Agenda

1.	Opening Remarks (5 min.)	W. Gurtner
2.	ILRS Status/Action Items (15 min.)	M. Pearlman/C. Noll
3.	Working Group Briefs and Recommendations (5-10 min each)	WG Chairs
	✦ Analysis	E. Pavlis/C. Luceri
	✦ Missions	G. Appleby
	✦ Data Formats and Procedures	W. Seemueller
	✦ Networks and Engineering	G. Kirchner
	✦ Transponders	
4.	Task Force Reports (5 min. each)	
	✦ Communications	E. Pavlis
	✦ Center-of-Mass Corrections	G. Appleby
5.	Laser Retroreflectors (5 min.)	M. Pearlman
6.	Data Replacement Policy (5 min.)	C.Noll/C. Luceri
7.	Stanford Counter Tests (5 min)	G. Appleby/G. Kirchner
8.	NRL PERCS Satellite Support (5 min.)	M. Pearlman
9.	16th International Workshop on Laser Ranging (5 min)	M. Pearlman
10.	ILRS Special Issue in Journal of Geodesy (5 min.)	E. Pavlis
11.	Coping with Future Satellite Missions (10 min.)	W. Gurtner
12.	GGOS Activities (5 min.)	M. Pearlman
13.	New Business	W. Gurtner/WG Chairs
14.	Other Business	W. Gurtner

ILRS Update

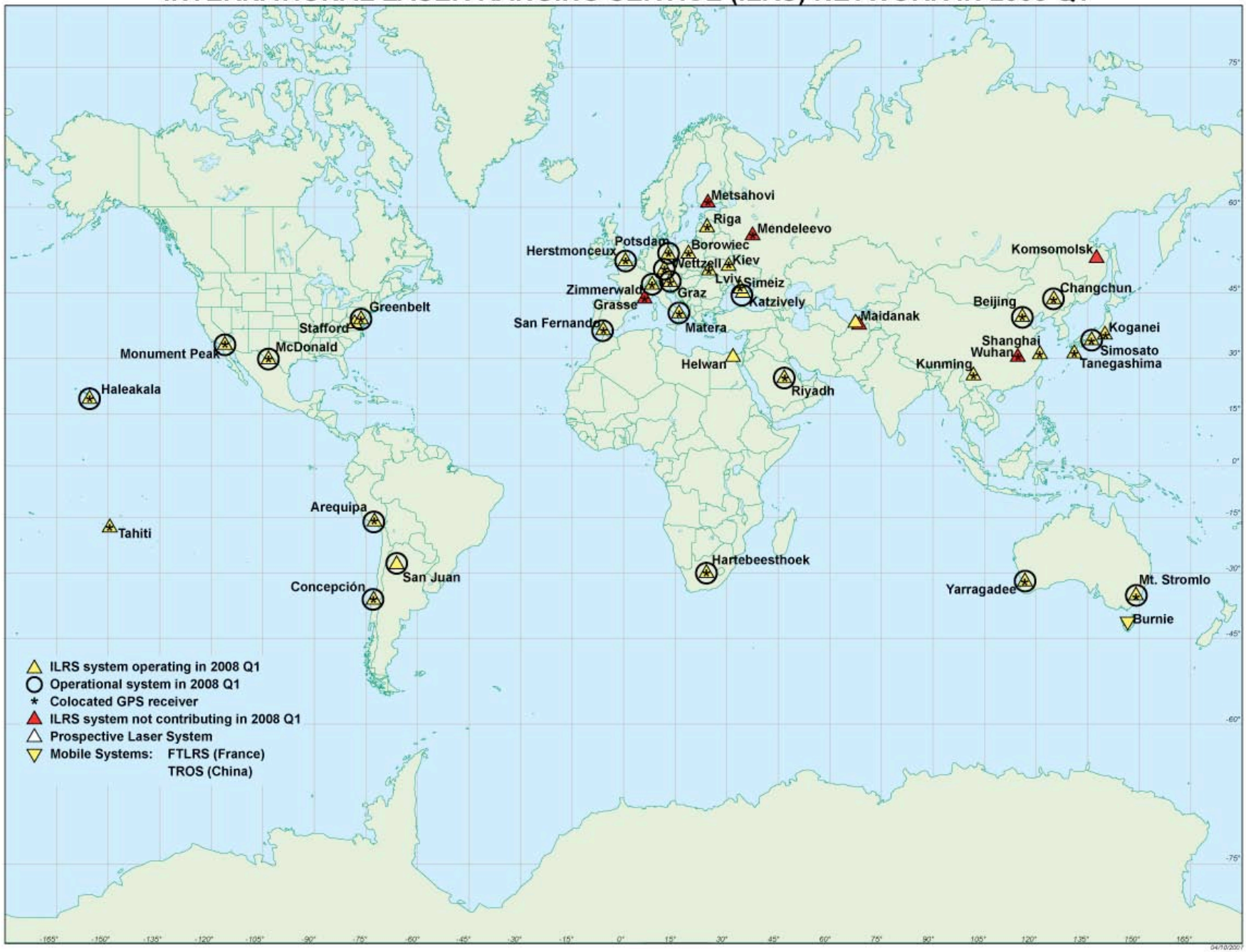
April 14, 2008

ILRS Central Bureau
NASA GSFC, Greenbelt, MD USA
cb@cddis.gsfc.nasa.gov

Network Status

- 31 global stations regularly providing tracking data in 2008
- Most productive stations are Yarragadee, San Juan, Mt. Stromlo, Graz, Herstmonceux, Wettzell, Changchun and Riyadh; Concepçion tracking much improved
- Kunming back in operation
- Several other systems have recently undergone repair and upgrade
- Simosato seems to have been rescued (at least temporarily), but still not operational
- FTLRS is in Burnie, Tasmania for a campaign to support Jason calibration/validation
- TROS going to Korea for three month tracking campaign in 2008
- NASA engineers now in Tahiti to refurbish and upgrade MOBLAS-8; upgrade will include CPF prediction and restricted tracking s/w
- Letters sent in support of Simosato and Herstmonceux in 2008; San Juan in 2007

INTERNATIONAL LASER RANGING SERVICE (ILRS) NETWORK IN 2008 Q1



ILRS Report Card
(2008 Q1: Apr-07 through Mar-08)

Site Information		Data Volume									Data Quality		
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Location	Station Number	LEO pass Tot	LAGEOS pass Tot	High pass Tot	Total passes	LEO NP Total	LAGEOS NP Total	High NP Total	Total NP	Minutes of Data	Cal. RMS	Star RMS	LAG RMS
Baseline		1000	400	100	1500								
Yarragadee	7090	9415	1892	1311	12618	196173	24997	12142	233312	79613	4.8	9.1	9.5
San_Juan	7406	4892	1031	1193	7116	76171	12608	7908	96687	43591	9.1	9.1	12.3
Mount_Stromlo_2	7825	5071	1267	464	6802	66531	12736	3132	82399	32003	3.1	4.3	6.1
Graz	7839	4970	819	547	6336	99137	9154	4573	112864	29919	2.1	3.8	6.2
Zimmerwald_423 Zimmerwald_846	7810	4746 4676	999 998	559 493	6304 6167	74629 73865	11926 13107	3709 2845	90264 89817	29468 28041	12.1 26.5	15.2 22.4	17.8 24.4
Wettzell	8834	4414	1095	506	6015	47823	8360	2169	58352	20853	4.9	12.1	18.1
Changchun	7237	4569	690	651	5910	50771	5661	3499	59931	20398	17.7	16.6	20.7
Herstmoncex	7840	3930	909	426	5265	62411	10797	1875	75083	20741	5.7	9.7	13.2
Riyadh	7832	3721	896	618	5235	46722	7036	3577	57335	22594	10.6	13.9	17.2
Matera_MLRO	7941	2412	752	208	3372	33587	7888	1858	43333	17767	1.4	4.2	5.0
Concepcion_847 Concepcion_423	7405	2022 18	1109 3	227	3358 21	27223 164	15056 11	1682	43961 175	25147 52	5.3	10.0	12.5
San_Fernando	7824	2820	449	72	3341	41850	3370	380	45600	8951	5.6	12.2	17.3
Beijing	7249	2034	328	216	2578	30439	3181	1674	35294	11576	6.0	31.9	15.3
Monument_Peak	7110	1963	392	139	2494	37555	4097	1219	42871	10836	5.0	13.2	15.8
Arequipa	7403	1991	214		2205	23804	1474		25278	4453	5.4	7.5	7.5
Haleakala	7119	1758	441		2199	27593	5056		32649	8028	5.0	10.4	10.2
Greenbelt	7105	1723	245	76	2044	38605	2414	460	41479	6950	6.0	9.1	10.4
Potsdam_3	7841	1680	308		1988	31943	3549		35492	5832	12.9	15.2	20.2
Hartebeesthoek	7501	1619	322	38	1979	20133	2772	229	23134	6209	4.5	7.4	8.6
McDonald	7080	1363	392	219	1974	15612	3380	897	19889	7295	15.2	13.7	13.4
Katzively	1893	1198	273	82	1553	19782	2304	504	22590	5971	34.6	73.0	54.4
Koganei	7308	690	248	92	1030	10124	2308	997	13429	6850	9.0	12.9	15.3
Maidanak_1	1864	441	189	117	747	5438	1463	497	7398	3231			
Simeiz	1873	495	132	48	675	6110	1156	911	8177	2895		48.6	53.0
Shanghai_2	7821	654	21		675	8012	164		8176	1221	12.0	41.0	27.6
Burnie_Tafe	7370	521	4		525	7192	19		7211	963	5.6	11.7	13.6
Riga	1884	364	82		446	7031	891		7922	1237			
Tanegashim	7358	287	63	76	426	4958	626	586	6170	2805	5.1	5.3	8.1
Borowiec	7811	299	75	4	378	5153	801	14	5968	1252	16.6		13.6
Simosato	7838	159	56		215	2520	607		3127	971			
Lviv	1831	173	20		193	3125	183		3308	464	14.7	56.4	58.9
Kunming	7820	167	9		176	2493	57		2550	345	23.4	35.4	37.1
Helwan	7831	62			62	459			459	36	6.0		

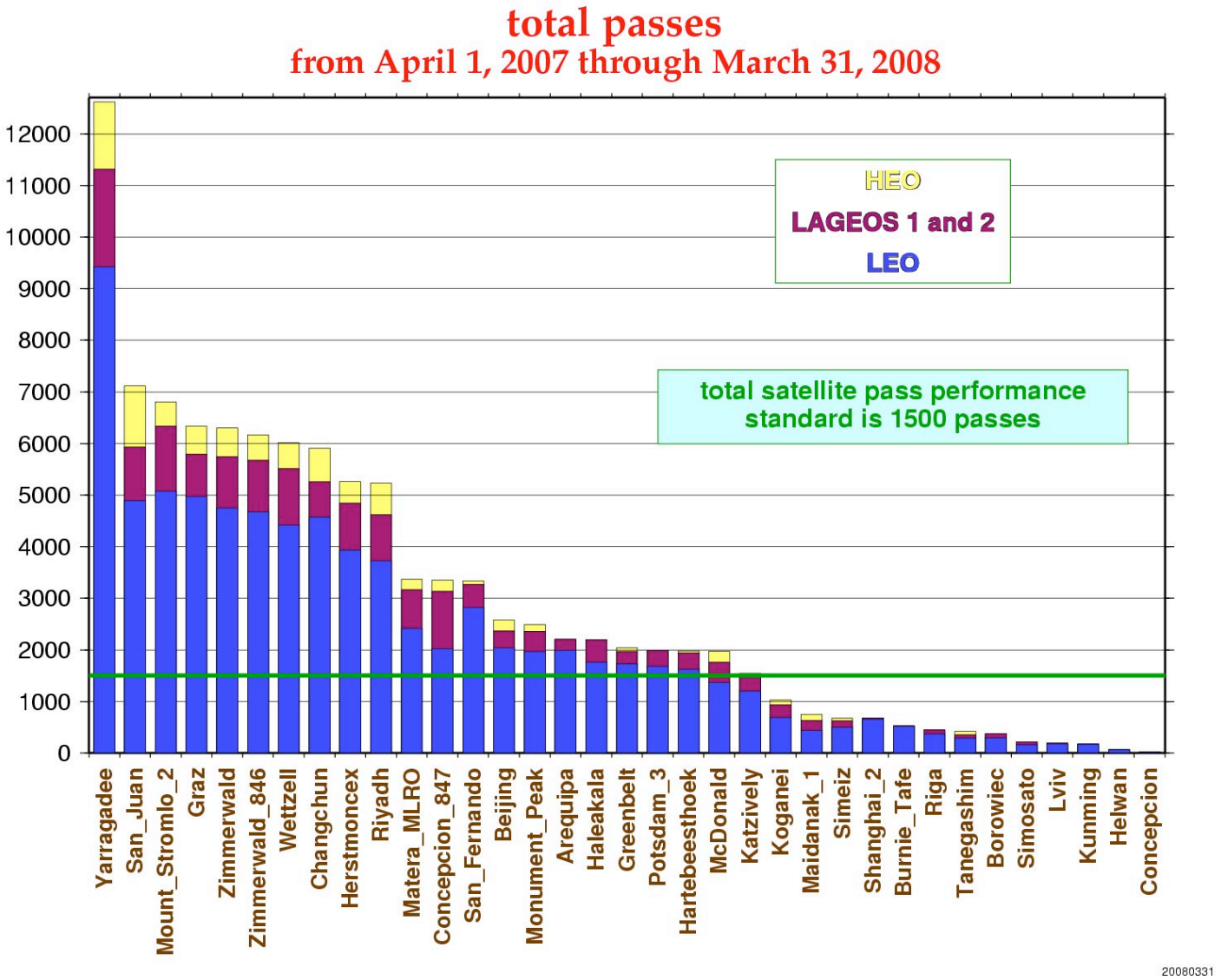
Site Information		Data Information			
Column L1	L2	L3	L4	L5	L6
Location	Station Number	num nights tracking last 12 mon	num npt last 12 mon	num npts last 3 mon	ave npt rms last 3 mon
McDonald	7080	35	72	22	62.3
Matera_MLRO	7941	1	2		

ILRS Report Card
(2008 Q1: Apr-07 through Mar-08)

Site Information		DGFI Orbital Analysis				Hitotsubashi Univ. Orbital Analysis				JCET Orbital Analysis				MCC Orbital Analysis				SHAO Orbital Analysis			
Station Location	Station Number	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP
Baseline		10.0	20.0	20.0	95	10.0	20.0	20.0	95	10.0	20.0	20.0	95	10.0	20.0	20.0	95	10.0	20.0	20.0	95
Yarragadee	7090	2.4	21.4	5.9	100.0	1.7	8.4	2.3	100.0	2.8	20.4		99.5	2.1	8.0	2.5	99.2	2.0	15.2	1.3	95.8
San_Juan	7406	4.3	33.5	6.6	100.0	3.0	15.7	11.7	99.6	4.5	19.6		98.3	4.5	20.2	11.7	99.4	3.4	28.2	3.8	94.3
Mount_Stromlo_2	7825	4.7	23.7	7.0	100.0	4.2	10.9	5.9	99.8	4.3	21.6		96.4	4.7	12.1	2.9	92.6	3.5	16.3	2.4	94.7
Graz	7839	1.9	15.2	6.2	100.0	1.4	8.0	1.1	100.0	2.2	17.9		99.7	1.9	7.6	3.0	99.3	1.6	16.2	2.5	95.4
Zimmerwald_423 Zimmerwald_846	7810	2.7	19.1	5.1	100.0	2.7 3.2	10.9 8.3	2.4 4.4	99.9 99.4	3.6	10.3		100.0	2.8	5.0	2.6	99.1	3.4 3.2	20.2 18.6	1.6 1.2	94.5 92.1
Wettzell	8834	3.3	28.9	11.1	100.0	3.0	12.1	7.3	100.0	3.5	17.5		99.0	2.9	10.6	2.3	97.0	2.4	18.4	3.6	96.2
Changchun	7237	8.1	35.9	10.6	100.0	7.0	29.5	15.1	99.7	6.2	29.8		87.5	8.3	27.1	6.0	95.4	5.3	26.8	9.5	94.4
Herstmoncex	7840	2.2	17.9	6.0	100.0	1.7	8.9	3.2	100.0	3.4	23.7		99.9	2.4	7.1	2.4	99.2	1.8	15.0	2.5	96.1
Riyadh	7832	3.8	30.2	10.8	100.0	3.3	11.5	10.0	99.6	3.6	20.0		97.4	3.2	18.4	3.9	96.2	3.4	22.0	4.5	95.9
Matera_MLRO	7941	2.6	19.6	12.0	100.0	1.9	10.3	10.9	100.0	3.0	25.0		100.0	2.4	13.2	11.8	99.6	1.9	31.9	13.8	99.1
Concepcion_423 Concepcion_847	7405	2.2	30.8	6.0	100.0	1.4	18.0	5.4	99.9	3.0	15.3		99.8	2.4	18.9	3.3	99.7	2.3	28.8		97.7
San_Fernando	7824	3.7	41.8	14.2	100.0	3.6	19.9	9.4	100.0	4.3	29.3		99.2	4.5	14.8	9.6	99.2	3.8	20.9	10.2	97.0
Beijing	7249	6.8	36.8	28.9	100.0	5.4	18.7	15.0	97.8	5.5	22.2		92.0	7.8	22.4	8.6	97.6	6.0	20.6	7.3	93.0
Monument_Peak	7110	3.7	31.8	11.9	100.0	2.7	11.8	5.1	99.7	2.9	21.3		98.3	2.9	12.1	5.9	96.9	2.7	17.3	3.3	94.6
Haleakala	7119	2.7	31.9	22.0	100.0	2.5	9.7	2.3	99.6	3.1	24.4		96.9	4.1	18.4		99.2	2.9	22.1	11.9	95.6
Greenbelt	7105	2.7	25.5	12.1	100.0	2.1	13.1	3.6	100.0	3.9	17.1		99.2	2.8	17.5	8.3	98.4	1.5	16.0	3.6	93.4
Potsdam_3	7841	5.8	26.9	15.1	100.0	4.1	10.0	7.9	99.9	4.3	15.0		93.7	3.7	9.5	6.9	91.7				
Hartebeesthoek	7501	2.7	32.4	20.5	100.0	2.5	8.0	7.7	100.0	4.2	28.7		100.0	2.8	18.4	8.3	100.0	1.3	34.2	8.0	95.6
McDonald	7080	3.5	37.2	11.9	100.0	3.1	15.3	6.9	99.8	3.3	20.5		100.0	3.1	21.6	7.5	95.7	3.1	16.8	7.0	95.4
Koganei	7308	7.1	31.3	7.6	100.0	5.1	12.7	5.6	99.5	5.5	15.4		92.5	6.8	12.5	2.2	96.0	5.2	25.6	6.5	95.5
Simeiz	1873					74.4	44.8	23.7	98.0	0.5	9.2		-416.7					30.9	35.2	14.5	56.2

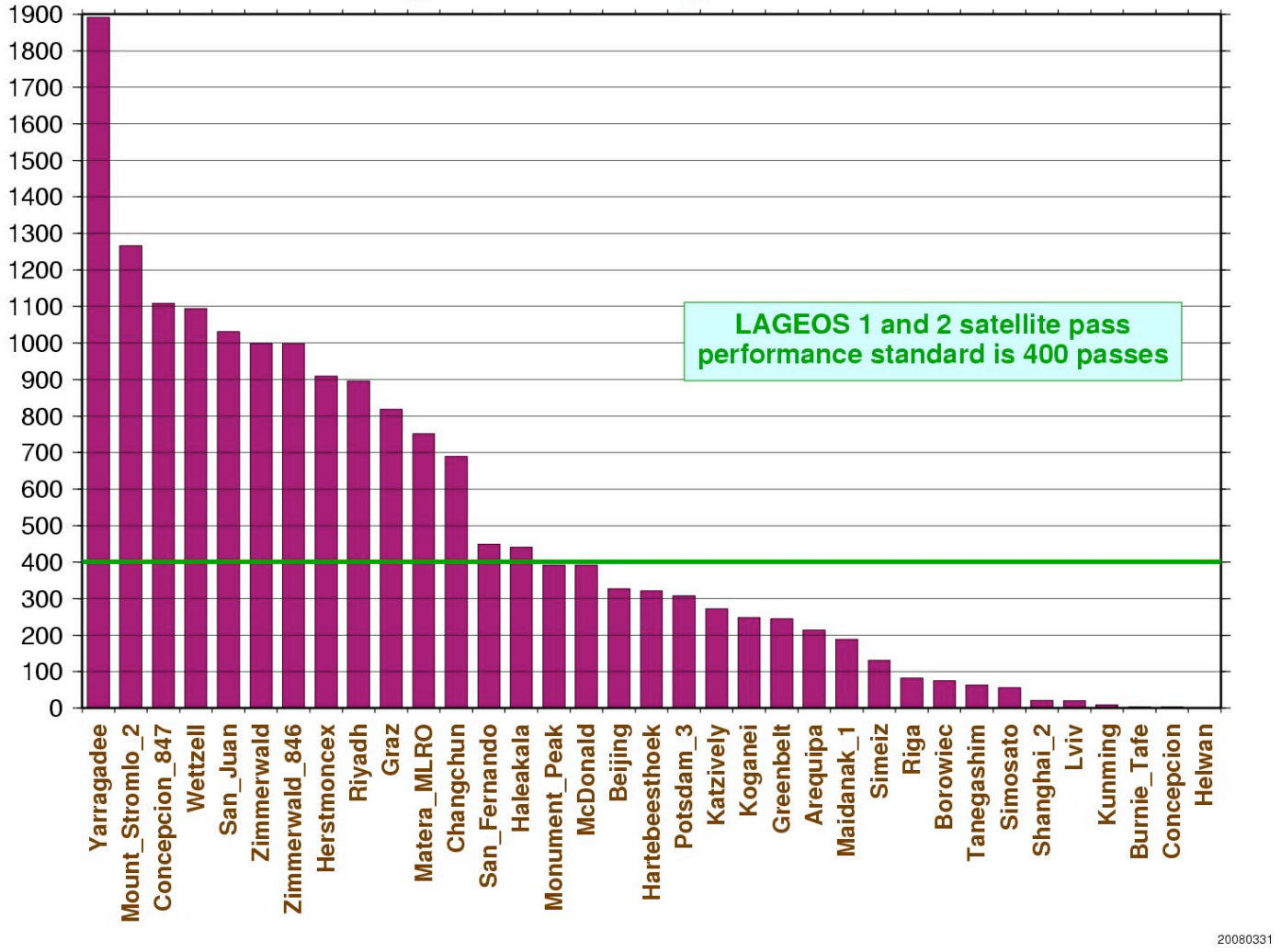
Station Performance

All Satellites (2008Q1)

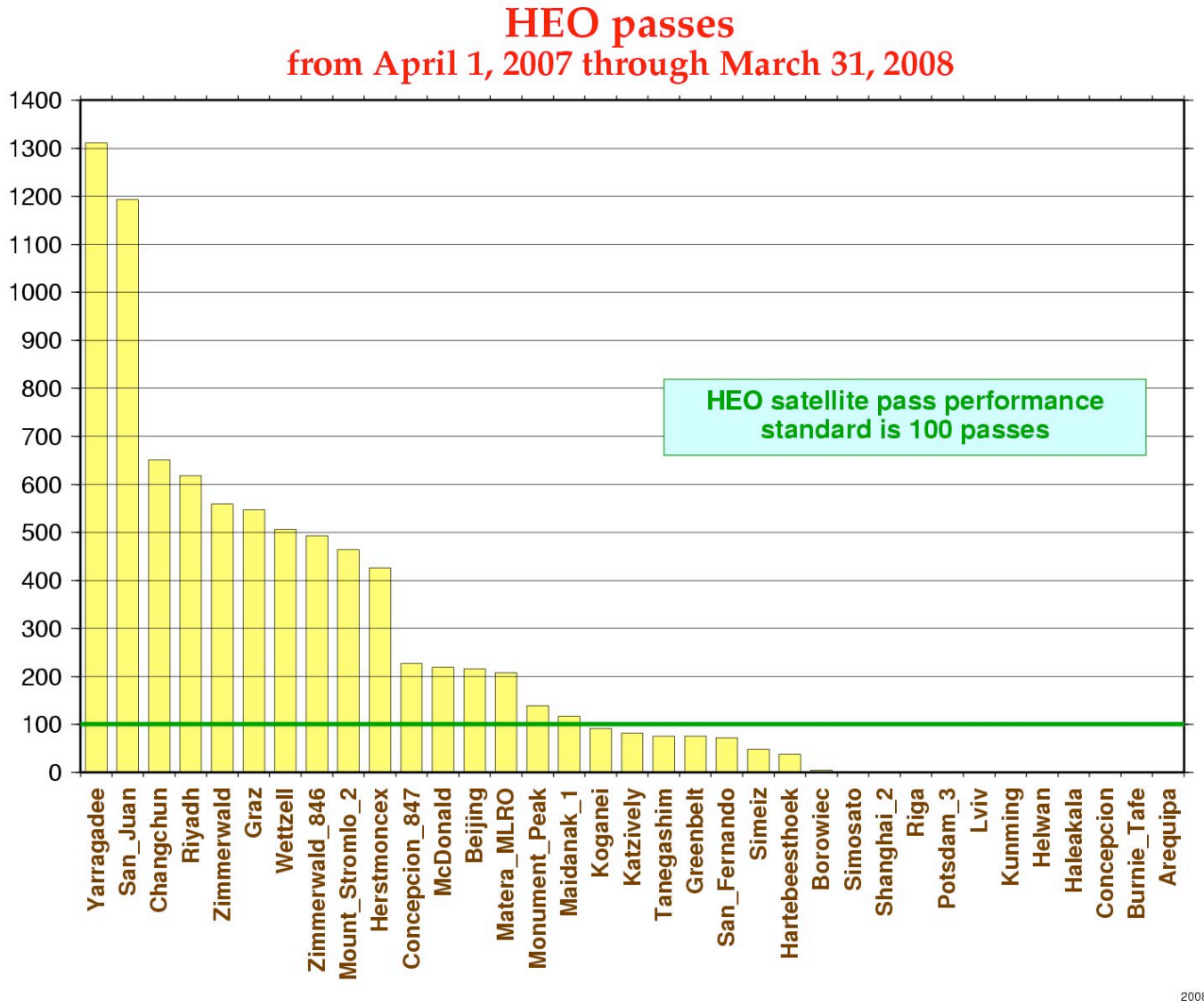


Station Performance

LAGEOS Satellites (2008O1)

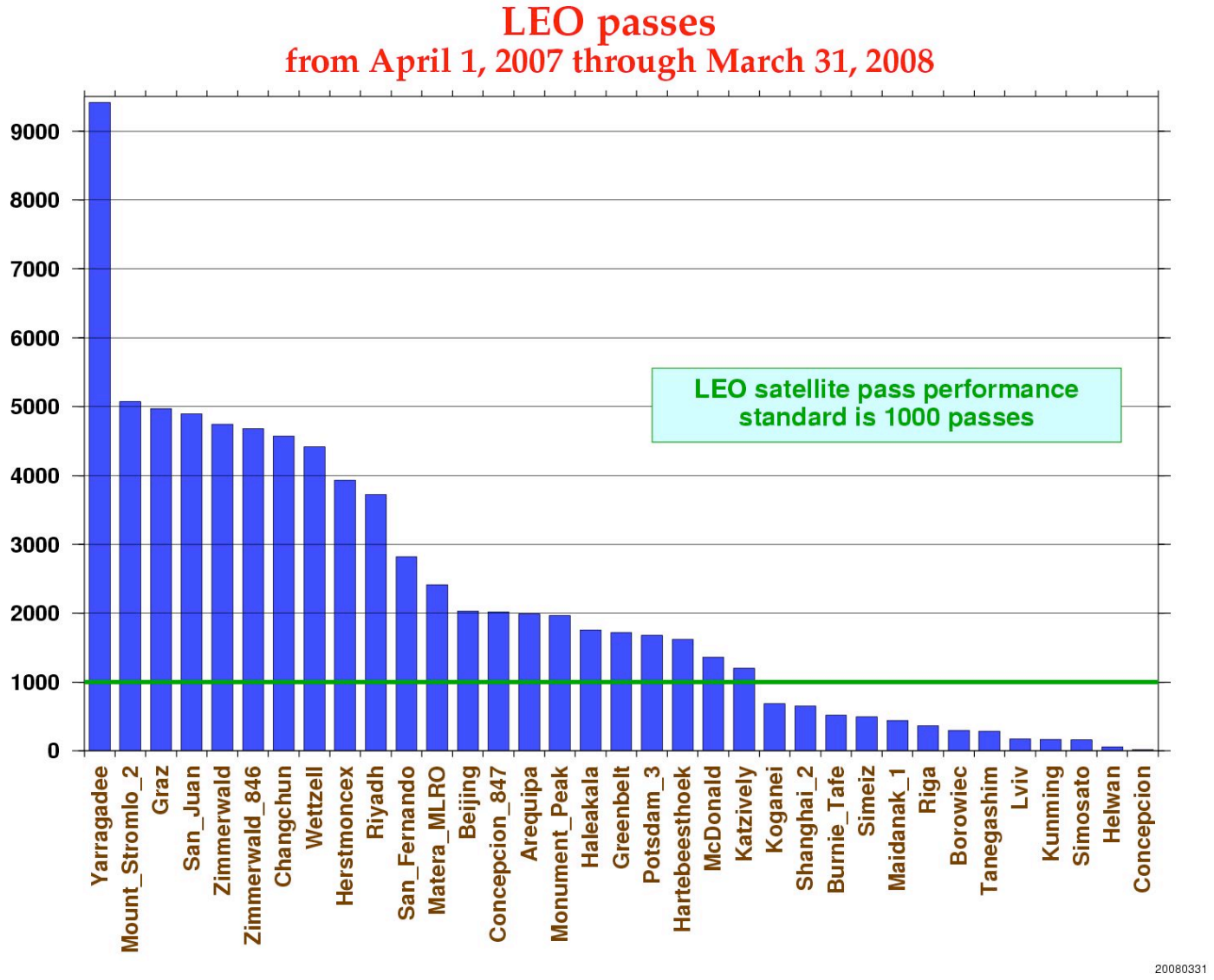


Station Performance
High Satellites (2008Q1)

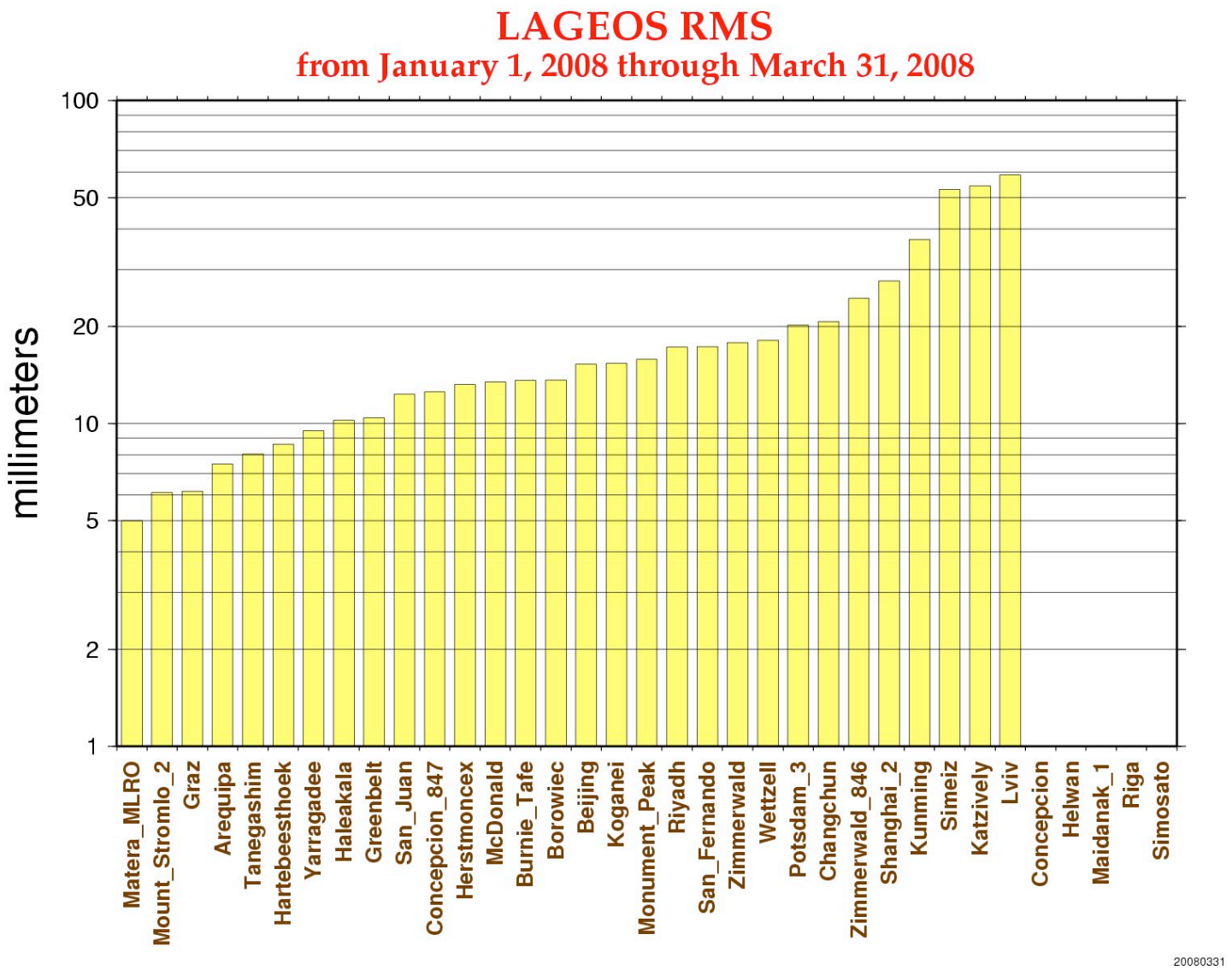


Station Performance

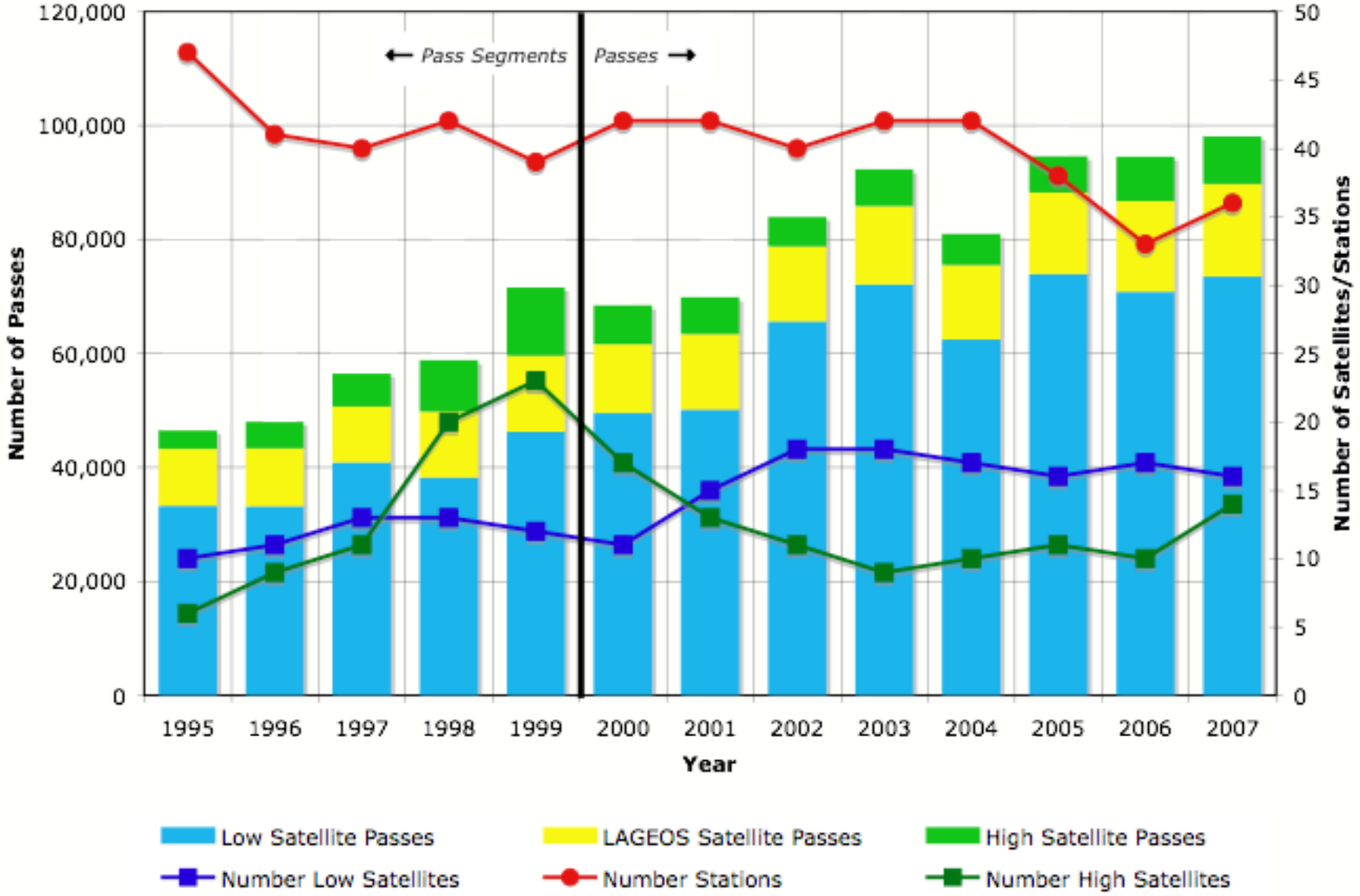
Low Satellites (2008Q1)



Station Performance
LAGEOS RMS (2008Q1)

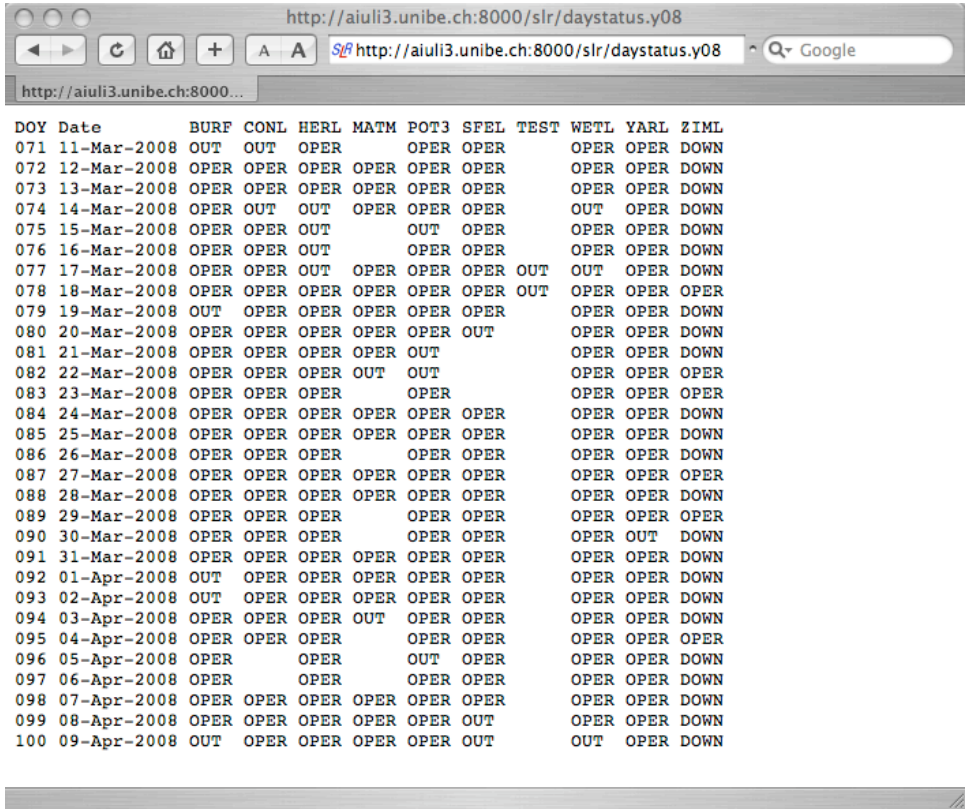


Annual Data Yield



Daily Station Status Report

- Analysts need current station availability information
- Gurtner modified EUROSTAT reporting to generate daily status report
- CB asked stations not already participating in EUROSTAT to use software to provide status messages



http://aiuli3.unibe.ch:8000/slr/daystatus.y08

http://aiuli3.unibe.ch:8000/slr/daystatus.y08

Google

http://aiuli3.unibe.ch:8000...

DOY	Date	BURF	CONL	HERL	MATM	POT3	SFEL	TEST	WETL	YARL	ZIML
071	11-Mar-2008	OUT	OUT	OPER		OPER	OPER		OPER	OPER	DOWN
072	12-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
073	13-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
074	14-Mar-2008	OPER	OUT	OUT	OPER	OPER	OPER		OUT	OPER	DOWN
075	15-Mar-2008	OPER	OPER	OUT		OUT	OPER		OPER	OPER	DOWN
076	16-Mar-2008	OPER	OPER	OUT		OPER	OPER		OPER	OPER	DOWN
077	17-Mar-2008	OPER	OPER	OUT	OPER	OPER	OPER	OUT	OUT	OPER	DOWN
078	18-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER	OUT	OPER	OPER	OPER
079	19-Mar-2008	OUT	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
080	20-Mar-2008	OPER	OPER	OPER	OPER	OPER	OUT		OPER	OPER	DOWN
081	21-Mar-2008	OPER	OPER	OPER	OPER	OUT			OPER	OPER	DOWN
082	22-Mar-2008	OPER	OPER	OPER	OUT	OUT			OPER	OPER	OPER
083	23-Mar-2008	OPER	OPER	OPER		OPER			OPER	OPER	OPER
084	24-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
085	25-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
086	26-Mar-2008	OPER	OPER	OPER		OPER	OPER		OPER	OPER	DOWN
087	27-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	OPER
088	28-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
089	29-Mar-2008	OPER	OPER	OPER		OPER	OPER		OPER	OPER	OPER
090	30-Mar-2008	OPER	OPER	OPER		OPER	OPER		OPER	OUT	DOWN
091	31-Mar-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
092	01-Apr-2008	OUT	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
093	02-Apr-2008	OUT	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
094	03-Apr-2008	OPER	OPER	OPER	OUT	OPER	OPER		OPER	OPER	DOWN
095	04-Apr-2008	OPER	OPER	OPER		OPER	OPER		OPER	OPER	OPER
096	05-Apr-2008	OPER		OPER		OUT	OPER		OPER	OPER	DOWN
097	06-Apr-2008	OPER		OPER		OPER	OPER		OPER	OPER	DOWN
098	07-Apr-2008	OPER	OPER	OPER	OPER	OPER	OPER		OPER	OPER	DOWN
099	08-Apr-2008	OPER	OPER	OPER	OPER	OPER	OUT		OPER	OPER	DOWN
100	09-Apr-2008	OUT	OPER	OPER	OPER	OPER	OUT		OUT	OPER	DOWN

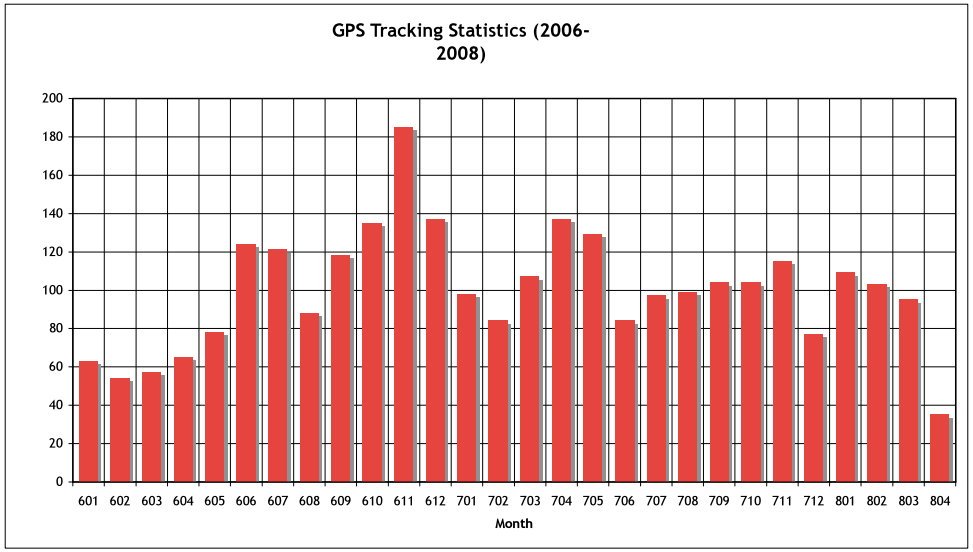
Mission Developments

- Supporting 28 missions and lunar tracking
- ANDE-Active re-entered in December, ANDE-Passive predicted to re-enter in May; a few stations were able to track down below 300 km (good omen for GOCE)
- Two-month campaign on GPS-35 and -36 underway; satellites will soon be decommissioned
- ILRS GB approved support for GOCE (gravity field) scheduled for launch on May 31 (may slip due to some launch vehicle issues); organizing prediction test with ESOC using CHAMP
- QZS-1 (test for Japanese Navigation satellite system) approved for ILRS tracking; launch in 2009
- LRO launch now scheduled for late November
- GIOVE-B launch scheduled for April 27, 2008

GPS Campaign Status

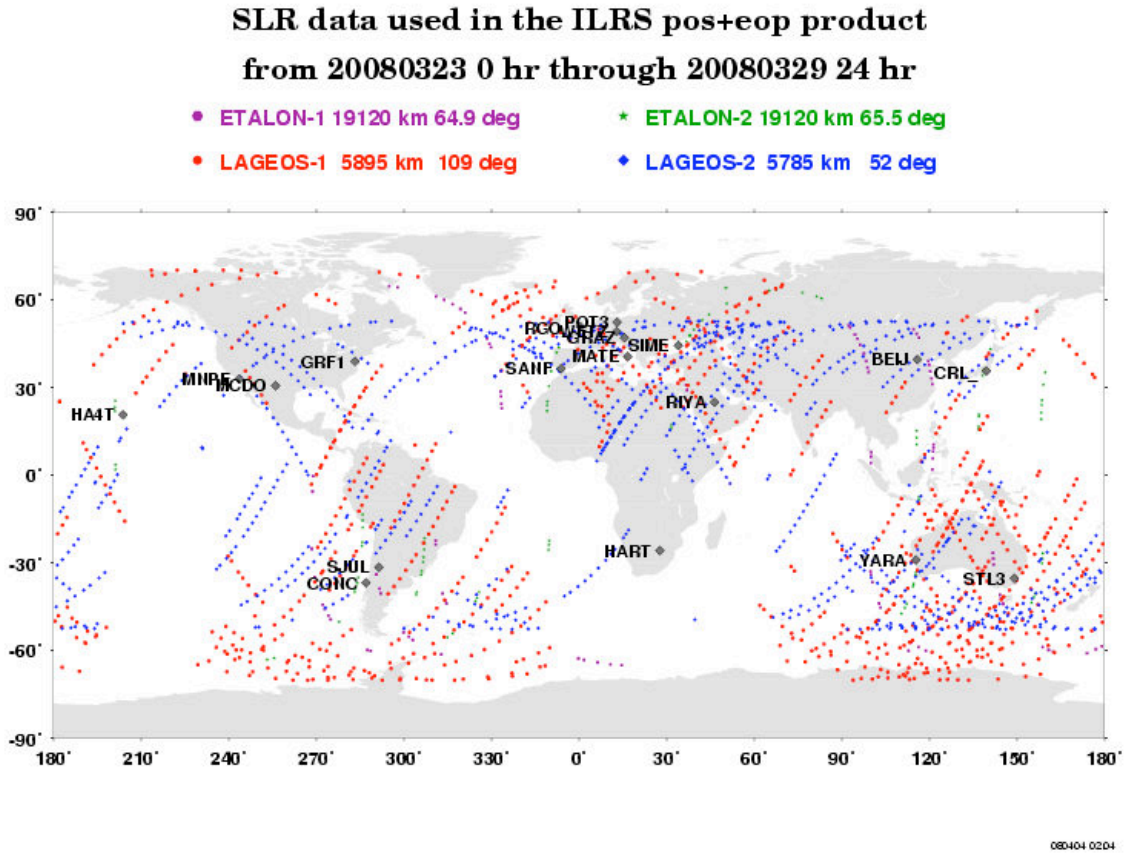
- GPS-35 and -36 satellites will soon be decommissioned
- Intensive campaign underway (21-Mar-2008 through 31-May-2008)
- Nighttime passes visible for GPS-35 in Europe, Saudi Arabia, South Africa, Eastern Australia, Tahiti, and the Western U.S.
- Nighttime passes visible for GPS-36 in Asia, South America, Australia, and Eastern U.S.
- Current status:

Site Name	Station	Start Date	End Date	Number Passes	Number Normal Pts.
Beijing	7249	01-Jan-08	25-Mar-08	3	16
Changchun	7237	01-Jan-08	13-Mar-08	33	189
Concepcion	7405	03-Jan-08	06-Mar-08	10	55
Graz	7839	07-Feb-08	06-Apr-08	24	198
Greenbelt	7105	31-Jan-08	25-Mar-08	3	8
Herstmonceux	7840	05-Jan-08	09-Apr-08	25	85
Katzively	1893	13-Feb-08	13-Feb-08	1	4
Koganei	7308	06-Jan-08	31-Mar-08	5	30
Monument Peak	7110	28-Mar-08	28-Mar-08	1	3
Mount Stromlo	7825	05-Jan-08	08-Apr-08	13	36
Riyadh	7832	02-Mar-08	03-Apr-08	15	85
San Juan	7406	02-Jan-08	09-Mar-08	95	568
Tanegashima	7358	18-Jan-08	07-Apr-08	17	96
Wettzell	8834	11-Jan-08	06-Mar-08	7	24
Yaragadee	7090	06-Jan-08	08-Apr-08	88	303
Zimmerwald	7810	21-Jan-08	23-Jan-08	2	6
Totals:	16 stations			342	1,706



ILRS Web Site Developments

- Updated plots of data availability since 2000
- Added new pages for missions and updated future mission list
- Added plots of data used in pos+eop product:



Reports

- EOS issued proceedings (document and CD) from 15th International Workshop on Laser Ranging held in Canberra, October 2006
- Updated CDDIS copy of proceedings Web site with links to papers and photos; see *http://cddis.gsfc.nasa.gov/lw15/index.html*
- Continue to update webpages for past international laser workshops with scans of proceedings reports (all but 1st, 6th, 7th, and 9th online in PDF form); see *http://ilrs.gsfc.nasa.gov/reports/workshop/index.html*
- ILRS 2005-2006 report completed and mailed (December 2007)
- Start 2007-2008 report in late fall 2008
- Started planning for 16th International Workshop on Laser Ranging to be held in Poznan Poland, October 13-17, 2008

Meetings

- April 12-18, 2008: EGU, Vienna Austria
- June 02-08, 2008: IGS Analysis Workshop, Miami Beach FL
- June 16-20, 2008: AOGS, Busan Korea
- June 23-27, 2008: IAG Symposium on Gravity, Geoid, and Earth Observation 2008, Chania Crete Greece
- July 13-20, 2008: 37th COSPAR General Assembly, Montreal Canada
- October 13-17, 2008: 16th International Workshop on Laser Ranging, Posnan Poland
- November 11-15, 2008: OSTST and IDS Workshops, Nice France
- December 15-19, 2008: Fall AGU, San Francisco CA
- 2009: IAG Scientific Assembly, Buenos Aires Argentina
- 2011: IUGG General Assembly, Melbourne Australia

NGSLR Developments

- Successfully ranged to GLONASS-95 (as well as many LEO and many LAGEOS) with the eyesafe laser
- Successfully ranged to multiple LEO, as well as LAGEOS, ETALON and GLONASS with LRO laser, but so far no luck with GPS
- Full time operator has been hired and will be onboard in next couple of weeks; will hire a second operator shortly
- Began process of applying for NGSLR membership in ILRS
- Expect to perform an intercomparison with MOBLAS-7 in summer of 2008 and begin operations in the fall with two shifts
- Working on completing the automated closed-loop tracking

ILRS Data Replacement Policy

- Previous policy:
  - Data can be re-supplied by stations within 30 days of the date of the data
  - Station must ensure that normal point release flag is incremented
  - Data Centers automatically replace these data
  - Data older than 30 days NOT forwarded to Operations Centers
  - Station issues email about data older than 30 days
  - Data older than 30 days NOT removed from DC archive files
- New policy:
  - Automated replacement of data within 30 days continues
  - Replacement of data older than 30 days in DCs will be made on a case-by-case basis
  - Station should contact CB with reason for replacement
  - Station issues notification email detailing problem
  - Station must ensure that normal point release flag is incremented

SLR 2000

- Ranged to GLONASS-95 (as well as many LEO and many LAGEOS passes) with the eyesafe laser;
- Ranged to ETALON and GLONASS with LRO laser, but so far no luck with GPS.
- Full time operator has been hired and will be onboard in next couple of weeks;
- A second operator is to be hired shortly;
- Process for ILRS membership underway;
- Intercomparison with MOBLAS-7 planned for this summer;
- Two-shift operations planned for this fall;
- Top Priority - automated closed-loop tracking.

LRO-LR

- Mission Support Request has been approved;
- Meeting with the stations held at Workshop in Grasse in October;
- Several stations have expressed interest in participating (most in synchronous mode);
- Web site has been established: http://lrolr.gsfc.nasa.gov/
- Call for Participation has been prepared; due out shortly;
- Letter of agreement being prepared;
- Launch is now late November 2008;
- Data should be submitted in CRD format;

AWG Report 4/2008

- GRGS accepted as official ILRS Analysis Center (09/2007)
- All 8 ACs contributing routinely to the WEEKLY products
- Five ACs (ASI, BKG, GFZ, JCET and NERC) support the DAILY product since about mid-February 2008
- Benchmark evaluations of University of Newcastle solutions continue
- New application for acceptance as an AC from CODE (reviewed during the AWG/Vienna)
- Proposition of a new procedure for acceptance of new groups in the AC/CC group (AWG/Vienna)
- NEOS feedback from the first couple of months of the DAILY product
- SLRF2005 issued, based on a fusion of ITRF2000, ITRF2005SLR, and ASI2007 (a priori for reanalysis project)
- SLRF2005 proposed as a basis for adoption of a JASON-2 POD standard TRF
- Reanalysis project is about six months behind, but should get back on schedule soon after EGU:
  - 1993 - present: ASI, GA, GFZ, GRGS
  - 1983 - 1992: ASI
- Orbital product pilot project to be discussed/restarted at AWG/Vienna
- Maintenance of an online "definitive" bias list in a SINEX-like format nearly finalized
- New (DAILY) QC product from JCET, now included in CODE's Bias Rpt and Quarterly Score Card Rpt.
- Pilot Project for QA assessment activity for new/returning stations based on data quality, reliability, stability being defined (DGFI/ASI)
- AWG discussion of improvements in modeling and in the ILRS products (next reanalysis project, in coordination with ITRS)
- AWG will coordinate with DF&P WG the implementation of the new CRD format (validation of station submissions)
- JoG Call for contributions to a special ILRS issue in preparation (to be discussed at the GB)

ILRS Combined Range Bias Report 1 2008.4.9

Author: Werner Gurtner
Subject: ILRS Combined Range Bias Report 09-Apr-2008

ILRS Combined Range Bias Report 1
****

2008-03-26 00:00 UT - 2008-04-09 00:00 UT

Compiled by: SLR Observatory Zimmerwald
Date : 2008-04-09 12:30 UT
E-Mail : Werner.Gurtner@aiub.unibe.ch

No.	Site	Location	wl	DGFI		MCC		HIT-U		SAO		JCET	
				rb	pr	rb	pr	rb	pr	rb	pr	rb	pr
1873	SIML	Simeiz	532	-51	13	38	70	-93	91	-13	49	93	8
1893	KTZL	Katzively	532	-21	10			-172	9			-177	8
7080	MDOL	McDonald	532	12	4	11	3	6	3	7	3	2	4
7090	YARL	Yarragadee	532	6	2	0	2	2	1	-6	1	7	3
7105	GODL	Greenbelt	532	2	4			2	2			0	3
7110	MONL	Monument Peak	532	-4	3	0	3	4	3	-4	3	-4	4
7119	HA4T	Haleakala	532	6	3	0	3	8	2	-5	3	8	4
7249	BEIL	Beijing	532	15	7	1	7	0	6	55	5	17	6
7308	KOGC	Koganei	532	33	2	62	2	26	2	31	1	14	3
7358	GMSL	Tanegashima	532	40	2			49	1	-79	6	41	4
7405	CONL	Concepcion	847	-4	4	-29	3	-55	2	-24	3	-35	4
7406	SANJ	San Juan	532	0	6	4	3	0	2	-3	3	8	4
7501	HARL	Hartebeesthoek	532	13	2	4	9	13	3	-34	2	3	8
7820	KUNL	Kunming	532	-519	7			117	8			125	8
7824	SFEL	San Fernando	532	-14	3	-42	4	-16	2	1	4	-15	3
7825	STL3	Mt Stromlo	532	3	3	-13	3	-2	2	-7	2	1	3
7832	RIYL	Riyadh	532	18	3	-21	3	16	2	-32	3	26	3
7839	GRZL	Graz	532	0	1	-6	1	-8	1	0	1	0	2
7840	HERL	Herstmonceux	532	12	1	7	2	13	1	13	2	9	2
7841	POT3	Potsdam	532	4	7	-3	5	-9	5			0	6
7941	MATM	Matera	532	-5	2	18	2	-4	2	18	1	5	3
8834	WETL	Wettzell	532	1	3	-2	3	3	3	-17	2	5	3

CRD Format Implementation & Validation

- **April '08** - We will request that all stations begin to make the conversion to the new format as soon as possible. We will also request that they send in both formats of the data for data validation. OCs will develop QC s/w to certify the submitted CRD files reflect EXACTLY the same info as in the OLD format files. Once a system's data are validated by the OCs, the **Analysis Working Group will further validate their submissions with regular processing of their files and if successful**, they will no longer be required to send in both formats.

- **Sept '08** - The Data Centers should be archiving data regularly. As of this date, the Operations Centers (EDC, HTSI) will convert all data that is NOT yet in the CRD format for a parallel delivery to the Data Centers. If a station's data has been validated, and they are only sending in CRD data, then the Operations Center will convert to normal point data for parallel delivery.

- **December '08** - All **AWG** ACs will be able to use CRD-formatted data in their routine processing.

- **April '09** - By this date, we will expect that ALL ILRS systems will be sending in CRD data format.

- **January '10** - The Operations Centers will cease converting data to the old normal point format, and will only deliver CRD data to the Data Centers.

New (& Returning) station (re-)qualification

1. Station has to contact ILRS GB and get an official response,
   - a site log and if applicable local ties.
2. The analysis centers ASI, DGFI and GRGS will be informed by the GB with a contact address of the station.
3. In close contact with the station these centers will validate the quality of the data delivered will be validated
   - copies of the correspondence have to be send to ILRS CB
4. After a period of about 8 weeks the 3 centers will in mutual agreement propose to the ILRS/AWG to include the station in the daily/weekly processing.
   - In the beginning the station has to be significantly down-weighted, to not affect the official product.
   - a better set of a priori station coordinates will be provided from the validation centers.
5. After a period of at least 3 months, with sufficient data delivered the weighting can be changed to the standard one, if no objections are raised.
   - preferably at during an AWG meeting (a good AC representation).
6. The status of a core station, for the orientation of the official product needs a common decision of the AWG after a suggestion from the combination centers.
7. The GB will sent out an official letter to the station when it is accepted to be included in the standard processing and eventually the list of core stations.

JoG Special ILRS Issue

- Editorial board decided at the Grasse GB meeting:
  - Pavlis, Pearlman, Gurtner and Noomen
  - Recently (to get a more balanced Analysis/Technology representation), changed to:
    - Pavlis, Luceri, Pearlman and Gurtner
- JoG Editor in Chief contacted and information on the possibility and technicalities
- We propose an issue that roughly covers 80% science and 20% technology
- A call for papers will have to be issued by the CB based on the EB input
- Need to decide on a number of key-papers to ensure coverage of certain topics that are central to SLR (e.g. on ILRS, SLR products and technology, etc.)

From: "r.klees" r.klees@tudelft.nl
Date: January 22, 2008 10:23:10 AM EST
To: "Erricos C. Pavlis" epavlis@umbc.edu
Cc: "klees >> Roland Klees" r.klees@tudelft.nl
Subject: Re: Journal of Geodesy ILRS Special Issue

Dear Erricos,

I am prepared to support a special issue in Journal of Geodesy on ILRS. Currently, I receive papers for a special issue on IGS; moreover, a special issue on DORIS is in preparation. Journal of Geodesy quality rules apply to each submission as to any regular original research or review paper. I suggest the following procedure:

...

I need to know in advance an estimate of the number of submissions you expect. Based on this information, we should fix the max number of pages for each submission. Format of text, figures, tables etc. is according to JOGE standards/rules. Hoping that helps.

Best regards,

Roland Klees
EiC JOGE

Dear Erricos,

The maximum number of pages per issue is 60. It is, however, possible to have double/triple issues with 120/180 pages.

Regards,
Roland

Editorial Process for JoG Special ILRS Issue

- All papers are submitted via Editorial Manager (EM), noting that they are meant for the special issue on ILRS. The whole review procedure is done via EM.
- EiC needs to know the names of the guest editor(s) and the name of the special issue to configure EM. More than one guest editor (GE) is possible.
- Submitted papers of the special issue will be assigned by EiC to one of the GE.
- Once a paper dedicated to the special issues was submitted via EM, EiC will check the submission and will eventually filter submissions, which only contain interim results or which are of bad quality.
- The GE assigns the manuscripts to the normal number of reviewers (which is 3) using EM.
- The GE makes a recommendation to me as EiC using EM. The EiC takes the final decision about acceptance/rejection.
- We can decide whether we accept only one revision in order to speed up the review process.
- Regarding number of days author has to revise the submission, the number of days reviewer has to respond to invitation and days to review the article, I prefer to apply the same rules as for original research and review papers.

Global Report Card - 1st Quarter 2008

Table 2

Site Information		DGFI Orbital Analysis				Hitotsubashi Univ. Orbital Analysis				JCET Orbital Analysis				MCC Orbital Analysis				SHAO Orbital Analysis			
Station Location	Station Number	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP	LAG NP RMS (mm)	short term (mm)	long term (mm)	% good LAG. NP
Baseline		**10.0**	**20.0**	**20.0**	**95**	**10.0**	**20.0**	**20.0**	**95**	**10.0**	**20.0**	**20.0**	**95**	**10.0**	**20.0**	**20.0**	**95**	**10.0**	**20.0**	**20.0**	**95**
Yarragadee	7090	2.5	21.1	3.5	100.0	1.7	8.4	2.3	100.0	2.8	13.3		99.7	2.1	10.2	1.8	99.2	2.0	15.2	1.3	95.8
San_Juan	7406	4.3	32.8	5.7	100.0	3.0	15.7	11.7	99.6	4.2	15.5		97.2	4.5	22.7	8.4	99.4	3.4	28.2	3.8	94.3
Mount_Stromlo_2	7825	4.7	23.7	6.6	100.0	4.2	10.9	6.0	99.8	4.0	14.6		96.7	4.5	12.7	2.9	92.5	3.5	16.2	2.5	94.7
Graz	7839	1.9	18.5	4.6	100.0	1.4	8.0	1.1	100.0	2.1	15.2		99.6	2.0	7.9	2.8	99.1	1.6	16.1	2.5	95.3
Zimmerwald_423 Zimmerwald_846	7810	3.5 3.5	20.0 29.9	4.6 4.8	100.0 100.0	2.7 3.2	10.9 8.7	2.4 4.4	99.9 99.5	3.9 3.0	9.9 10.3		99.2 98.9	3.0 3.4	7.0 7.5	1.9 2.9	96.7 94.4	3.4 3.1	20.2 17.9	1.6 1.2	94.5 91.9
Wettzell	8834	3.4	27.0	10.8	100.0	3.0	12.2	7.4	100.0	3.5	14.4		98.7	2.9	10.0	2.0	97.0	2.4	18.2	3.6	96.1
Changchun	7237	7.6	36.2	9.7	100.0	7.0	29.3	15.2	99.7	6.2	22.7		90.9	7.2	30.0	6.3	95.4	5.3	26.7	9.5	94.6
Herstmoncex	7840	2.2	18.5	6.5	100.0	1.7	8.8	3.1	100.0	3.2	16.8		99.9	2.3	7.4	2.8	98.9	1.9	15.2	2.4	96.1
Riyadh	7832	3.7	30.3	7.0	100.0	3.2	11.5	10.0	99.6	3.8	17.5		97.6	3.5	21.8	6.2	95.8	3.4	22.2	4.5	95.8
Matera_MLRO	7941	2.5	18.9	10.7	100.0	1.9	10.3	10.9	100.0	3.0	17.6		99.7	2.4	12.3	11.0	99.3	1.9	31.9	13.8	99.1
Concepcion_423 Concepcion_847	7405	2.3	32.2	3.6	100.0	1.4	17.9	5.5	99.9	2.8	10.5		99.9	2.5	18.9	3.7	99.8	2.3	28.8	5.6	97.6
San_Fernando	7824	3.3	39.8	13.7	100.0	3.6	19.9	9.4	100.0	4.0	23.0		99.5	4.2	22.3	12.9	99.5	3.8	20.9	10.1	97.0
Beijing	7249	7.4	34.2	23.5	100.0	5.4	18.7	15.0	97.8	5.7	17.6		92.7	7.4	19.4	9.3	97.5	6.0	20.6	7.3	93.0
Monument_Peak	7110	3.7	27.8	9.4	100.0	2.7	11.8	5.1	99.7	3.0	11.7		99.1	2.8	12.9	4.5	97.8	2.7	17.3	3.3	94.6
Haleakala	7119	3.3	31.5	5.2	100.0	2.5	9.7	2.3	99.6	3.7	17.8		97.8	4.1	20.2		99.4	3.0	22.0	11.9	95.6
Greenbelt	7105	2.9	25.6	4.9	100.0	2.1	13.1	3.6	100.0	3.4	16.1		99.3	2.7	18.2	8.3	98.8	1.5	16.0	3.6	93.4
Potsdam_3	7841	6.3	28.8	13.3	100.0	4.1	10.0	7.9	99.9	4.3	10.0		94.2	3.6	9.0	2.6	91.3				
Hartebeesthoek	7501	2.3	28.9	11.9	100.0	2.5	8.0	7.7	100.0	3.6	15.9		100.0	2.4	23.2	5.9	99.4	1.3	34.2	8.0	95.6
McDonald	7080	4.4	34.7	10.8	100.0	3.1	15.3	6.9	99.8	3.4	11.2		97.5	3.7	18.0	6.4	94.1	3.1	16.8	7.0	95.4
Katzively	1893	14.1	45.7	18.5	100.0									12.1	24.2	18.9	82.1				
Koganei	7308	6.9	31.3	9.0	100.0	5.1	12.7	5.5	99.5	5.6	14.2		94.9	6.2	14.3	4.0	96.3	5.2	25.6	6.5	95.5
Simeiz	1873	25.6	51.4	43.0	100.0	74.4	44.8	23.7	98.0	2.1	24.3		22.2	55.6	32.5	17.9	81.3	30.9	35.2	14.5	56.2

Mission Working Group
Spring 2008 Report to Governing Board

- Two Missions have applied for ILRS tracking support since the last Report (September 2007)

1. **GOCE:** ESA (launch 2008 August?)
2. **QZS-1:** JAXA

GOCE

- Gravity Field and Steady-State Ocean Circulation Explorer will measure the Earth's gravity field and model the geoid with extremely high accuracy and spatial resolution.

- Mission support request fully completed, including all requested details of LRA (7-cube hemisphere)
- Issues regarding sufficiency of prediction accuracy for this v-LEO mission (~290km) taken up by CB
  - ESA (ESOC) expect to be able to deliver at ~50m
  - Want to carry out tests using say ENVISAT
  - Needed to test sub-daily prediction cycle based on GPS
  - ESA suggest ILRS specify and run these tests – action

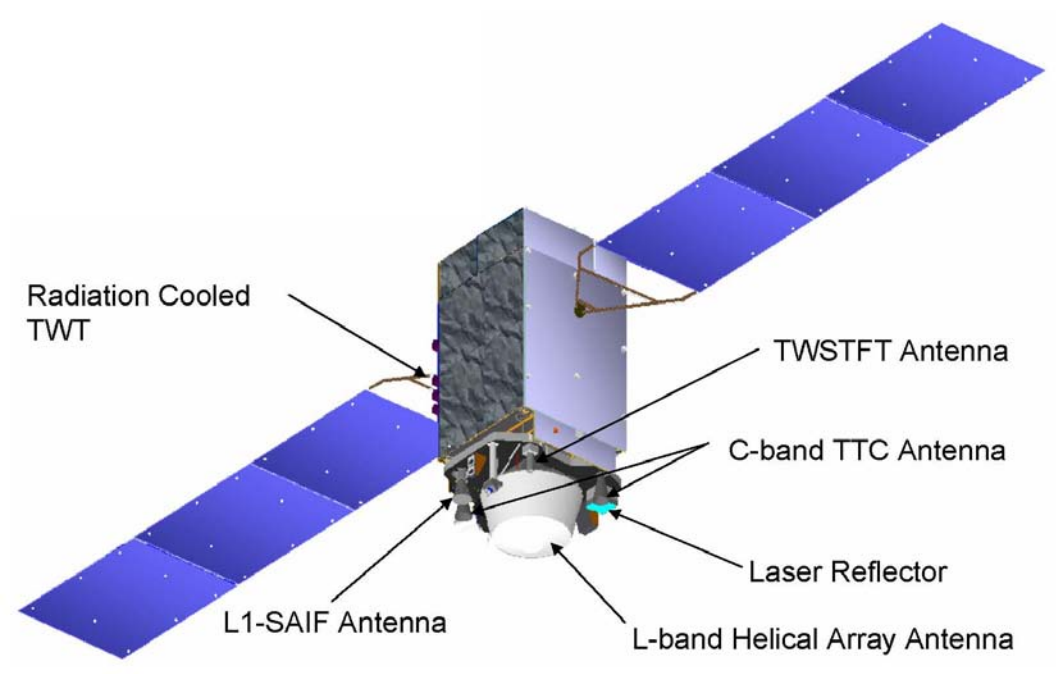
- MWG has recommended to GB that ILRS track GOCE
- GB ratified that recommendation in March 2008.

QZS-1 (quasi-zenith satellite)

- JAXA submitted a support request for the first satellite of the developing Japanese navigational satellite system, the Quasi-Zenith Satellite System.
- Satellite will be at GEO distance but with an inclination of 45 degrees.
- Two-stage system deployment is planned, of which this first satellite QZS-1, a technical validation and application demonstration, will be launched in 2009.
- As a second step, the 2nd and 3rd satellites will be launched several years later.
- JAXA hopes to involve the relevant ILRS Western Pacific Ocean Network stations in a two-stage SLR tracking schedule
  - SLR tracking will be necessary in order for JAXA to estimate navigation data biases and to evaluate the radiometric orbit determination accuracy.

QZS-1(cont.)

- MWG has recommended to GB that ILRS track QZS-1
- GB ratified that recommendation in March 2008.



Further work on LAGEOS CoM Issues

Graham Appleby

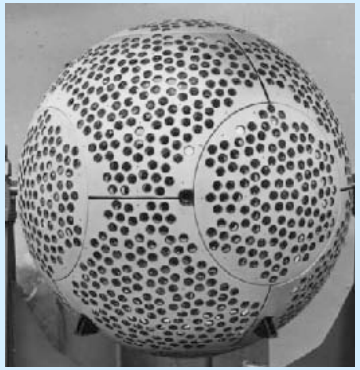
Space Geodesy Facility, Herstmonceux, UK

Acknowledgements:
ILRS Task Force #2

NATURAL ENVIRONMENT RESEARCH COUNCIL

ILRS GB, Vienna Monday 14th April 2008

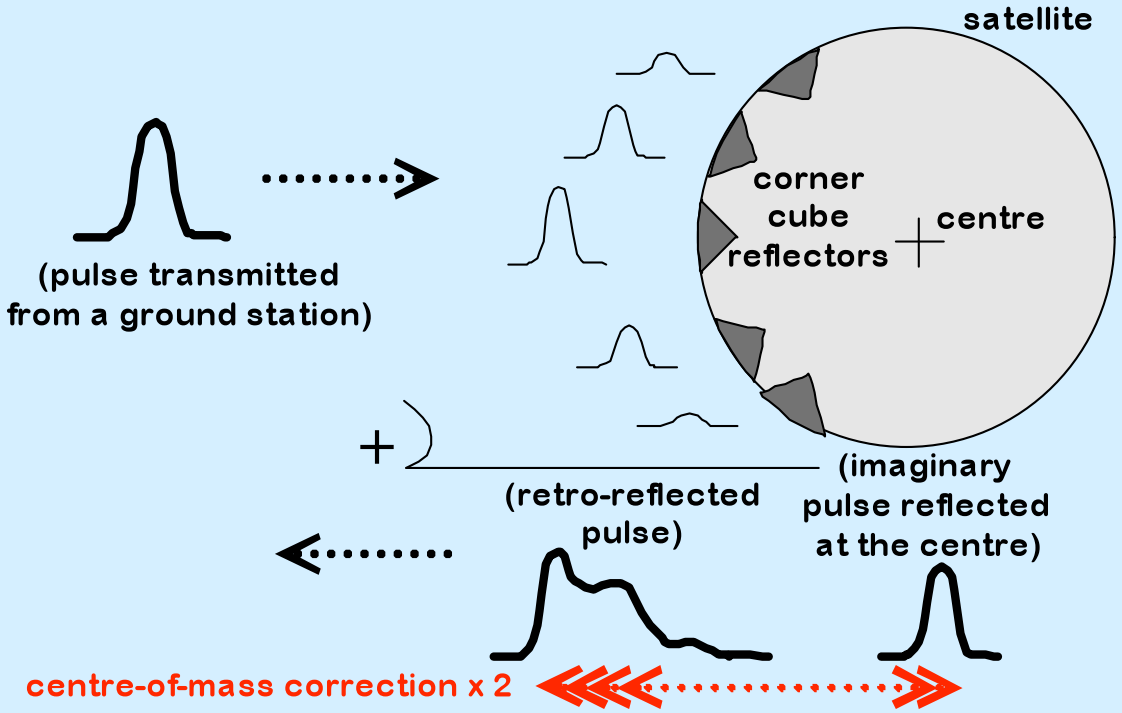
International Laser Ranging Service



ETALON

Centre of Mass corrections: Satellite 'signature' contribution

LAGEOS

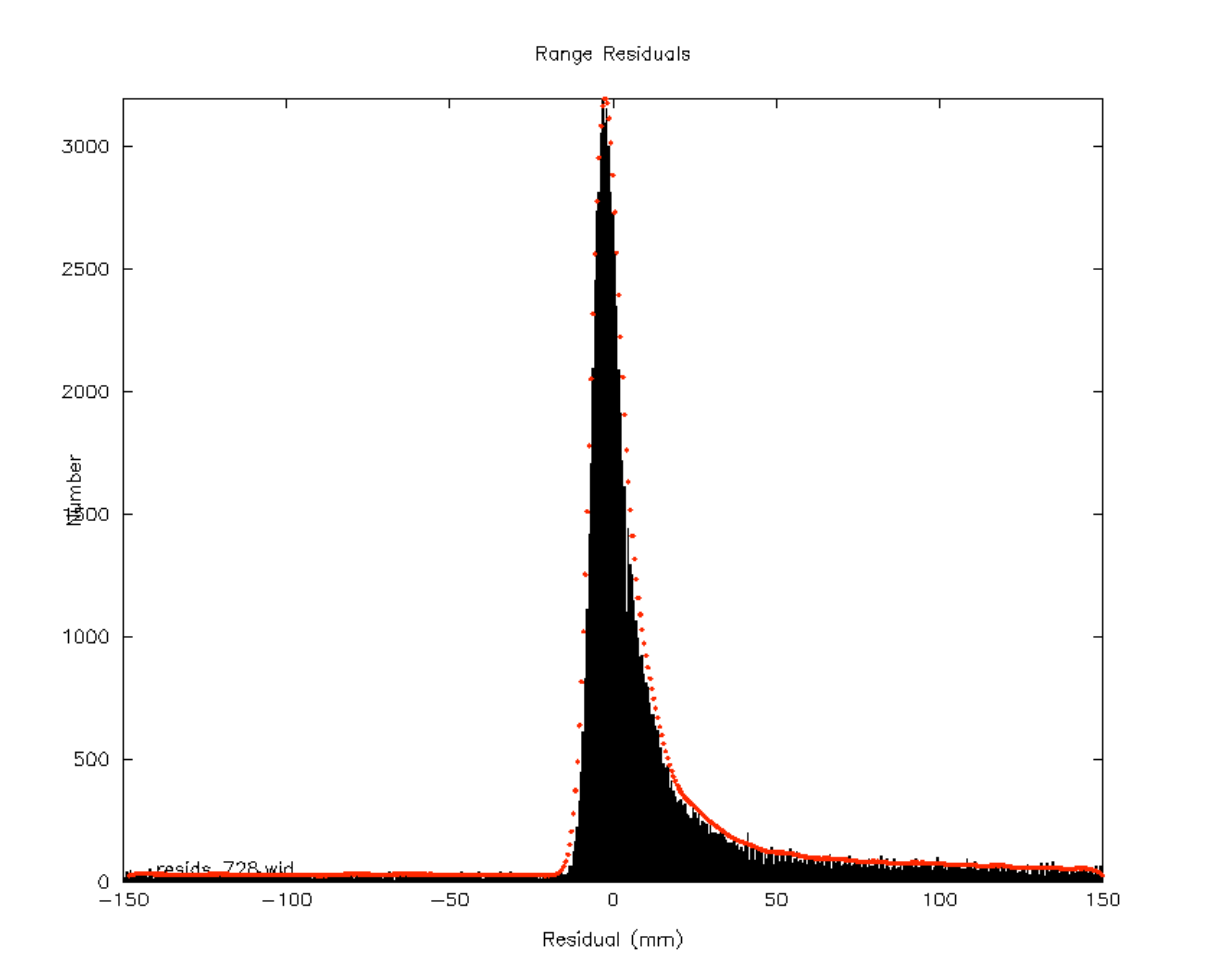


On average, over many shots, returning pulse-shape can be modelled as a convolution of laser pulse-shape with the satellite response function.

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)
- Station technology:
  - multi-photon returns:
    - photomultiplier or first-photon detection
  - single photon return
- Development of a model, illustrated using a low return-energy system (single photons):

Real data from a pass at **<< single photons**.
σ = 8.5mm: (data will be rejected at -12 and +25mm



For this case, possible to compute **from the model** an **average** CoM value accurate to ~1mm (=245mm)

Centre of mass corrections >> single photons

- For NASA systems, for example, returns peak at several hundreds of photons (est. from link models, e.g. Degnan, 1993)
- Models for CoM depend upon characteristics of electronic discriminators;
- Cannot use statistical method for CoM as for single-photon systems
  - But can **estimate** from the model distributions (leading edge), to give CoM 248 ±2 mm
  - This compares with ground tests on LAGEOS-2 giving 249 mm (Minott, 1993)

In summary:

There exist different CoM values dependent on the stations' technology.

- Single photon systems have smallest uncertainty: **±1mm**
- Com for high-energy systems have an estimated uncertainty of ± 2mm
  - take account of unknown effect of discriminators at different stations;
  - effect is to increase effective pulse-length
- A table of values has been produced:
- CoM for typical single photon station 245mm
- Com for typical, majority, high-energy station 248mm
  - or use 249mm as measured for MCP on LAGEOS-2 in lab.

Retroreflector Arrays

- Dialog continues with relevant agencies on the importance of including reflectors on GPS-III satellites;
- Specification for GNSS arrays approved by the ILRS, GGOS and IAG;
- Study underway at GSFC on hollow cube technology in collaboration with the testing facility at INFN-LNF in Italy)
  - Zerodur test cubes have been delivered;
  - Preliminary tests at ambient temperatures underway at GSFC;
  - Final testing planned at INFN-LNF;
  - Fall back position is solid, uncoated cubes;
- INFN/Frascati
  - LAGEOS sector, GPS array, and “new” Russian cubes at INFN for testing;
  - Thermal analysis of the LAGEOS sector underway;
  - Optical tests on the Glonass CCR underway;
  - Modifications have been made to the chamber to rotate and translate the target array;

ILRS Retroreflector Standards

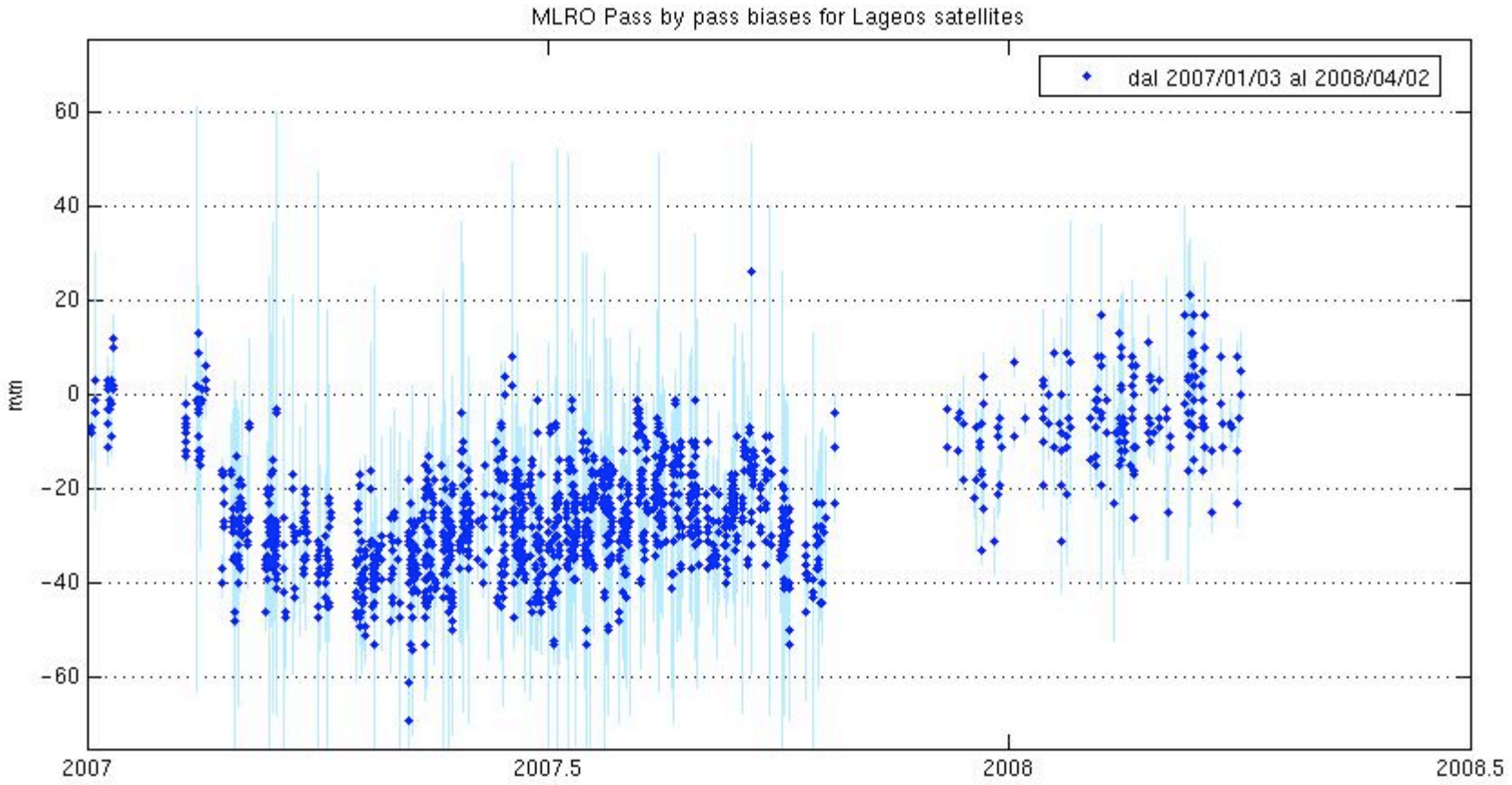
(Revision September 28, 2007)

- Retroreflector payloads for GPS, GLONASS, and COMPASS satellites should have an “effective cross-section” of 100 million sq. meters (5 times that of GPS-35 and -36) for GNSS satellites;
- *Added Recommendation: Retroreflector payloads for satellites such as Galileo in higher orbits should scale the “effective cross-section” to compensate for the R**4 reduction in signal strength;*
- The parameters necessary for the precise definition of the vectors between the effective reflection plane, the radiometric antenna phase center and the center of mass of the spacecraft be specified and maintained with an accuracy sufficient to support GGOS objectives;
- Standards now need to be developed for LEO and Synchronous satellites;

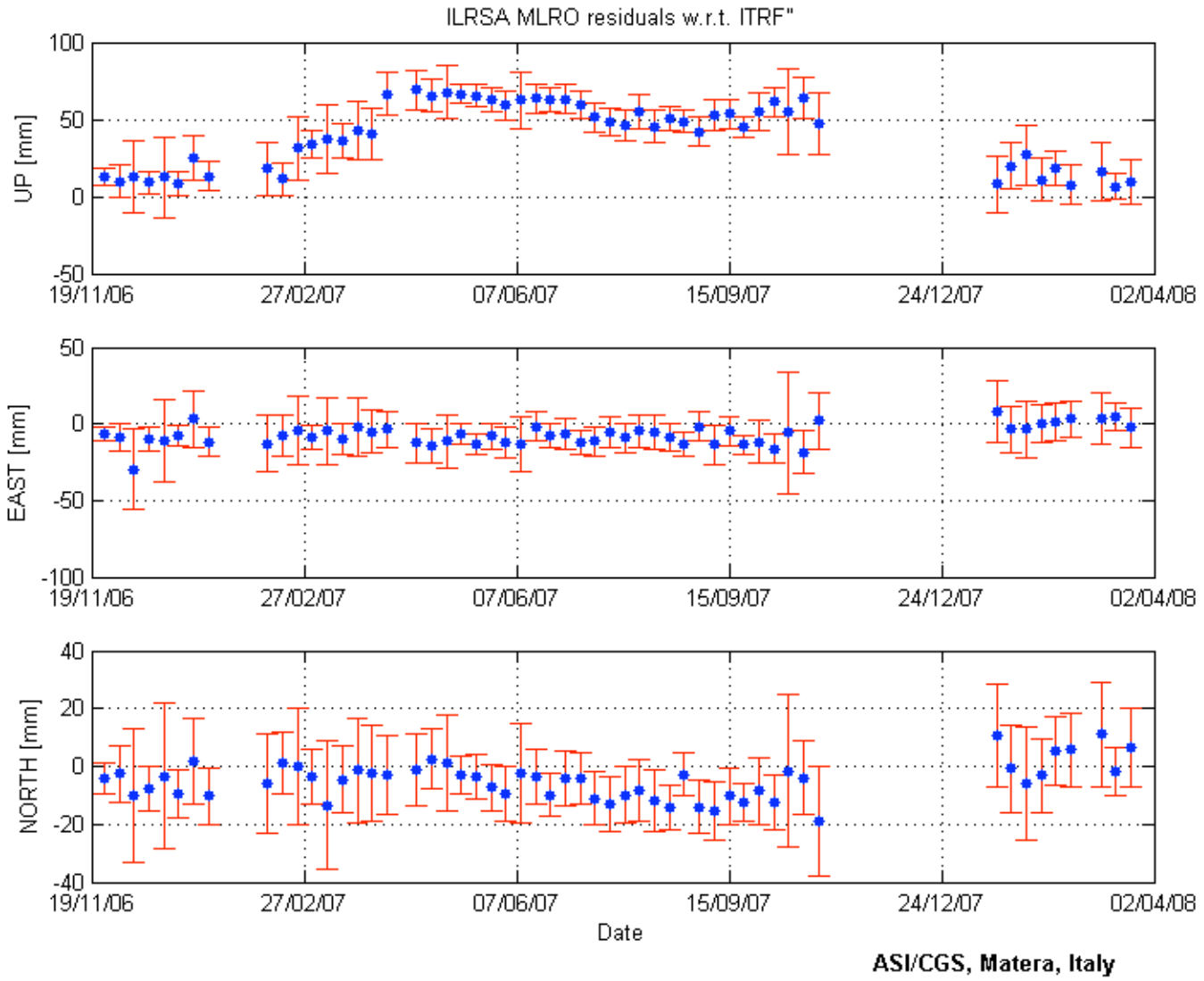
MLRO 2007 range bias issue analysis and solution

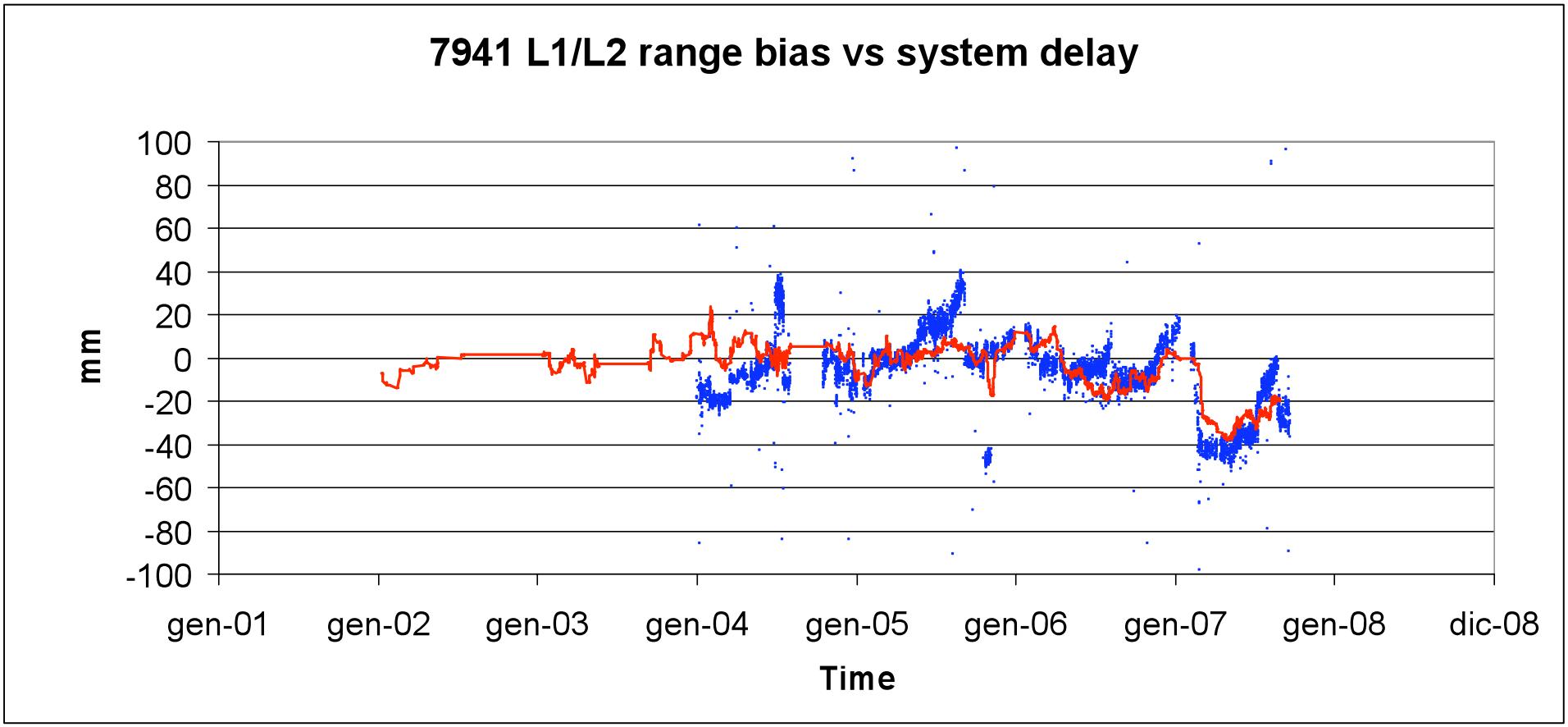
V. Luceri, G. Bianco

MLRO LAGEOS BIAS, Hit-U (T. Otsubo)



MLRO coordinate time series
(ILRSA weekly product)

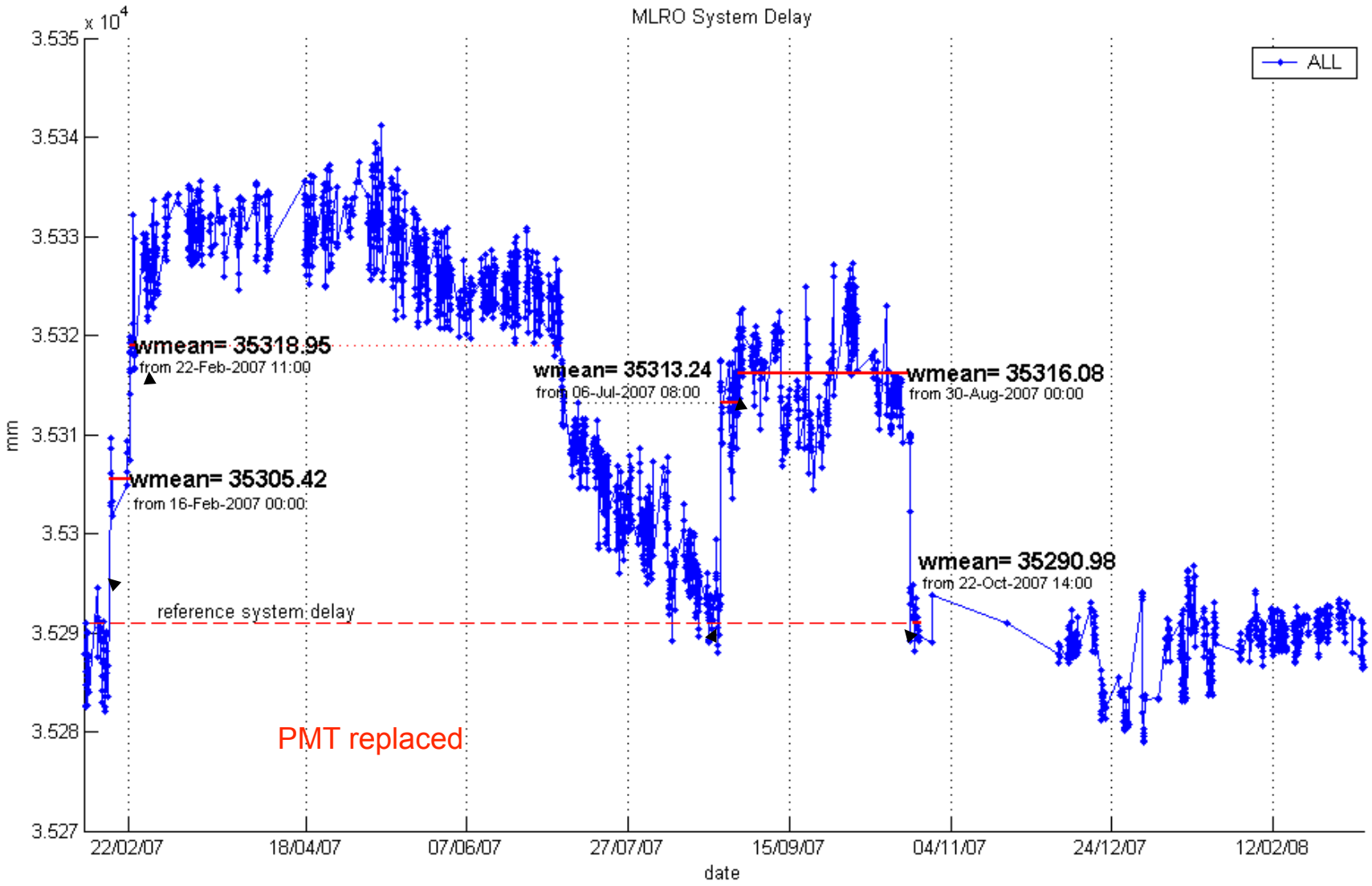




Red curve: MLRO LAGEOS bias values by T. Otsubo, Hit-U

Blue dots: system delay values from calibrations, arbitrary zero point

MLRO system delay



PMT window change

Start diode battery replaced

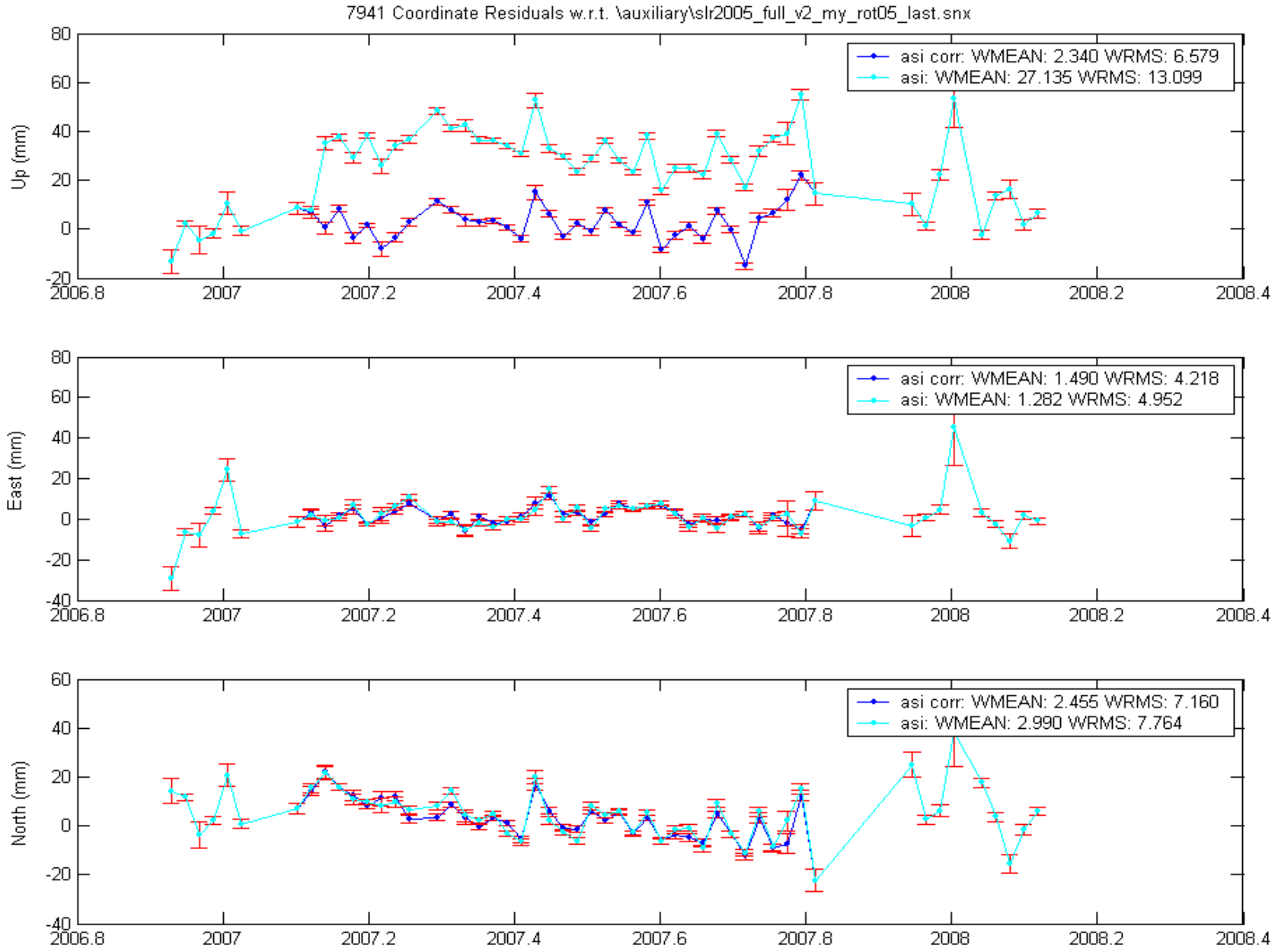
PMT window change

PMT window change

CORRECTIONS

breaks set at PMT window change dates (22/02/07 , 30/08/07 , 22/10/07 and 06/07/07)				
system delay reference value averaged immediately after the October 07 correction				
start	**stop**	value(mm)	ref value (mm)	**bias**
16/02/07 00:00	**22/02/07 11:00**	35305	35291	**-14**
22/02/07 11:00	**06/07/07 08:00**	35319		**-28**
06/07/07 08:00	**30/08/07 00:00**	35313		**-22**
30/08/07 00:00	**22/10/07 14:00**	35316		**-25**

MLRO Time series before and after the bias correction

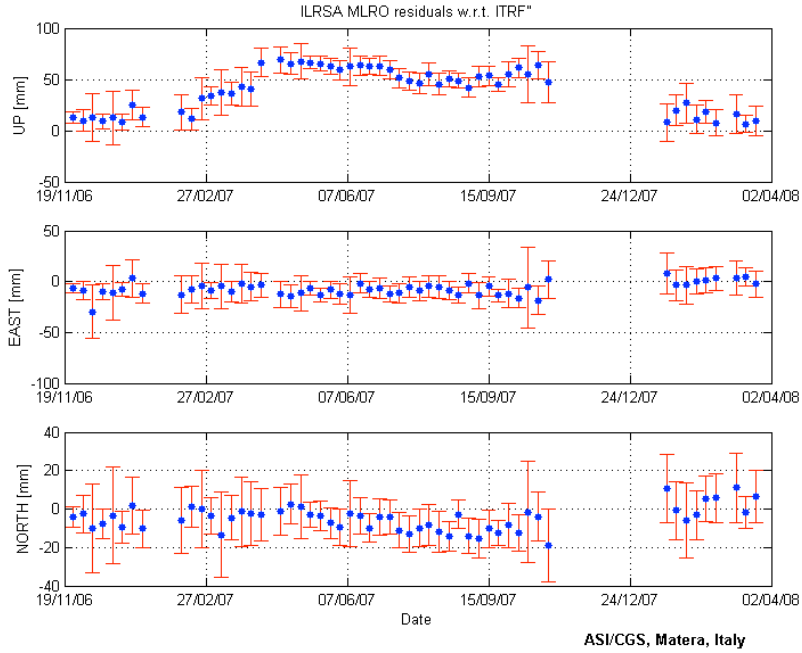


THE MLRO 2007 RANGE BIAS PROBLEM
ANALYSIS AND SOLUTION

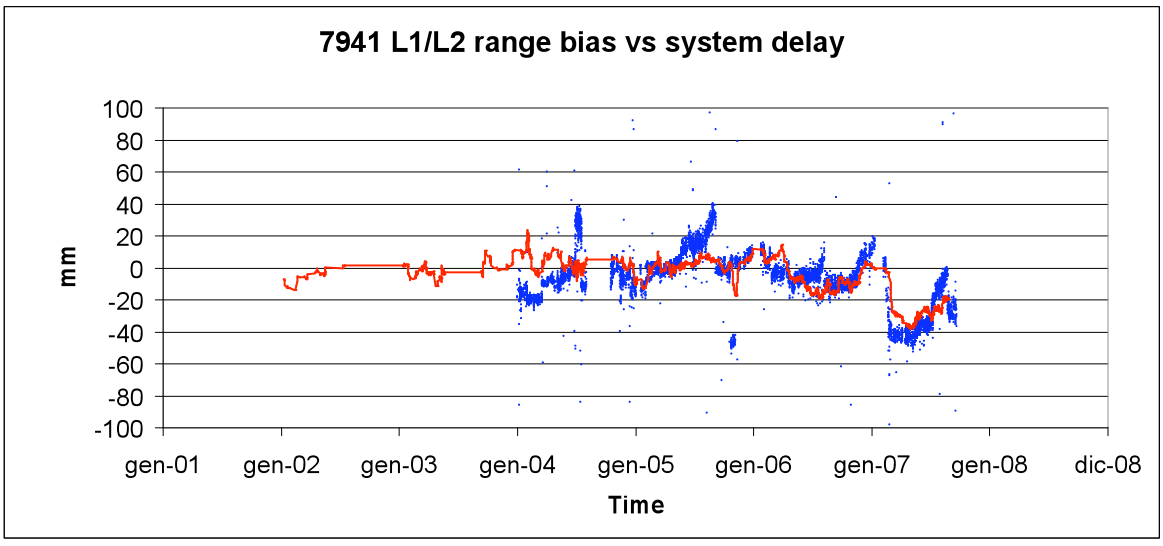
V. Luceri, G. Bianco

Introduction

Starting from the second half of February, 2007, SLR solutions from the ILRS analysis centers have been showing an anomalous behaviour in the MLRO data, as clearly illustrated in the graph below which shows MLRO Up, East and North residuals with respect to the ITRF as computed in the ILRSA combined solution.



The very significant misbehaviour in the "Up" component was clearly caused by a non zero range bias, non properly modelled in the system calibration. The graph below shows the MLRO range biases derived from Lageos-1 and Lageos-2 (thanks to T. Otsubo, Hitotsubashi University, hereafter Hit-U) as a red curve, while the blue dots represent the single system delay values plotted with an arbitrary zero point.



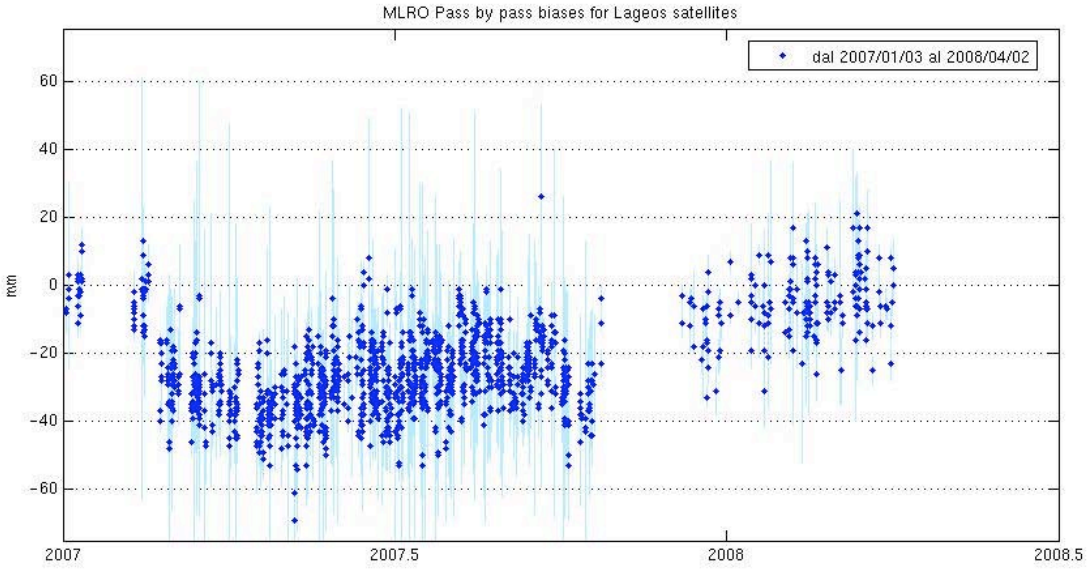
Calibration scheme screening

It is clear that, for some reason, at a certain point in time the system calibration routine became unable to properly compensate the system delay variations, which are clearly mapped into the solved-for bias values. At a first glance, nothing was changed in the MLRO calibration scheme, so this prompted us to thoroughly review the whole procedure.

The first finding has been a strong dependence of the System Delay from the received pulse energy.

The problem was finally traced in a wrong value of a few parameters, which had changed after the MCP/PMT replacement but had not been correctly written into the configuration files by the station operators. Those parameters are the PMT Gate Start Bias and, consequently, the CFD Gate Start Bias. The correct figures have been finally computed for the three operational MLRO configurations, i.e. Ground Target, Internal calibration and Satellite Ranging, and written into the relevant configuration files.

Once the parameters have been adjusted to the proper values, the MLRO range bias has returned to a zero value, as illustrated in the following graph in which MLRO Lageos' range bias computed by T. Otsubo (Hit-U) are plotted as a function of time.



Correction of 2007 data

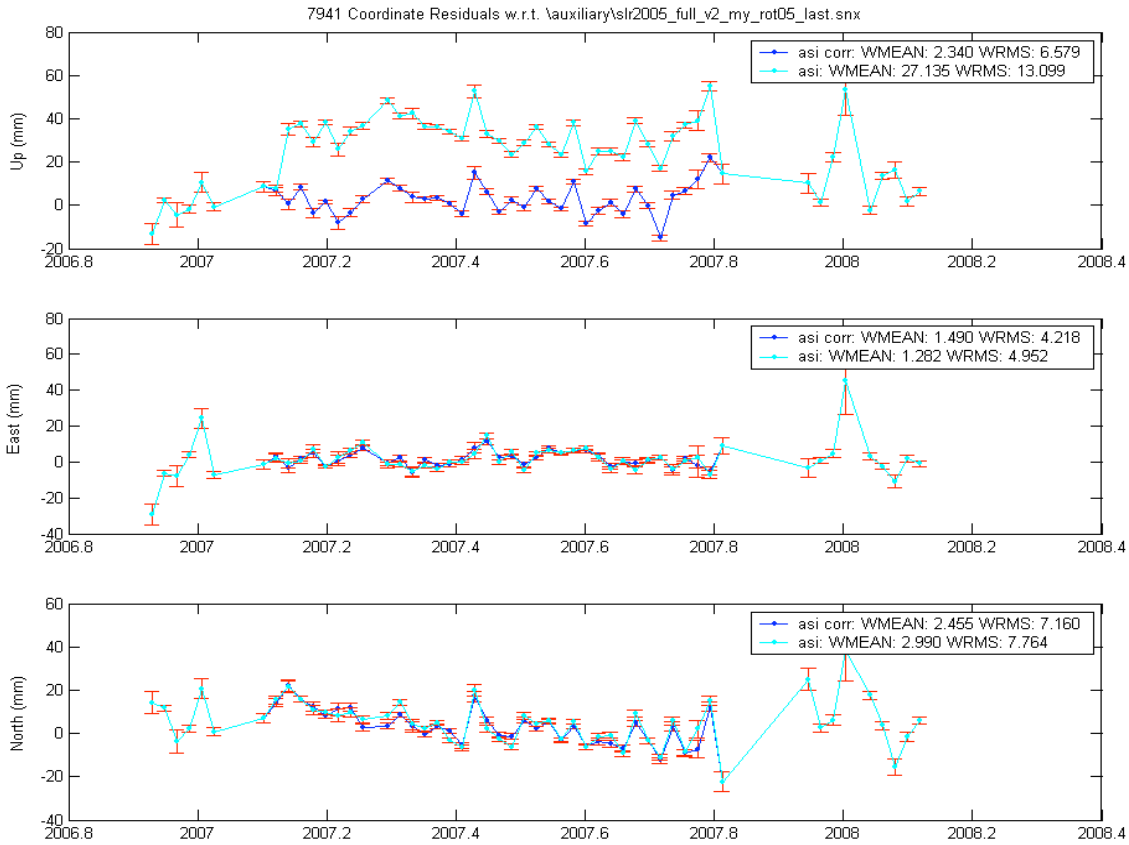
All MLRO observational data taken in the period between February 16th, 2007 and October 22nd, 2007 are affected by a negative range bias which we have quantified by crossing the time series of system delay measurements with all significant system change events. It's important to note that this process has been kept independent from SLR solutions.

The result is the following table which gives the computed MLRO range bias values for a few relevant time intervals.

Start (UTC)	Stop (UTC)	MLRO range bias (mm)
16/02/07 00:00	22/02/07 11:00	-14
22/02/07 11:00	06/07/07 08:00	-28
06/07/07 08:00	30/08/07 00:00	-22
30/08/07 00:00	22/10/07 14:00	-25

NOTE: These biases must be <u>subtracted</u> from the ranges to obtain the correct value.

The following graph shows the MLRO coordinate residuals computed before (cyan) and after (blue) the corrections (ASI SLR solution). The improvement is readily apparent and brings the MLRO back to the ILRS core station quality standard.



Progress with Stanford Counter assessments

Philip Gibbs and Graham Appleby

Space Geodesy Facility, Herstmonceux, UK

NATURAL ENVIRONMENT RESEARCH COUNCIL

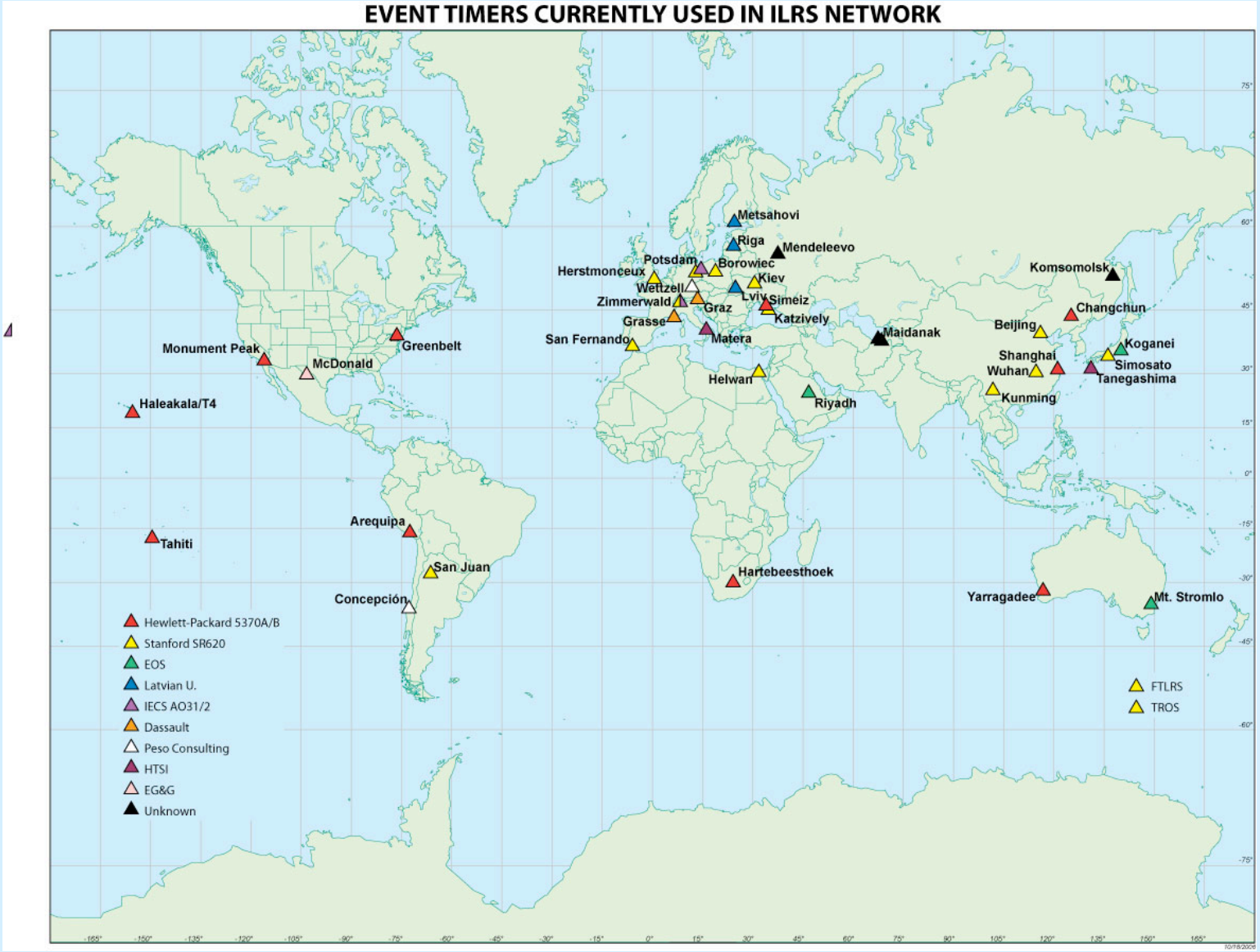
ILRS GB Vienna Monday 14th April 2008

International Laser Ranging Service

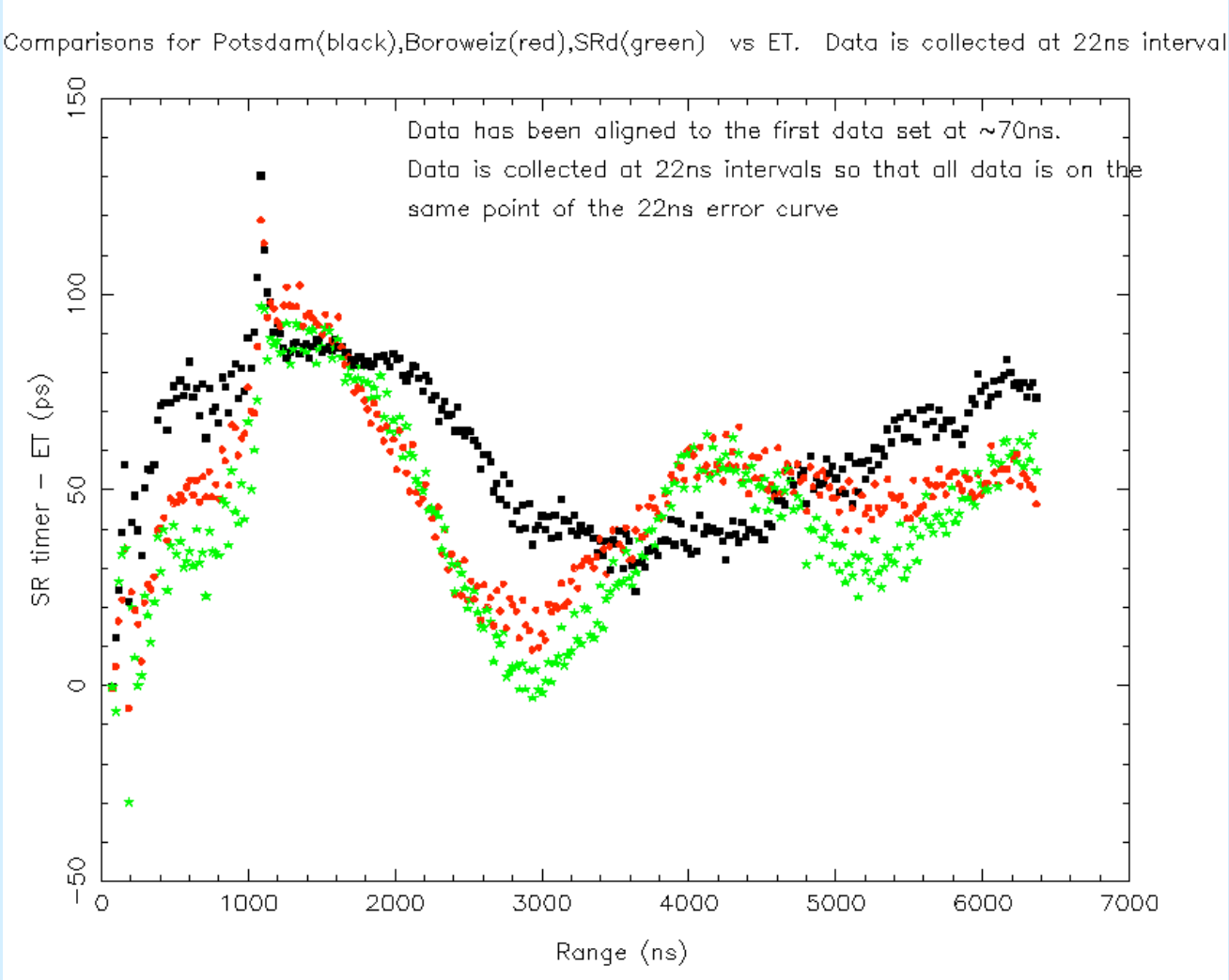
Tests on (Stanford) counter linearity

- Relative to a ‘perfect’ time-of-flight counter, what are the characteristics of the counters in common use over the last 15+ years?
- Work has been carried out on ***Stanford*** counters in use at Herstmonceux, relative to a high-spec, ps-level event timer.
- Counters from Potsdam and Boroweic also tested at Herstmonceux.
- Studied effects at LAGEOS and at local calibration target distances.

Counters in use in ILRS stations



Tests at Hx with Potsdam (7836) and Borowiec counters – at calibration ranges



Tests and estimates

- From tests or estimates, following table constructed
- Computed for LEO-MEO
- Test results in **bold**
- Re-iterate the uncertainty in this approach
  - High-frequency several mm variations present
  - Not possible to do an exact ‘calibration’
  - Uncertainty may by 3mm

STATION NAME		PAD ID	Calib error	LEO error	LAGEOS error	GPS error
BEIL	Beijing	7249	-12	- 2	- 2	- 3
BORL	**Borowiec**	**7811**	**- 9**	**- 9**	**- 9**	**0**
BREF	Brest	7604	-10	0	0	- 1
GLSV	Kiev	1824	- 6	+ 4	+ 4	+ 3
HELW	Helwan	7831	0	+10	+10	+ 9
HERL	**Herstmon.**	**7840**	**- 7**	**- 7**	**- 7**	**- 7**
KTZL	Katzively, Ukraine	1893	0	+10	+10	+ 9
KUNL	Kunming, China	7820	- 9	+ 1	+ 1	0
POT3	**Potsdam**	**7841**	**0**	**+ 5**	**+ 5**	**+ 5**
POTL	Potsdam	7836	0	+ 3	+ 3	+ 3
SFEL	**San Fernando**	**7824**	**0**	**+ 8**	**+ 8**	**+ 8**
SISL	Simosato, Japan	7838	+ 1	+11	+11	+10
SJUL	San Juan	7406	0	+10	+10	+ 9
WUHL	Wuhan	7231	0	+10	+10	+ 9
ZIML	**Zimmerwald**	**7810**	**- 3**	**- 3**	**- 3**	**- 3**
GRSL	Grasse	7835	- 1	+ 9	+ 9	+ 8

Summary where specific dates known

Station	Dates	Range Correction (mm)
7840 HERL	1994/10/01 – 2002/01/31	+2.5
7840 HERL	2002/02/01- 2007/02/10	-7.0
7836 POTS	1992/05/01 ->	+3.0
7841 POTS	2001/07/01 – 2004/02/28	+5
7811 BORL	2002/05/01 ->	-9

Estimates for other stations

- In collaboration with ILRS CB
- Have invited fairly prolific stations to send their counters to SGF Herstmonceux for comparison with event timer
- One, possibly two, positive response;
  - Working with group(s) to exchange a counter.

Precision Expandable Radar Calibration Sphere (PERCS) Project

Paul A. Bernhardt, Principal Investigator
Plasma Physics Division
Naval Research Laboratory
Washington, DC 20375
Phone: 202-767-0196
E-Mail: bern@ppd.nrl.navy.mil

Expanding V60 Wire Frame with Double Scissor Edges

From US Patent Number 4,942,700
Reversibly Expandable Double-Curved Truss Structure
Issued to Charles Hoberman 24 July 1990

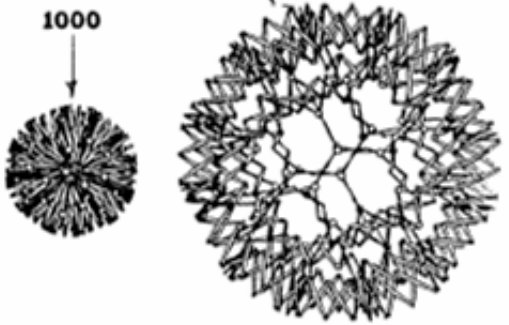


Fig. 13

Fig. 14

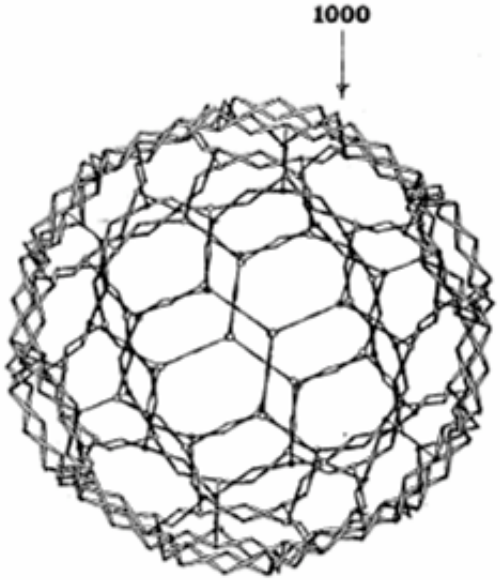


Fig. 15

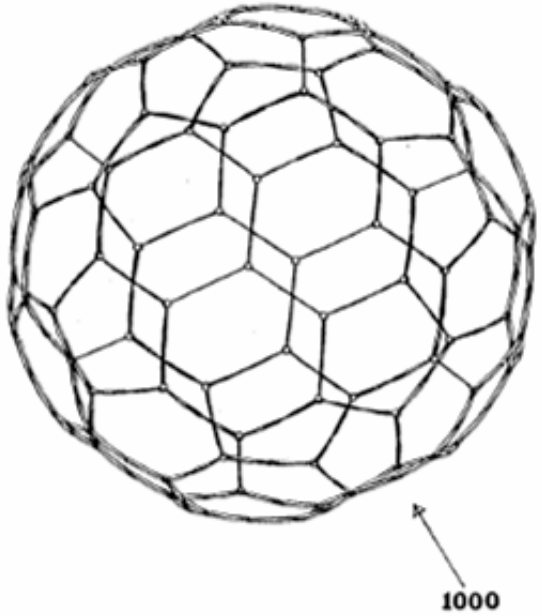
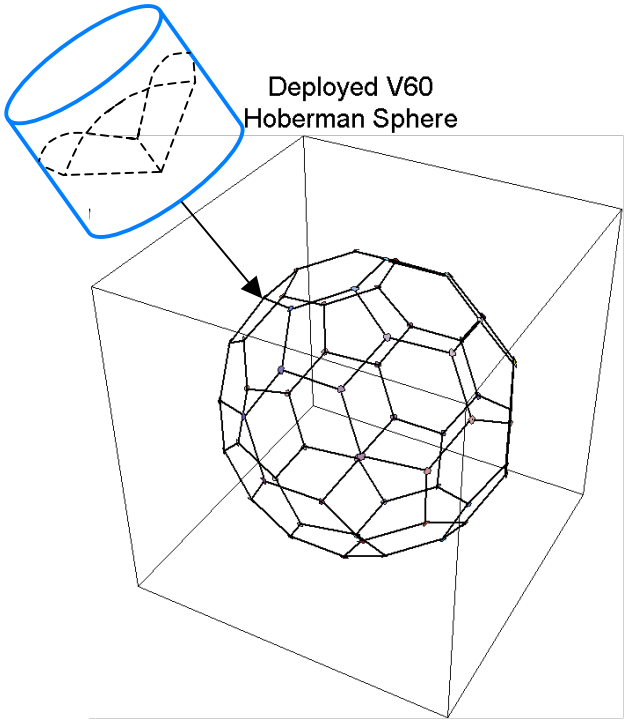
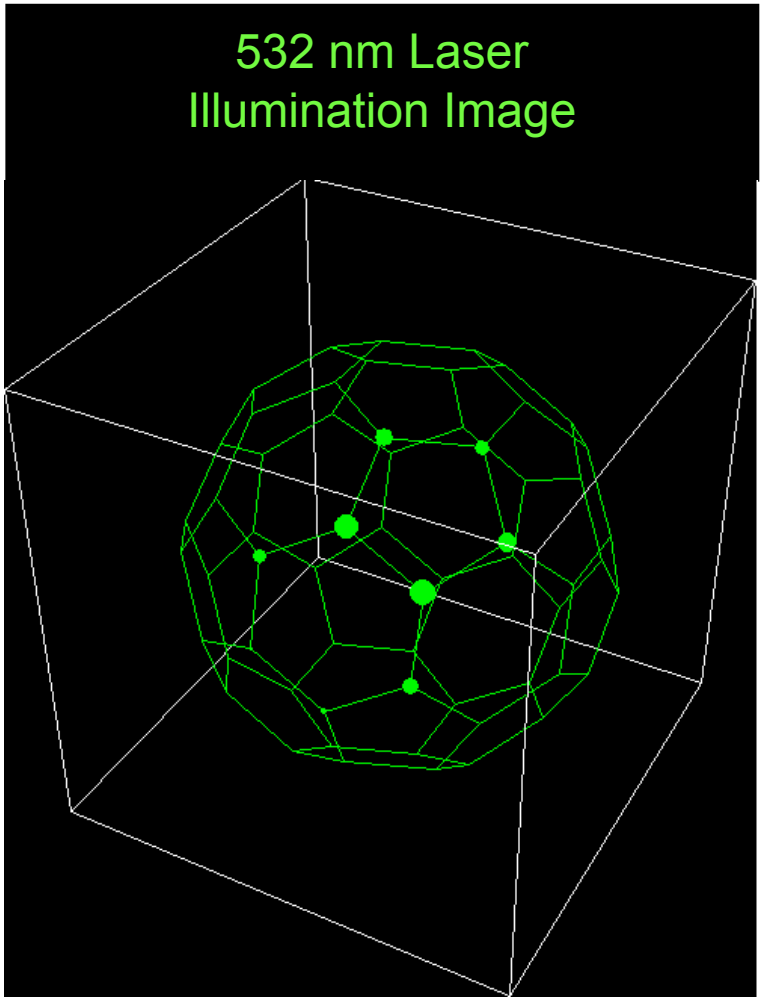


Fig. 16

PERCS (NRL-0708)

- One Corner Cube Reflector at Each External Vertex Hinge
  - Small Diameter to Match Hinge Size
  - Provides Precise PERCS Position using Laser Ranging and Tracking
  - Flight Heritage from ANDE-RR





PERCS Objectives

(1) Provide *HF Radar Calibration Target* Using Spherical Wire Frame

a. Purpose: Operational Calibration of Antenna Patterns for Radars

b. Construct Model for RCS Testing

c. Construct Spaceflight Version

d. Launch into Low Earth Orbit

(2) Study Deployment, Characteristics, and Plasma Interactions of *Large Polyhedral Structures in Orbit*

a. Purpose: Determine Limits on Construction and Lifetime of Large Wire Frames in Space

b. Automatic Deployment in Space

c. Electrodynamic Drag by Magnetic Field Interactions with Large Wire Frame in Space

d. Electric Field Excitation by High Power Electromagnetic Waves

(3) Provide Optical Calibrator for *Laser Satellite Imaging* with Array of Corner Reflectors

a. Purpose: Calibrate Laser Imaging Systems

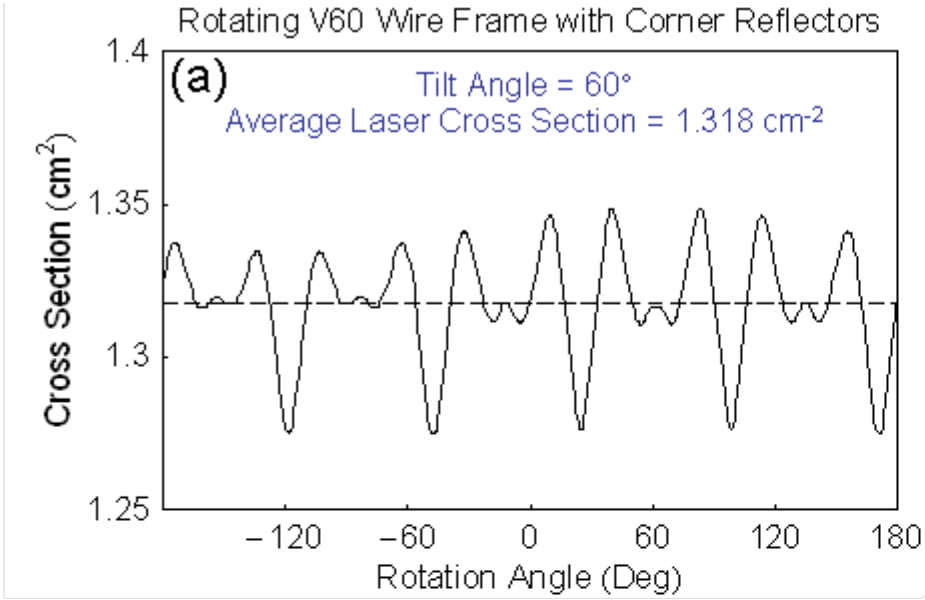
b. Add Corner Cube Reflectors to Each Vertex of Wire Frame

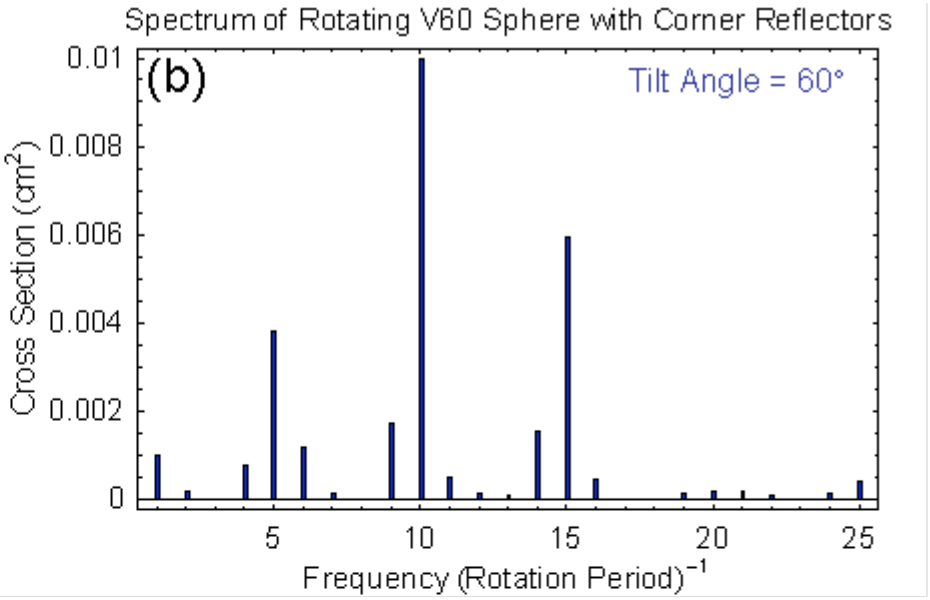
c. Support Operational Laser Ranging, Tracking and Imaging Systems

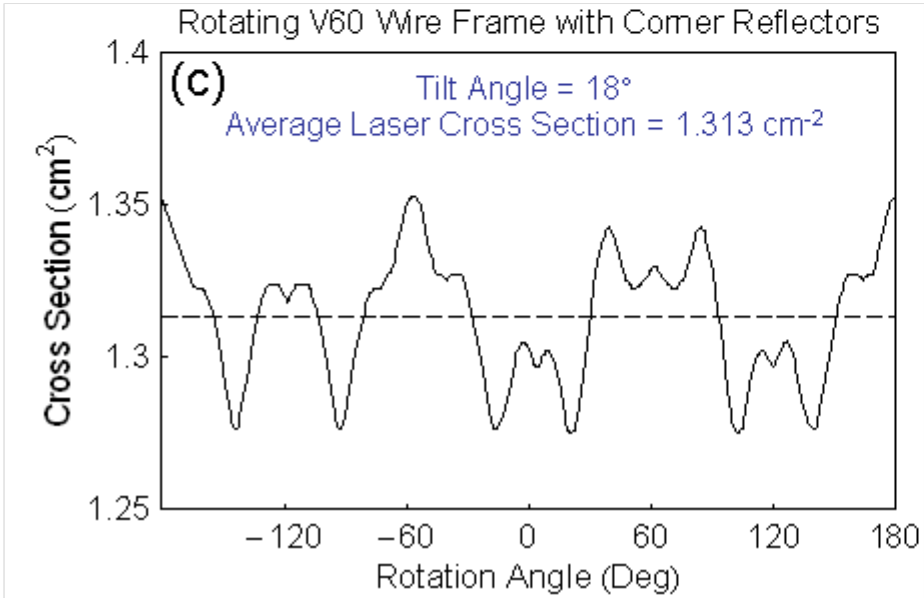
Technical Application

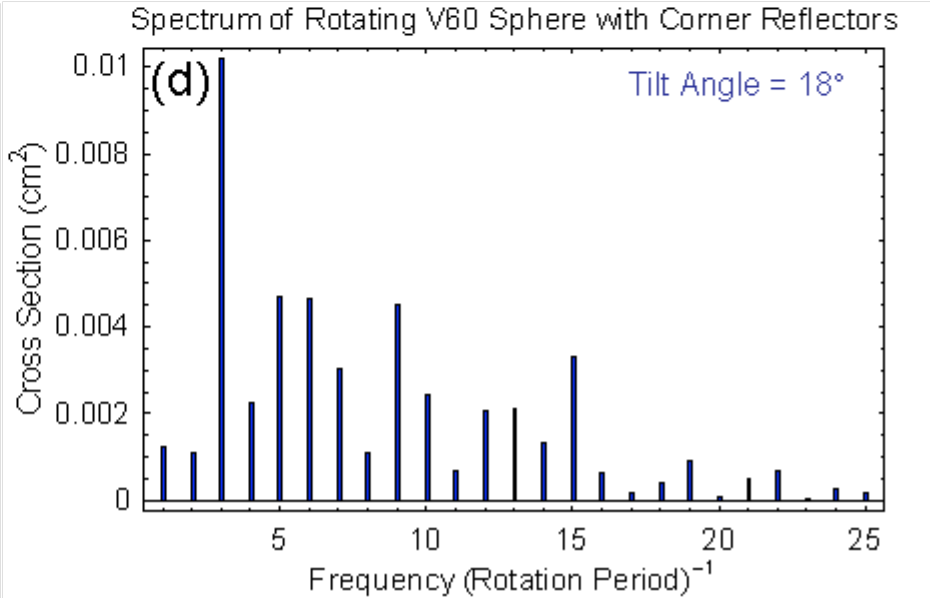
- Laser Imaging System Calibration Target
  - Laser Tracking Complements Radar Calibration and Electrodynamic Drag
    - Position Accuracy of 1 cm
    - Rotation Rate and Target Orientation Measurements
  - Computation
    - Mechanical Model for Corner Reflectors at Vertices of Polyhedral Wire Frame
    - Predicted Accuracy of Wire Frame Structure for Laser Imaging Calibration
    - Corner Cube Selection for Adequate Spread of Reflection Beam
    - Corner Cube Placement with Empty Vertices for Unique Configuration
  - Mechanical Model Studies
    - Add Corner Reflectors to Scaled Deployable Polyhedral Structures
    - Determine Structural Integrity and Operational Utility
  - Full Size Model
    - Mechanical Design and Fabrication
      - Add Corner Reflectors to Full Size Flight Model
    - Ground-Based Imaging Wire Frame in Space
      - Monitor Position of Wire Frame using Laser Ranging Systems
      - Provide Precise Laser Reflection Target
        - » Non-Resolvable Object Characterization
        - » High Resolution Laser Imaging

Simulated Cross Section of Rotating V60 Polyhedron with Corner Cube Reflectors









Plans

- FY08
  - Optimize Design of Polyhedral Conducting Mesh
    - HF Radar Target
    - Backscatter Reduction at Anti-Reflection Frequencies
    - Determine Tolerances on Target Construction
    - Consider Dielectric Layer on Inner Metal Sphere
    - Consider Resistive Conductors in Mesh
- FY09
  - Construct Mechanical Model for Anechoic Chamber Testing
    - Measure RCS at All Frequencies and Target Orientations
    - Determine Effects of Imperfections in Hinges and Vertices
  - Model Drag Effects to Determine Lowest Altitude for PERCS
  - Construct Flight Model for Launch into Low Earth Orbit
    - Environmental Tests
    - Deployment Tests
- FY10
  - Deliver Flight Model
  - Launch as Secondary Payload into High Latitude Orbit
  - Schedule Ground User Operations
- FY11
  - Measure PERCS RCS with OTH Radars
  - Compare Computed and Measured RCS Properties

PRELIMINARY AGENDA

Saturday, October 11

ILRS Working Group Meetings

Sunday, October 12

ILRS Analysis Working Group Meeting

19:00 Program Committee Meeting

17:00 - 21:00 On-Site Registration

Monday, October 13

8:00 - 9:00	On-Site Registration
9:00 - 10:00	Welcome / Introduction
10:00 - 10:30	Break
10:30 - 12:30	Session 1: **Scientific Achievements, Applications and Future Requirements (first session)** Chair: Zuheir Altamimi co-Chair: Steve Klosko
12:30 - 14:00	Lunch
14:00 - 16:00	Session 2: **Scientific Achievements, Applications and Future Requirements (second session)** Chair: Richard Gross co-Chair: Markus Rothacher
16:00 - 16:30	Break
16:30 - 18:00	Session 3: **Satellite Laser Ranging in Global Geodetic Observing System** Chair: Hans-Peter Plag co-Chair: Hermann Drewes
19:00	Reception at Andersia hotel

Tuesday, October 14

8:30 - 10:00	Session 4: **Network and Station Performance** Chair: Vincenza Luceri co-Chair: Mark Torrence
10:00 - 10:30	Break
10:30 - 12:30	Session 5 **New and Upgraded Stations and Expanded Facilities** Chair: Francis Pierron co-Chair: Stanislaw Schillak
12:30 - 14:00	Lunch
14:00 - 16:00	Session 6: **Lunar and Interplanetary Laser Ranging** Chair: Tom Murphy co-Chair: Peter Shelus
18:00	Trip to Borowiec Observatory, Reception

Wednesday, October 15

8:30 - 10:00	Session 7: **Kilohertz Systems** Chair: Georg Kirchner co-Chair: Jan McGarry
10:00 - 10:30	Break
10:30 - 12:30	Session 8: **Lasers, Detectors, and Timers** Chair: Ivan Prochazka co-Chair: Yuri Artyukh
12:30 - 14:00	Lunch
14:00 - 16:00	Session 9: **Software and Automation** Chair: Werner Gurtner co-Chair: Randy Rickleffs
16:00 - 16:30	Break
16:30 - 18:00	Session 10: **System Calibration Techniques and On-Site Quality Control** Chair: Yang Fumin co-Chair: John Luck
19:00	ILRS Governing Board Meeting

Thursday, October 16

8:30 - 10:00	Session 11: **Atmospheric Corrections: Theoretical and Experimental Approaches** Chair: Erricos Pavlis co-Chair: Horst Mueller
10:00 - 10:30	Break
10:30 - 12:30	Session 12: **Operational Issues and Mission Updates** Chair: Mike Pearlman co-Chair: Ben Greene
12:30 - 14:00	Lunch
14:00 - 16:00	Session 13: **Targets, Signatures and Biases** Chair: Graham Appleby co-Chair: Toshimichi Otsubo
16:00 - 16:30	Break
16:30 - 18:00	Session 14: **Advanced Systems and Techniques: Transponders, Altimeters, and Time Transfer** Chair: John Degnan co-Chair: Ulrich Schreiber
19:00	Banquet

Friday, October 17

8:30 - 10:00	Session 15 **Advanced Systems and Techniques: Transponders, Altimeters, and Time Transfer (continued)** Chair: John Degnan co-Chair: Ulrich Schreiber
10:00 - 10:30	Break
10:30 - 12:30	**ILRS General Assembly** Workshop Summary, Resolutions, Closure
12:30 - 14:00	Lunch
15:00	Tour around Poznań City

Saturday, October 18

8:00	Excursion to Toruń City place Nicolaus Copernicus birth

Workshop budget (approximate costs)
Fixed costs:

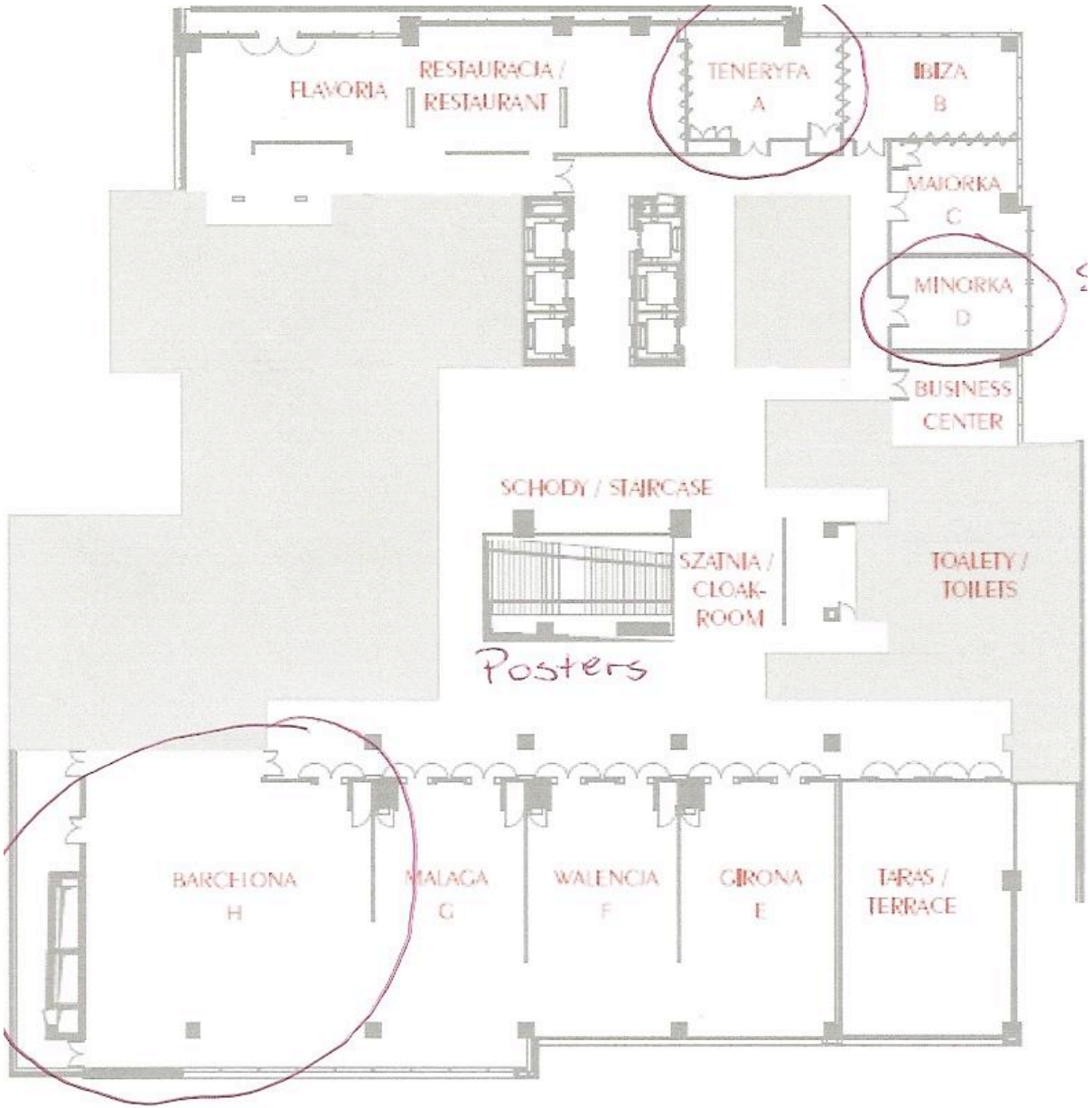
Andersia hotel meeting rooms and equipment	EUR 7300	USD 11500
www page costs	EUR 1500	USD 2400
Workshop bureau and cost of materials	EUR 5900	USD 9300
Total cost per participant (120 participants)	EUR 120	USD 190

Participant costs (per one person):

portfolio and abstracts	EUR 20	USD 30
coffee/tea breaks (8)	EUR 50	USD 80
reception at Andersia hotel	EUR 35	USD 55
trip to Borowiec, reception	EUR 45	USD 70
banquet	EUR 60	USD 95
proceedings (120)	EUR 5	USD 120?
Total cost per participant:	**EUR 335**	**USD 640?**
Workshop fee EUR 350/participant (proceedings in the next year)	**EUR +15**	**USD -105?**

Sponsors ???

No support for young scientists and students
No support for colleagues from Ukraine
No invited papers



Workshop

13-17.10.2008

Abstracts

Please complete the Abstract form below to submit an abstract to the workshop program. Please include co-author(s) and affiliation(s) in the abstract text. Abstract can be a maximum of 1500 characters in length. A list of abstracts received thus far is available. The Abstracts Book will be available at the Workshop.

In case of too large number of presentations the Program Committee may ask the authors to change the oral contribution to a poster presentation.

Deadline for abstract submission: September 10, 2008.

The Workshop Proceedings will be published in the next year and sent to the participants. Deadline for the papers submission to Proceedings will be decided at ILRS General Assembly in Friday, October 17, 2008.

Registration

A registration is required for the participants of the Workshop. We propose two registration forms:

- Online registration by filling and submitting the online registration form,
- Fax registration by download of the registration form in [MS Word] or [PDF] format, complete, sign and fax it to the Organizing Committee (Fax: +48-61-8170-219).

We strongly encourage pre-payment along with this registration for our planning purposes as well as to save time during the onsite check-in process.

A registration fee (payable prior to the Workshop):

- **Participant: EUR 350.00**
  The registration fee includes abstracts, proceedings (distributed after Workshop), coffee/tea breaks, reception in Andersia hotel, Borowiec Observatory Tour and reception, banquet dinner and administrations fees.
  The excursions costs will be paid in cash in onsite registration in Sunday (Oct. 12) or Monday (Oct. 13) - payment in PLN (Polish zloty).
- **Accompanying person: EUR 150.00** (payable prior the Workshop).
  This registration fee includes reception in Andersia hotel, Borowiec Observatory Tour and reception, banquet dinner and administrations fees.
  The excursions costs will be paid in cash in onsite registration in Sunday (Oct. 12) or Monday (Oct. 13) - payment in PLN (Polish zloty).

You can select one of two payment methods:

- by credit card (will be accepted via Visa, MasterCard, or American Express)
- by bank transfer - details for bank transfer are given in the registration form

Once you have submitted your completed registration form and payment, you will receive a detailed confirmation letter via either email or fax. Confirmations will be sent out no sooner than one month prior to the Workshop.

The registration deadline: September 10, 2008.

Hotels and Accommodation
Andersia Hotel

The preferred hotel for the Workshop is four stars ibb Andersia hotel . Andersia hotel will be also place of the Workshop (first floor).
The block of rooms has been reserved at the Andersia hotel for the nights of October 12-18, 2008, at a discount for the Workshop participants rate **EUR 100/single** or **EUR 125/double** per night, including taxes and breakfast. You can also booking the rooms two days before (Oct. 11-12) and two days later (Oct. 18-19) under the same conditions. The block of rooms will be held for Organizing Committee until September 12, 2008.

The hotel is located at Andersia square 3 in Poznań, in the center of town, 10 minutes walking distance from the Old Town, opposite the trams stop. Andersia hotel is convenient to many restaurants and attractions in a large cultural and shopping centre (opposite hotel). Two underground parking areas are available in hotel (**EUR 15/day**) or in the centre.

A pre-reservation is required, no later than September 10, 2008. We propose two reservation forms:

- Online reservation by filling and submitting the online reservation form,
- Fax reservation by download of the registration form in [MS Word] or [PDF] format, complete, sign and fax it to Andersia hotel (Fax: +48-61-6678-001).

Reservations will only be confirmed if credit card details are fully supplied; alternatively please forward a deposit of two nights accommodation per room by bank transfer (details in the Hotel Reservation form).

Guest Rooms
at the Institute of Bioorganic Chemistry
Polish Academy of Sciences

We also recommend Guest Rooms in Polish Academy of Sciences Center, ul. Wieniawskiego 17/19 offering in discount price good standard rooms within 20 minutes walking distance from Andersia (trams are possible) and 10 minutes from the Old Town.
The Guest Rooms has been reserved for the nights of October 12-18, 2008, at a discount for the Workshop participants rate **PLN 120-180/single** or **PLN 200-230/double** per night, including taxes and breakfast (1 EUR = 3.53 PLN (Polish złoty), 1 USD = 2.19 PLN (07.04.2008)). You can also booking the rooms two days before (Oct. 11-12) and two days later (Oct. 18-19) under the same conditions.
The reservations will be fulfilled on a first-come, the number of rooms is limited.

A pre-reservation is required, no later than September 10, 2008. We propose two reservation forms:

- Online reservation by filling and submitting the online reservation form,
- Fax reservation by download of the registration form in [MS Word] or [PDF] format, complete, sign and fax it to Organizing Committee (Fax: +48-61-8170-219).

The block of rooms will be held for Organizing Committee until October 03, 2008.
Payment method : at on-site registration in hotel by cash in Polish Złoty (PLN).
If the guaranteed reservation has not been cancelled by 03.10.2008 or the guest has not arrived, the guarantee holder will be charged for the first night.

The confirmation of the reservation will be sent by fax or e-mail.

University Hotel "Jowita„

We also recommend University Hotel "Jowita", ul. Zwierzyniecka 7 offering in discount price good standard rooms within 20 minutes walking distance from Andersia (trams are possible) and 15 minutes from the Old Town. The Jowita hotel has been reserved for the nights of October 12-18, 2008, at a discount for the Workshop participants rate **PLN 85-190/single** or **PLN 130-190/double** per night, including taxes and breakfast (1 EUR = 3.53 PLN (Polish złoty), 1 USD = 2.19 PLN (07.04.2008)). You can also booking the rooms two days before (Oct. 11-12) and two days later (Oct. 18-19) under the same conditions.

The reservations will be fulfilled on a first-come, the number of rooms is limited.

A pre-reservation is required, no later than June 30, 2008. We propose two reservation forms:

- Online reservation by filling and submitting the online reservation form,
- Fax reservation by download of the registration form in [MS Word] or [PDF] format, complete, sign and fax it to the Organizing Committee (Fax: +48-61-8292-772).

The block of rooms will be held for Organizing Committee until June 30, 2008.
Payment method : at on-site registration in hotel by cash in Polish Złoty (PLN).

If the guaranteed reservation has not been cancelled by 26 September 2008 or the guest has not arrived, the guarantee holder will be charged for the first night.

The confirmation of the reservation will be sent by fax or e-mail.

Details information about transportation from airport (5 km), railway station and between hotels will be given in the next time.

We strongly advise all participants to reserve hotel accommodation as soon as possible. The Organizing Committee will not be able to guarantee rooms after September 12, 2008.
Due to international tourist fairs in Poznań in the same week we highly recommended to do reservation as early as possible.

Accompanying persons program

Monday - Oct. 13
•Morning - Kórnik: Museum - Castle
•Evening - Reception in Andersia hotel

Tuesday - Oct. 14
•Evening - Trip to Borowiec Observatory
•

Wednesday - Oct. 15
•All day - Gniezno, Biskupin
•

Thursday - Oct. 16
•Evening - Banquet

Friday - Oct. 17
•Afternoon - Trip around Poznań City

Saturday - Oct. 18
•All day - Toruń City