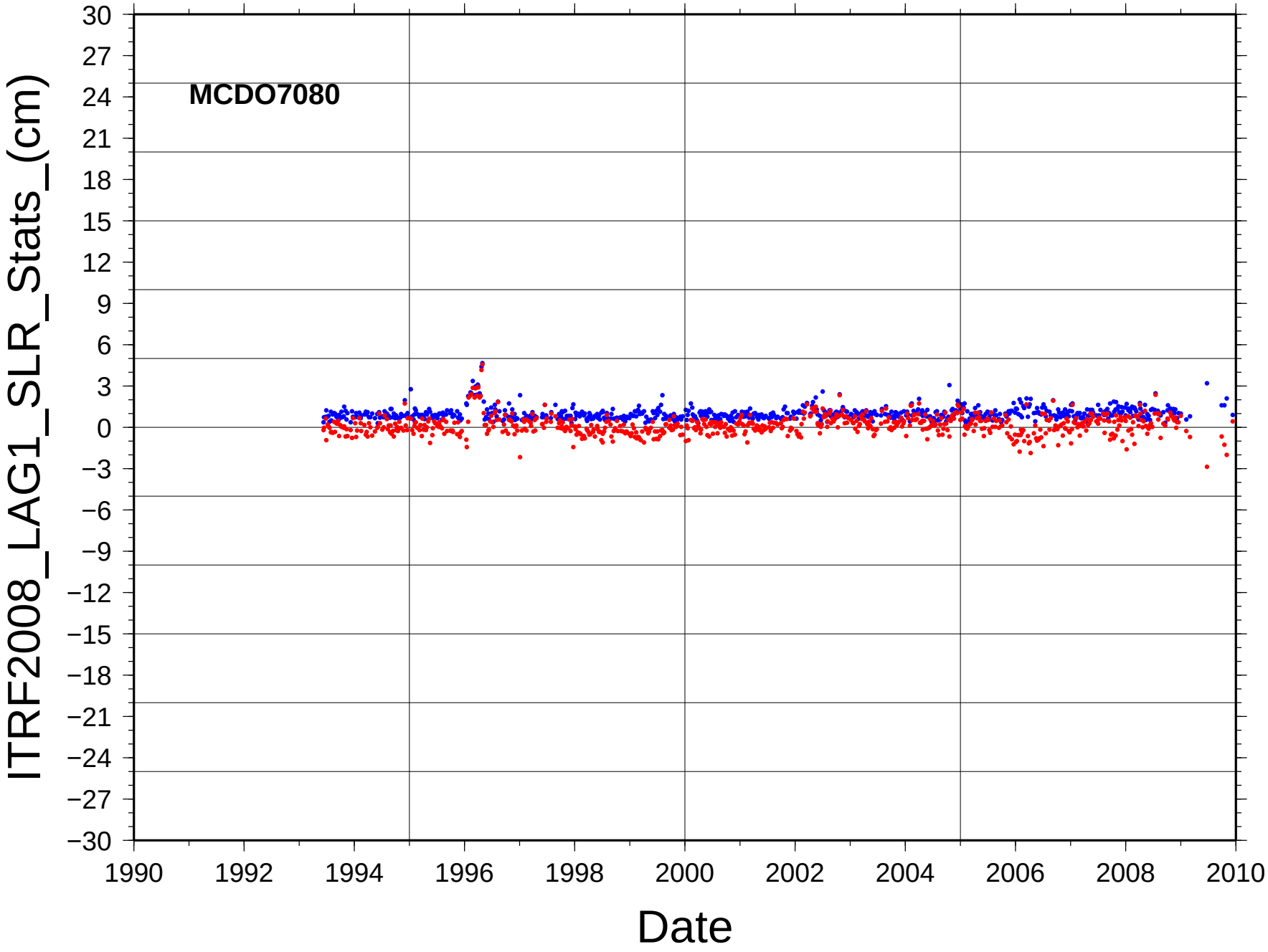
- No obvious difference between the use of a static vs. a daily changing gravity model
- We are examining the station height behavior, where we expect to see some difference
- Difference in mean RMS is 0.5 mm
- This is consistent with prior tests using a de-aliasing product based on ECMWF 6-hr fields only

BLITS 7-day Arc fits

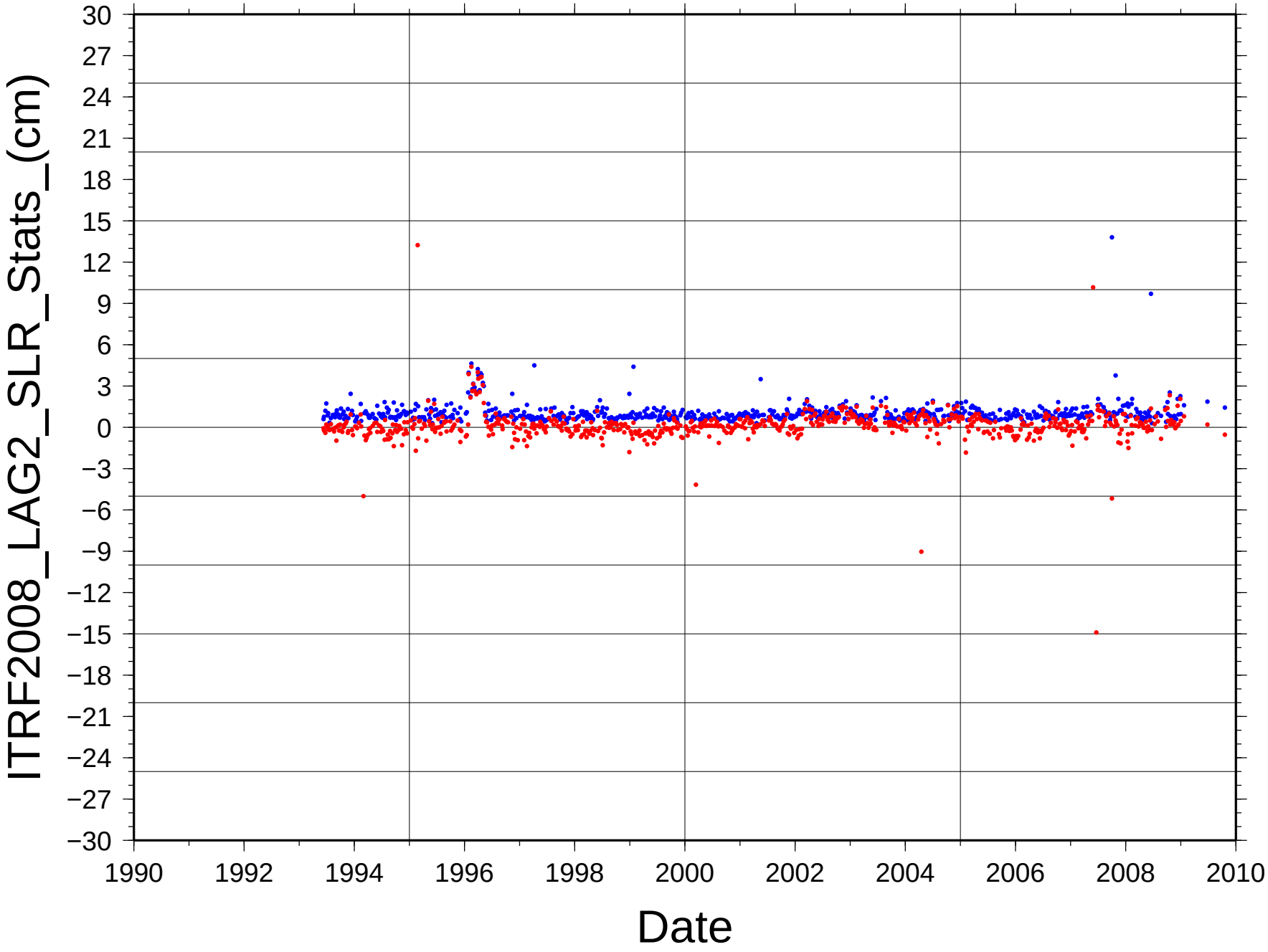


7d BLITS Arcs	RMS of fit
Minimum	1.8
Maximum	52.1
Points	43
Mean	13.9
Median	11.8
RMS	15.8
Std Deviation	7.7

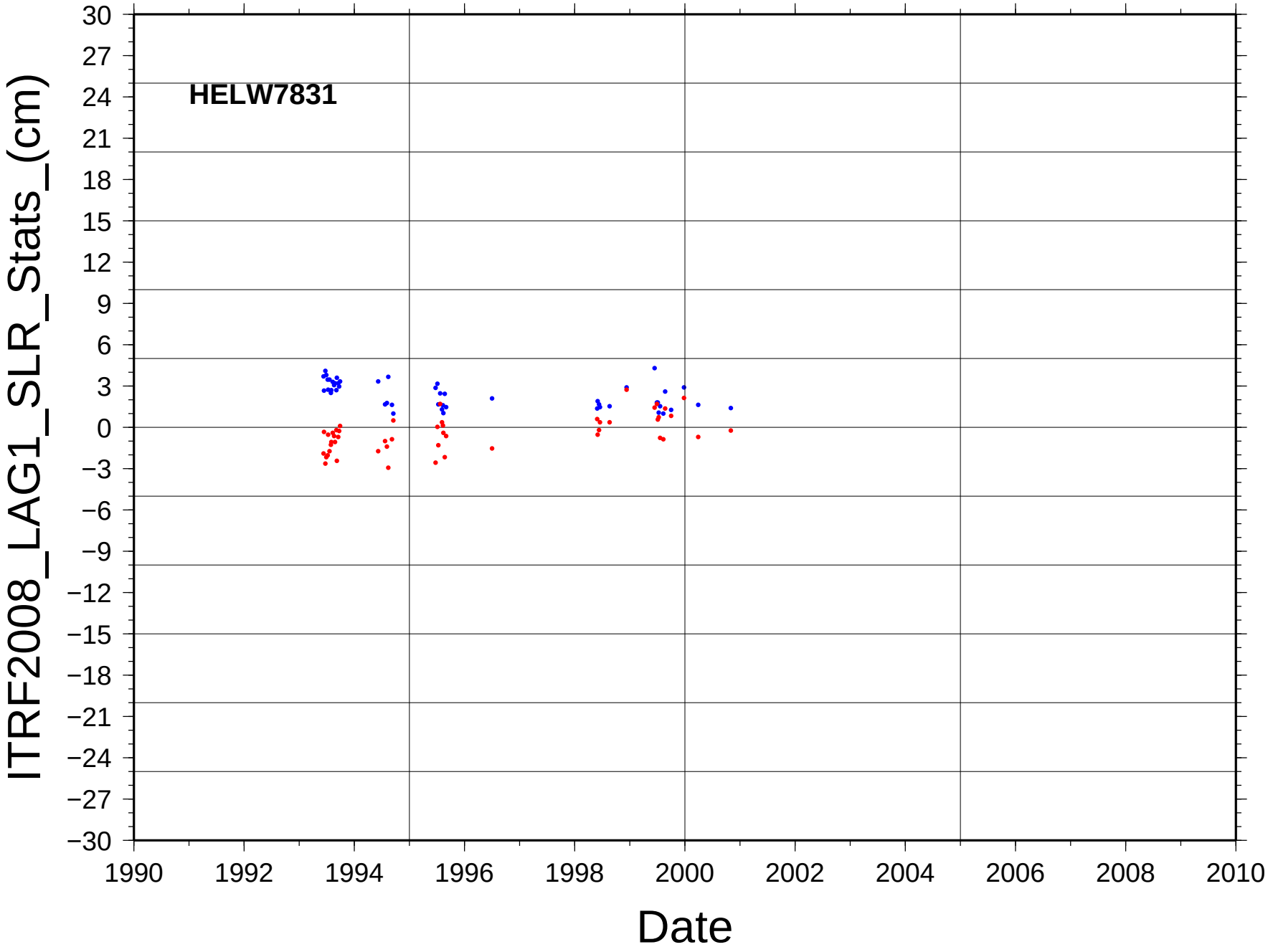
70802419


MCDO7080
ITRF2008_LAG1_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

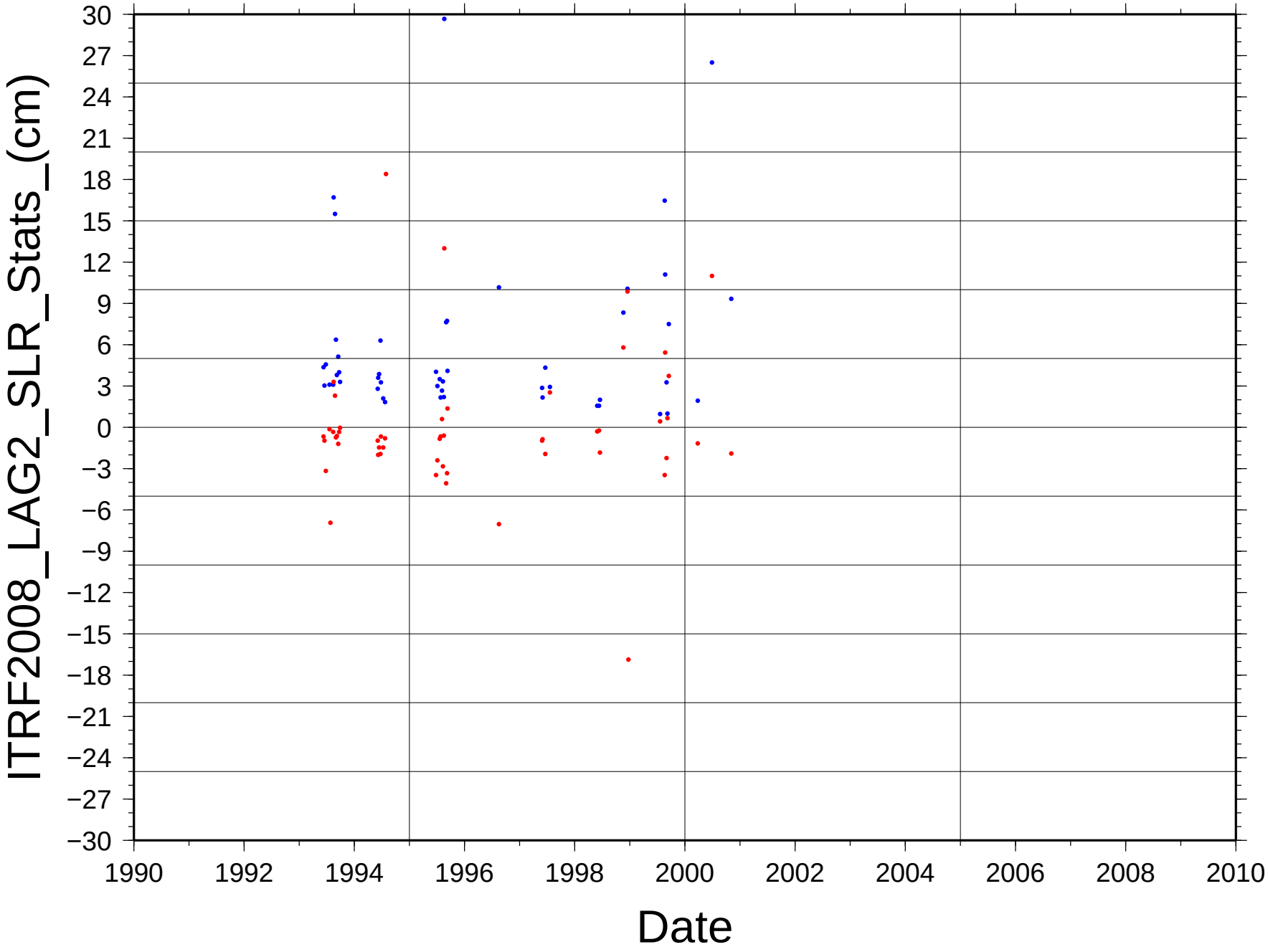
70802419


ITRF2008_LAG2_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

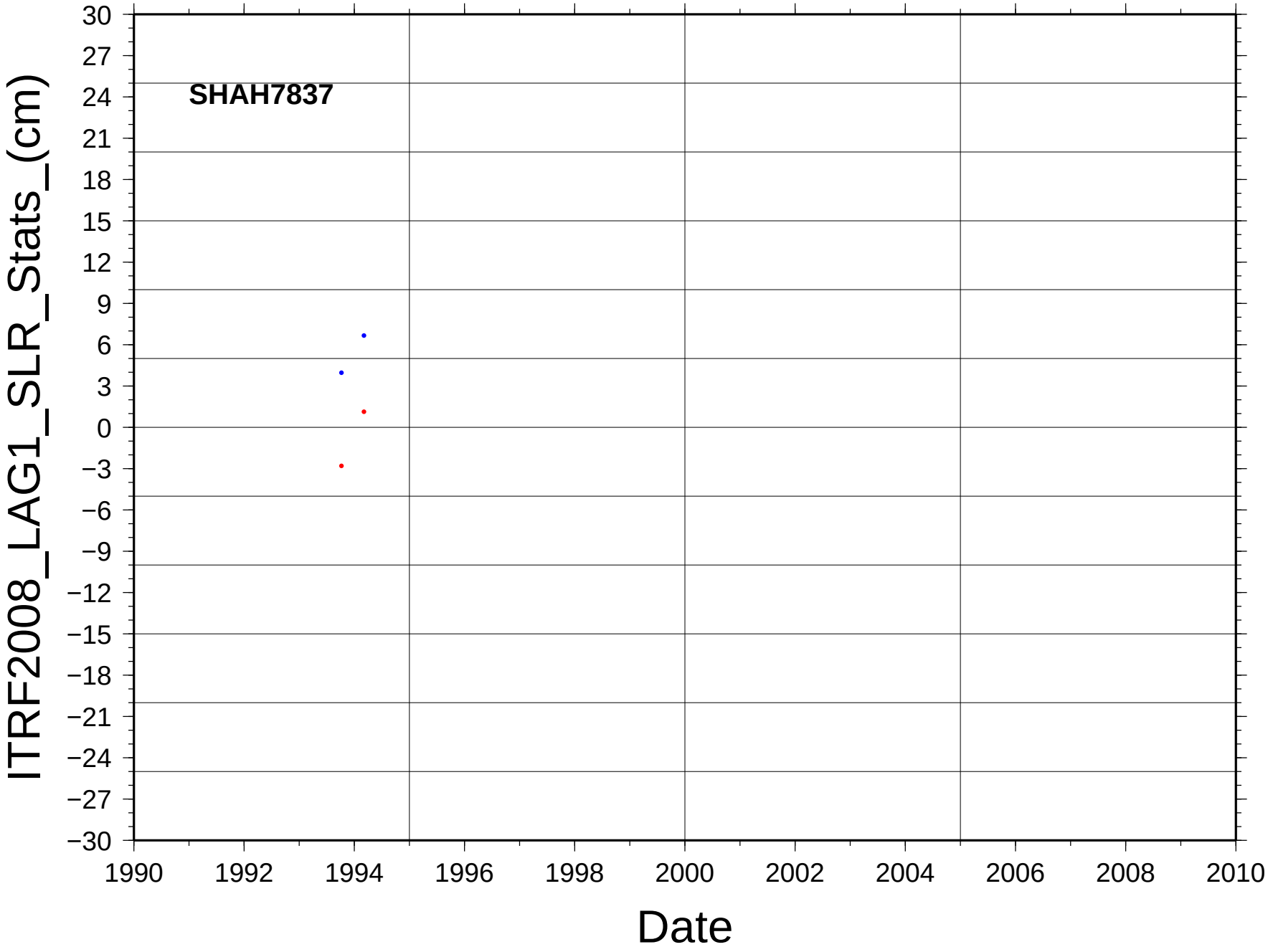
78314601


HELW7831
ITRF2008_LAG1_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

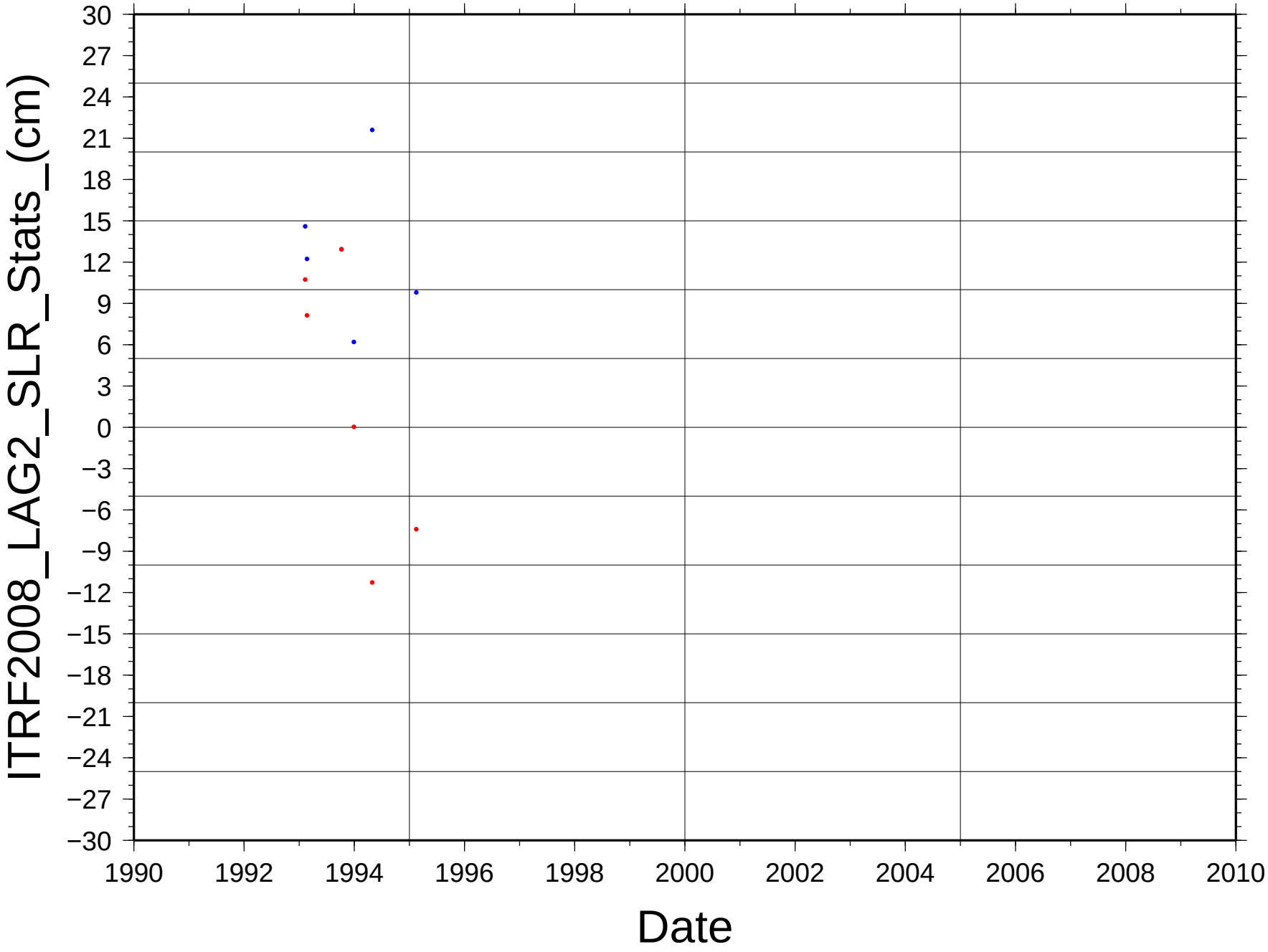
78314601


ITRF2008_LAG2_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

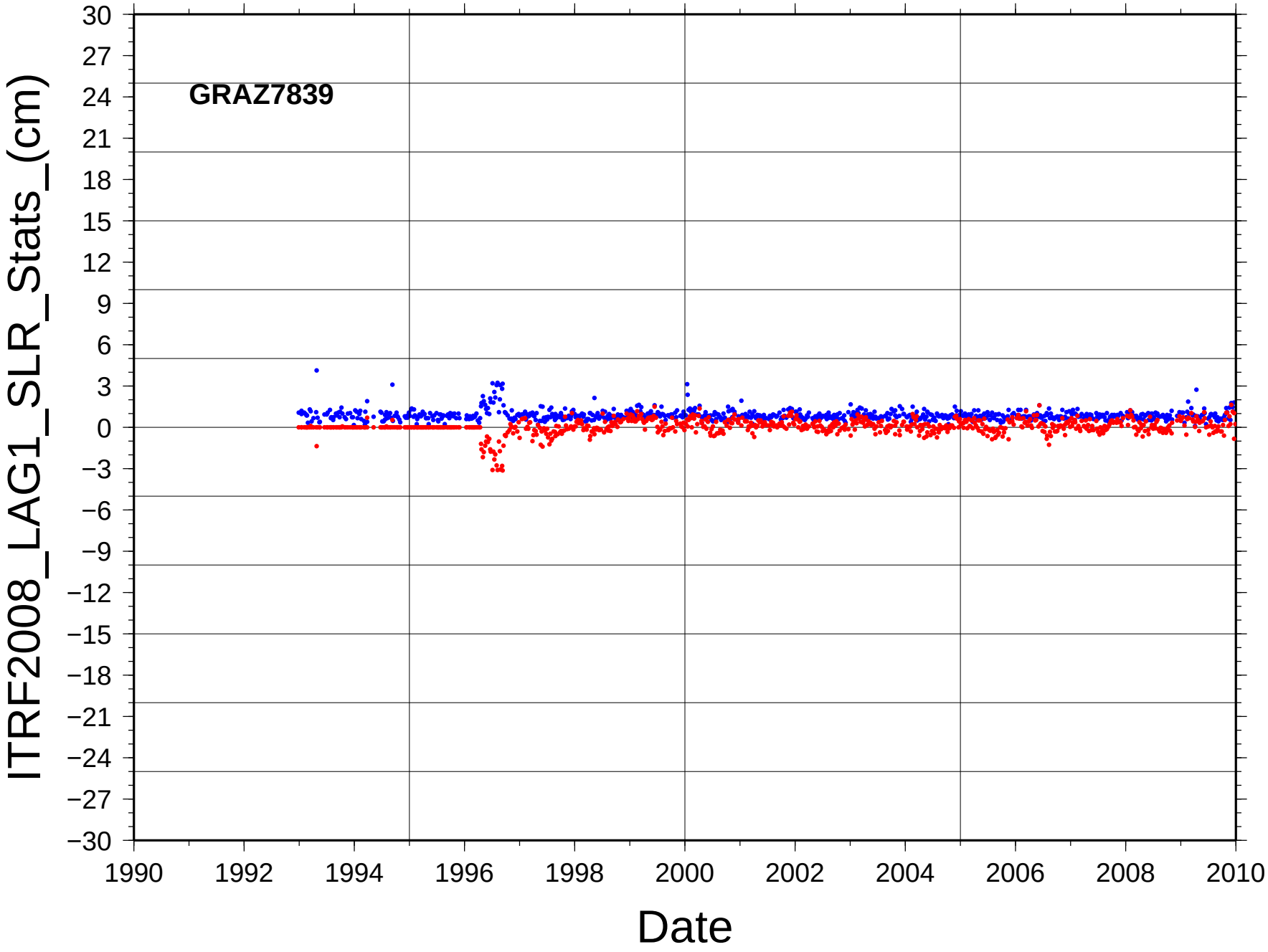
78372804


SHAH7837
ITRF2008_LAG1_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

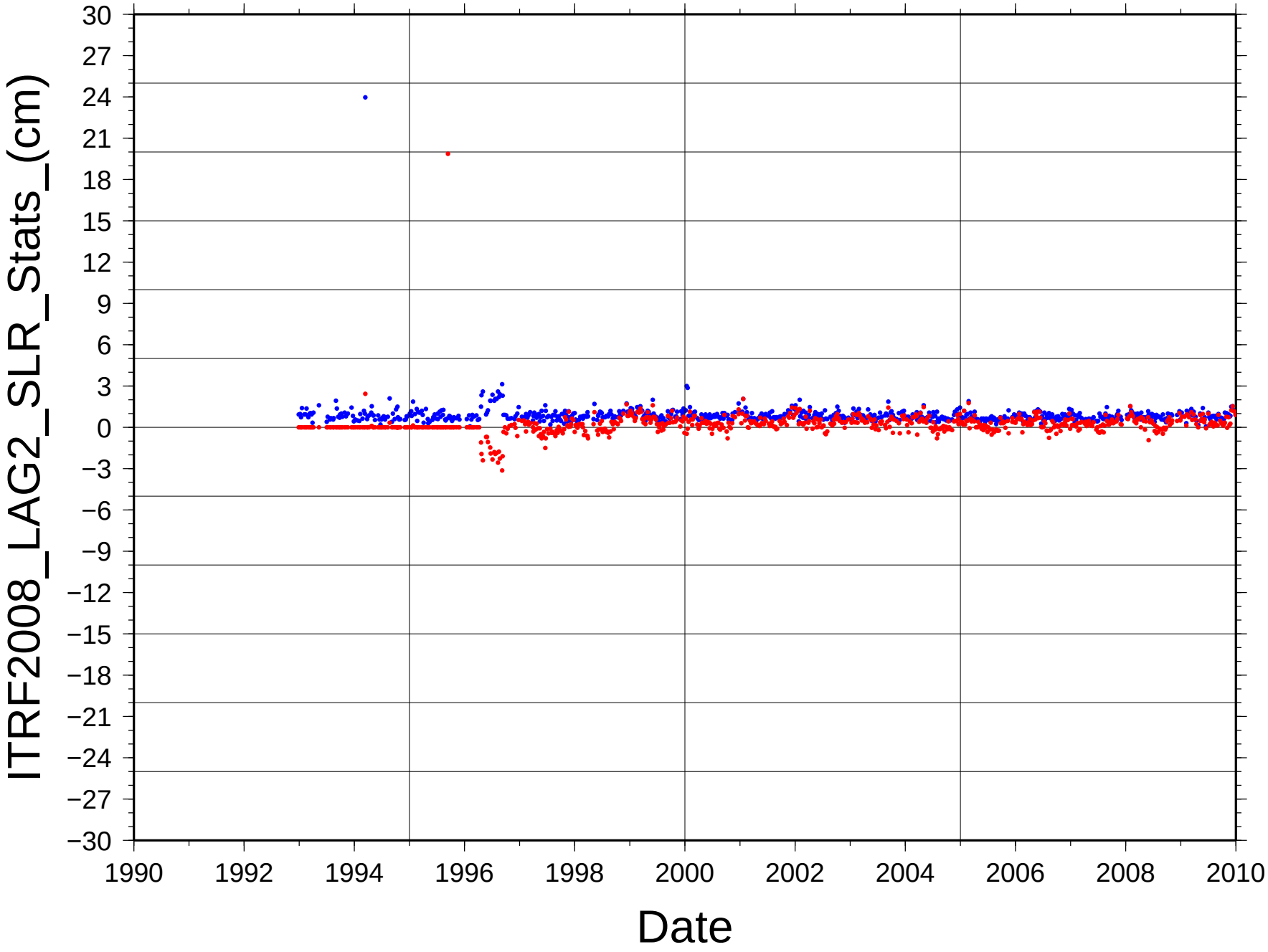
78372804


ITRF2008_LAG2_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

78393402


GRAZ7839
ITRF2008_LAG1_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

78393402


ITRF2008_LAG2_SLR_Stats_(cm)
30
27
24
21
18
15
12
9
6
3
0
−3
−6
−9
−12
−15
−18
−21
−24
−27
−30
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Date

CoM values for Geodetic SLR targets:
Current accuracy and prospects
towards all-new, 3D, version

Graham Appleby
Space Geodesy Facility, Herstmonceux, UK

NATURAL ENVIRONMENT RESEARCH COUNCIL

ILRS AWG meeting 1 Oct 2010
Obs de Paris, France

International Laser Ranging Service

Magnitude of effect

- Depending upon the stations' technology, there is a range of appropriate CoM values;

- For LAGEOS the total range is **~6mm** (Minott *et al*, 1993, Otsubo & Appleby, 2003)
  For ETALON the total range is **~5cm (**Otsubo & Appleby, 2003)

- Station technology:
  - multi-photon returns:
  - photomultiplier or first-photon detection
  - single photon return

Scope

- Tables of CoM values for LAGEOS and for ETALON for each ILRS station;
  - Already presented (UAW2009, AWG 2010 Vienna)
- Recent snapshot only
  - Mostly no 'history' of site changes
  - Can impact on recommended CoM
  - Missing stations
- Back to the log files

Extraction from logfiles

- To compute CoM, require:
- Detector type, energy regime, editing criteria, all as functions of date
- Logfiles contain this information but we need to extract it from the more comprehensive data record
- Script written/under development
- Ultimately will generate tables of CoM values

Example output from the script

7403 arel_20090320.log

Detector Type	MCP
Date Installed	1992-07-10
Date Removed	(yyyy-mm-dd)
Return-rate Controlled	YES
Mode of Operation	Few to Multi Ph
Laser Type	ND:YAG
Pulse Width (FWHM)	200
Max. Repetition Rate	5
Date Installed	1992-07-10
Date Removed	(yyyy-mm-dd)
Cal Return-rate Control	YES
Cal Mode of Operation	FEW to MULTI
Cal Single Shot RMS	5
Cal Edit Criterion	ITERATIVE 3.0 SIGMA
Sat Edit Criterion	ITERATIVE 3.0 SIGMA
LAG Single Shot RMS	8

More complex example

7845 grsm_20090514.log

Detector Type	APD
Date Installed	1992-09-14
Date Removed	(yyyy-mm-dd)
Return-rate Controlled	NO
Mode of Operation	Single to Multi
Detector Type	APD
Date Installed	2009-06-01
Date Removed	(yyyy-mm-dd)
Return-rate Controlled	NO
Mode of Operation	Single to Multi
Laser Type	ND:YAG
Pulse Width (FWHM)	20
Max. Repetition Rate	10
Date Installed	2009-01-01
Date Removed	(yyyy-mm-dd)
Laser Type	ND:YAG
Pulse Width (FWHM)	200
Max. Repetition Rate	10
Date Installed	2009-01-01
Date Removed	(yyyy-mm-dd)
Cal Return-rate Control	YES
Cal Mode of Operation	SINGLE PH
Cal Single Shot RMS	1.4
Cal Edit Criterion	ITERATIVE 2.5 SIGMA
Sat Edit Criterion	ITERATIVE 2.5 SIGMA
LAG Single Shot RMS	13

Status

- All log files downloaded from cddis
- Script has processed all files and generated 'summary';
- By-product is a check on log-file syntax errors;
- Next step is to automatically generate the CoM table

Summary

- Time-dependent CoM corrections for LAGEOS and ETALON are under development;
- Aim to produce machine-readable file
- Will submit to AWG for approval, towards an ILRS-recommended solution
- Must bear in mind the real uncertainties in these numbers!