Plenary Session

Mike Pearlman, Werner Gurtner

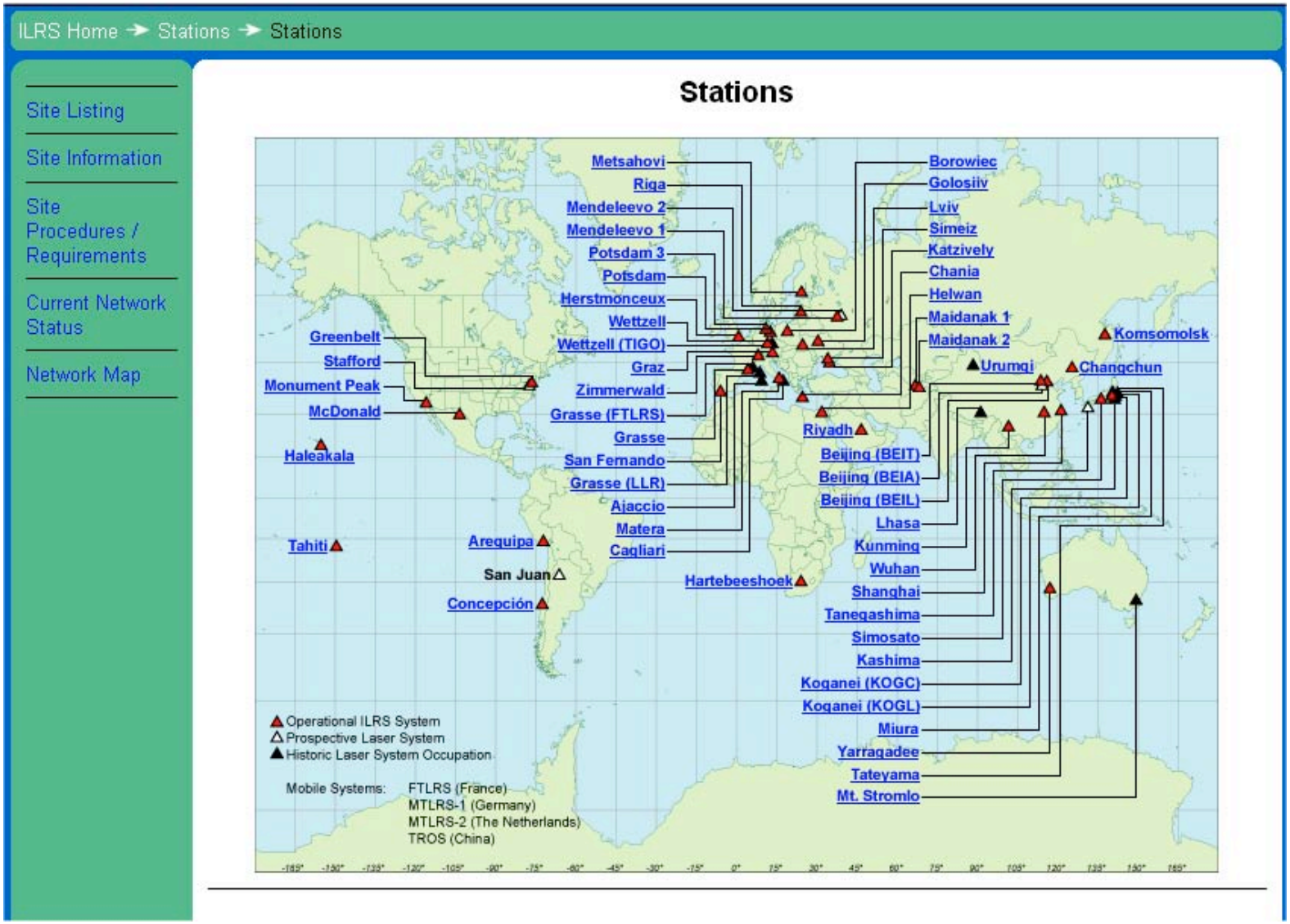
Website Enhancements

- New navigation scheme with breadcrumbs
- Bulletin Board
- “Best Practices” for Timers and Met Devices
- Strawman template for Satellite CoM
- Website Statistics:
  - http://ilrs.gsfc.nasa.gov/awstats/
- Reorganization of Stations Section including:
  - Phase I of “MyStationPerformance.com”
  - Automatic conversion of site log into HTML
- Completion of the Washington D.C. Laser Workshop website:
  - http://cddisa.gsfc.nasa.gov/lw13/lw_proceedings.html

Future Enhancements

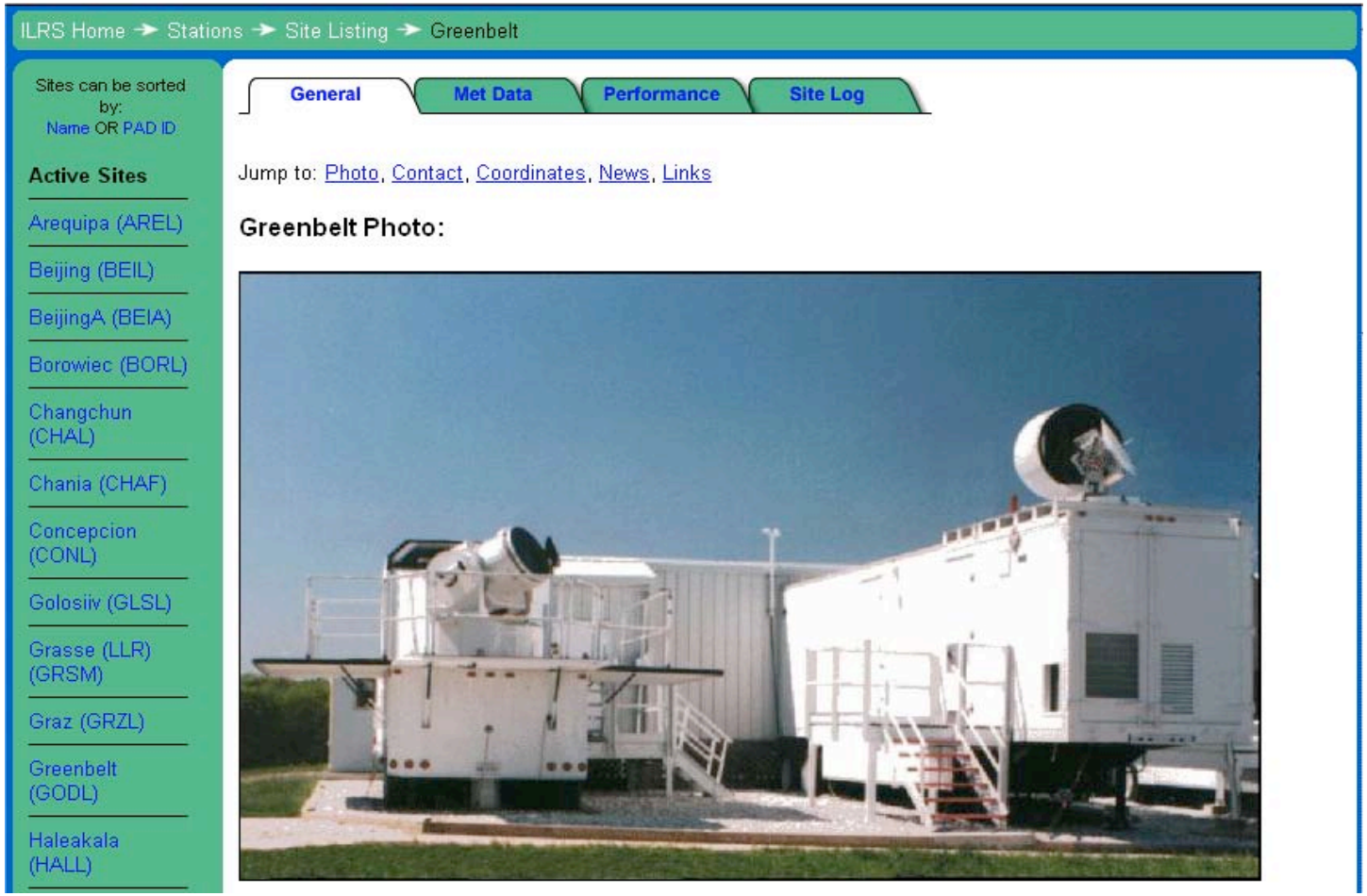
- Phase II of “MyStationPerformance.com”
  - Range and time bias analysis
- Redesign of the Satellite Missions pages
  - “MyMission.com”
    - Data volume by mission
  - Satellite Center of Mass Corrections
- Redesign of Web Forms
- Conformance with new NASA Web Site requirements for Look and Feel

Active ILRS Map



- The concept of “MyStationPerformance.com” was introduced in October, 2002
- Phase 1 was completed and deployed at: http://ilrs.gsfc.nasa.gov/stations/

Sample of a Typical Station's Page



- Each station has its own page, the page has a tabulator navigation that will display various information about the site.
- The "General" tab displays information such as site contacts, news, approximate positions, photo. This information comes from the site log, so please keep your logs current.
- The left navigation will allow you to access other stations in the ILRS network. This navigation can be sorted by station name or PAD ID

Sample of a Typical Station Local Events

Mt. Stromlo News:

Local Events:

Date	2003-01-18
Event	Fire storm
Additional Information	SLR station destroyed along with GPS, Doris and Glonass monitoring equipment. Monuments STR0 and STR1 not detroyed but will require re-furbishment and re-survey once the site is re-established.
Date	2003-07-04
Event	Facility replacement begins
Additional Information	The Australian Government, through Geoscience Australia (formerly AUSLIG) signed a contract with EOS Space Systems Pty Limited (EOS) to rebuild the Stromlo SLR facility.
Date	2003-09-09
Event	Operation of facility
Additional Information	Another contract signed with EOS Space Systems Pty Limited (EOS) for the operation and maintenance of the Geoscience Australia facilty. The building is already completed awaiting the installation of the dome, telescope and laser. Engineering data is expected to be available in December 2003, with full operational status in early 2004.

- Station's News consists of Local Events taken from the site log as well as SLRMail messages.

Sample of a Typical SLRMail Messages as Station News

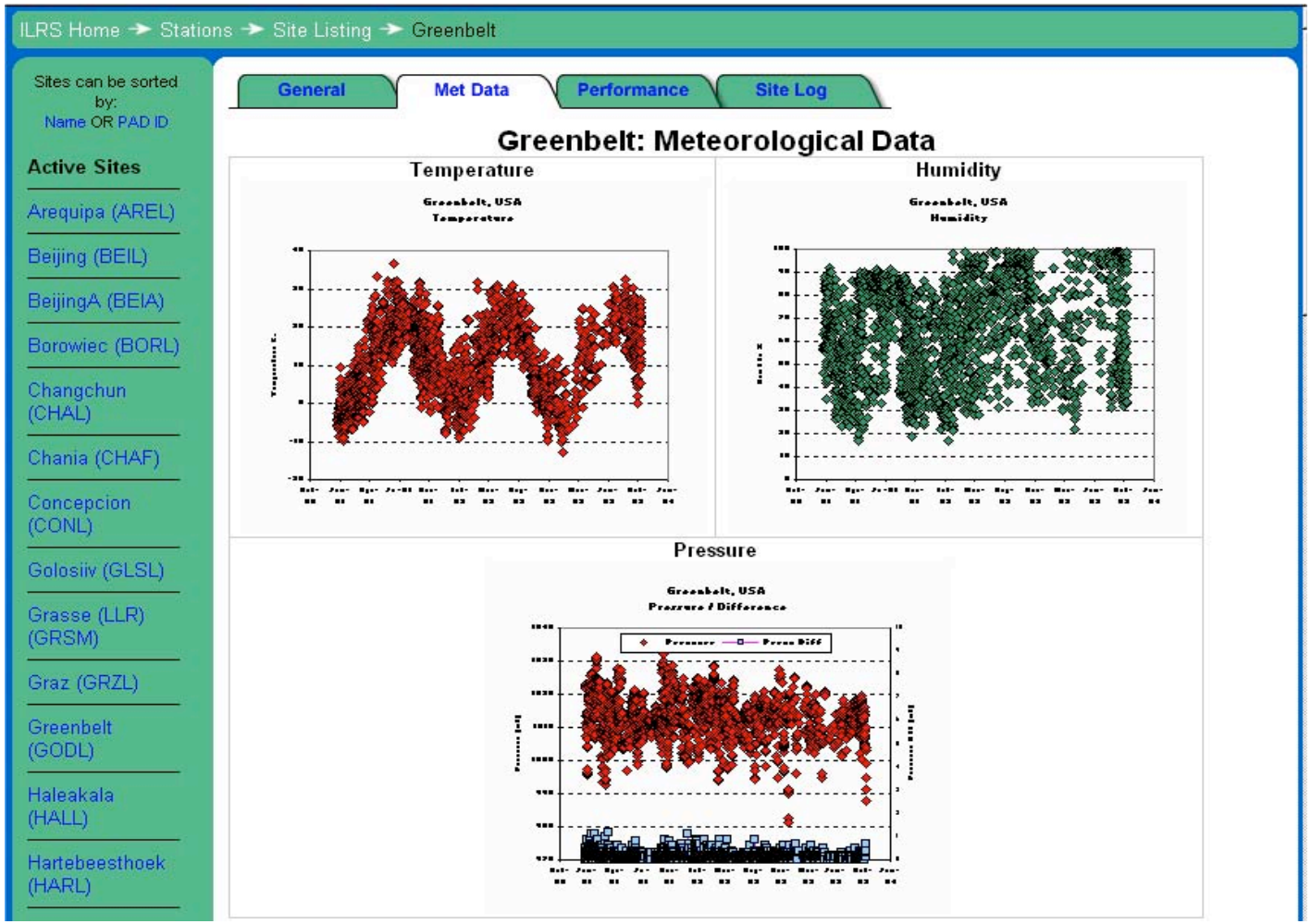
Zimmerwald:

SLRMail Messages:

Date	Subject
Thu Dec 19 16:00:02 MET 1996	New SLR System in Zimmerwald
Mon Jul 28 18:00:03 MET DST 1997	ZIMLAT range bias
Fri Sep 12 09:00:02 MET DST 1997	ZIMLAT 7810: Range and Time Biases
Tue Jul 21 13:00:03 MET DST 1998	Zimmerwald down
Thu Jan 21 18:00:01 MET 1999	1 ns range bias of Zimmerwald 7810
Thu Jan 21 19:00:02 MET 1999	Remark to SLRMAIL No.229
Thu Sep 28 01:20:00 CEST 2000	Zimmerwald Web Page
Wed Jan 10 16:20:00 CET 2001	Status of Zimmerwald SLR Station
Fri May 10 14:57:14 CEST 2002	ZIML 7810: Passes of April 25/26 replaced
Fri May 31 08:42:02 CEST 2002	Zimmerwald Range Bias Removed
Thu Aug 15 12:09:57 CEST 2002	Dual-wavelength data from Zimmerwald
Tue Sep 17 18:06:07 CEST 2002	Zimmerwald out of operation (mirror recoating)
Tue Nov 12 17:26:10 CET 2002	Zimmerwald: Operational again
Tue Mar 11 18:35:17 CET 2003	Zimmerwald: Switch to CSPAD
Mon May 5 14:27:07 CEST 2003	Zimmerwald: Change in Minimum Elevation
Mon May 5 14:27:07 CEST 2003	Zimmerwald Range Bias on 03 May 2003
Wed Jul 9 16:30:45 CEST 2003	Zimmerwald: Two-wavelengths observations restarted
Tue Sep 9 18:12:08 CEST 2003	7810 ZIML Range Bias 23/24-08-2003
Wed Oct 1 09:31:39 CEST 2003	7810 ZIML: System down: Laser damaged
Mon Oct 6 13:13:18 CEST 2003	7810 ZIML: Operation resumed, IR only

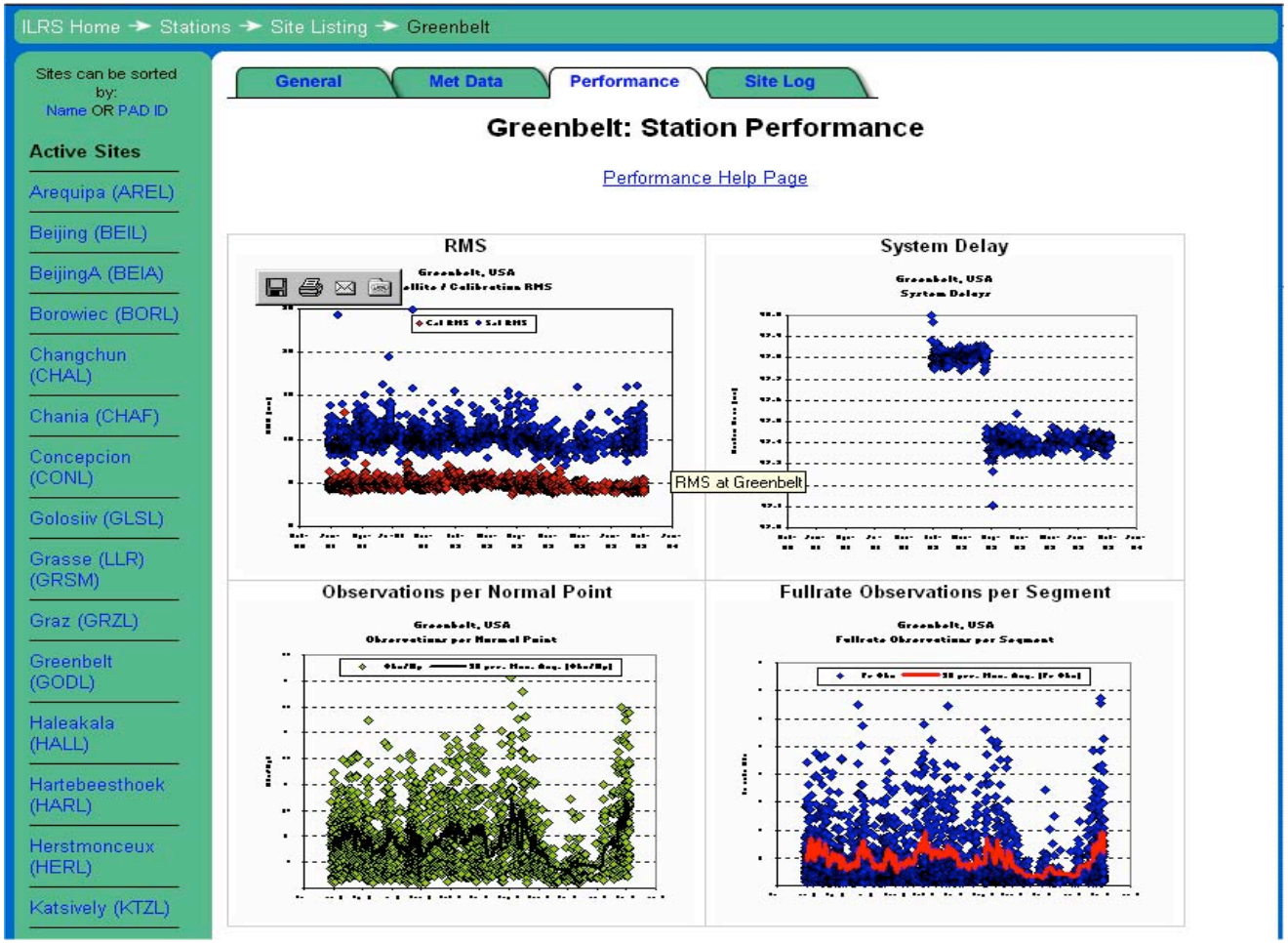
- On August 25, 2003, the ILRS adopted a standardized subject line for all station-related SLRMail messages.

Sample of a Typical Station's Meteorological Data



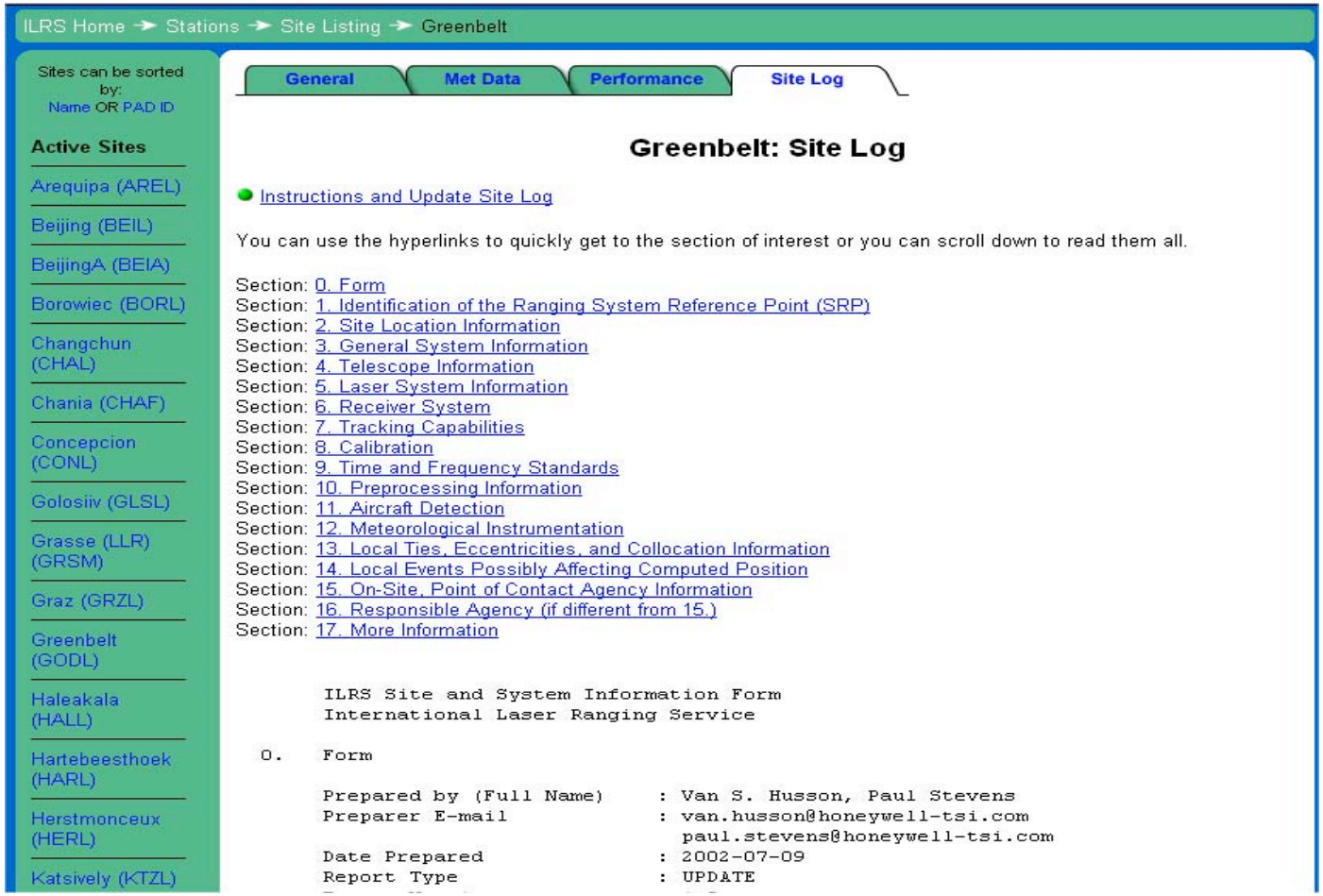
- The "Met Data" tab displays the temperature, humidity and pressure of the site.
- Click any one of these thumbnails, the actual chart will be displayed.

Sample of a Typical Station's Performance



- The "Performance" tab displays the RMS, System Delay, Observation per Normal Point, Fullrate Observation per Segment.

Sample of a Typical Station's Site Log



The "Site Log" tab displays the station's site log. The sections of the site log have been indexed for quick and easy access. Instructions on how to update the site log is also included.

Access Your Station's Page

To access your station's page, please bookmark the appropriate urls below:

http://ilrs.gsfc.nasa.gov/stations/sitelist/AJAF.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/AREL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/BEIA.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/BEIL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/BEIT.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/BORL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/CGLL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/CHAF.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/CHAL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/CONL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GLSL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GMSL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GODG.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GODL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GRSF.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GRSL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GRSM.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/GRZL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/HALL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/HARL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/HERL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/HLWL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KASL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KOGC.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KOGL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KOML.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KTZL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/KUNL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/LHAL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/LVIL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MAID.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MAIL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MATL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MATM.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MDOL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MDVL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MDVS.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/METL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MIUL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/MONL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/ORRL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/POT3.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/POTL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/RIGL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/RIYL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/SFEL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/SHAL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/SIML.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/SISL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/SNTL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/STAL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/STRL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/TATL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/THTL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/URUL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/WETL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/WETT.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/WUH0.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/WUHL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/YARL.html
http://ilrs.gsfc.nasa.gov/stations/sitelist/ZIML.html

Phase 2 of "MyStationPerformance.com"

Phase 2 requirements have been drafted. These requirements include:

1. Three new categories: Pass-by-Pass, Seasonal, and Aggregated – Seasonal will be added to the "Met Data" tab.
2. Five categories: Quantity, Precision, Accuracy, Latency, and Current Report Card will be added to the "Performance" tab.

We encourage to access your station's page and send us feedback and suggestions so that we can incorporate them in Phase 2.

Time of Flight Devices

SR620

HP5370B

Latvain Univ. A013a

Latvain Univ. A031

PESO Consulting PET

EOS MRCS

HTSI ET

TOF Devices Manufacture Specifications

Below is a table of TOF devices specifications, which are currently is use by the ILRS network (the most recent models in use are shown). The breakdown of TOF devices in the ILRS network as of October 2002, based on site log information, are presented in a pie chart. The specification below were taken from operation manuals or workshop papers (see references). For detailed specifications and best practices, please use the hyperlinks on the left.

Manufacturer	Current Model	Year	Approach	Resolution (ps)	Jitter (Ps)	Linearity (Ps)	Stability [Ps/K]	Stability [Ps/hour]	Max. repetition rate	Max. TOF (Secs)
SR	620	1988	Interval	4	22	50	5		100	1000
HP	5370B	1982	Interval	20	35	20			10	10
Latvian Univ.	A013a	2002	Interval	10	20	2		2	80	0.209
Ortec	TD811	<1980	Event	100			40			N.A.
PESO Cons.	PET4/TIGO	1999	Event	1.2	3.5	3	<0.3	<0.5	>100	NA
EOS	MRCS V.4	1998	Event	2	10	1		1	1000	NA
HTSI	MLRO	1998	Event	0.5	<2			0.5	2000	NA
Latvian Univ.	A031-ET	2003	Event	1	10.8	<1	0.1	0.5	1000	NA

Notes: HP spun-off its test, measurement and monitoring device business into Agilent Technologies. HTSI was formerly Allied Signal Technical Services (ATSC)

TOF Device Best Practices

Related links: SR620 best practices

Below are the BEST practices that are general and applicable to any time of flight device (time interval count or event timer) used for SLR/LLR applications:

1. **Signal integrity:**
    a. Use only high-quality cables and connectors.
    b. Take great care with shielding and grounding (earthing) in order to make sure that all noise sources are minimized.
2. **External frequency ("Clock source"):**
    a. Supply each timer with a separate, high quality 5 or 10 MHz sine wave;
    b. Make sure that the timer is set up to take an external "clock source"
3. **Power supply:**
    a. Never switch off. If the timer has been switched off for any reason, allow adequate warm up before any operational use. Please refer to the manufacturer's operations manual for more information.
    b. Use a stable mains voltage supply (for this and many other instruments it is useful to monitor the mains voltage regularly and warn when it falls).
    c. Use a transient suppressor to prevent voltage "spikes" reaching the timer.
4. **Environmental Control:**
    a. Maintain a stable working environment around the timer.
    b. Keeping the temperature constant is particularly important.
    c. Monitoring the temperatures of air at the timer air inlet and air outlet will give quick feedback of potential problems;
    d. Maintain a good airflow around and through the instrument.
    e. Be aware that nearby air-conditioning units, cycling on and off, can substantially alter the temperature of the air in the vicinity of the timer, even in a supposedly temperature stabilized room.
5. **Non-linearity/timer calibration:**
    a. For picosecond event timers perform optical calibration as recommended by the manufacturer.
    b. For time interval counters, either cluster the time interval units to help "average" non-linearities or calibrate each device versus a picosecond event timer and model any errors in data processing.
6. **Jitter**:
    a. Monitor the jitter of the timer at least monthly.

ILRS Bulletin Board

ILRS Home → ILRS Home

- What's New
- About the ILRS
- Contact ILRS
- Data & Products
- Engineering & Technology
- Links
- Links to Plug-ins
- Publications
- Satellite Missions
- Science & Analysis
- Search
- Stations
- Website Map
- Working Groups

Satellite laser ranging (brochure and animation) uses lasers to measure ranges from ground stations to satellite borne retro-reflectors to the millimeter level. The primary mission of the ILRS as stated in the organization's Terms of Reference is "*to support, through satellite and lunar laser tracking data and related products, geodetic and geophysical research activities.*"

If you have a suggestion or complaint about our service, please send an email to the ILRS CB Secretary.

ILRS Bulletins

Here is an alternate view of the ILRS Bulletins

3rd Quarter 2003 Performance Report Card is available on-line.

Center of Mass Correction Template

SLR SatelliteCventer-of-Mass Offset Information

SLR Satellite Center-of-Mass Offset Information

LRA Center-of-Mass Offset description

Satellite	Size of Array	Reflectors	spacecraft body fixed coordinates of the reflector center (mm)	spacecraft coordinate definition	CoM details
ADEOS-1	35.6 cm edge hollow cube	1	xx	yy	
ADEOS-2	16 cm diameter hemisphere	9	xx	yy	
AJISAI	214 cm diameter sphere	1,436	1010	sphere	details
ERS2	20 cm diameter hemisphere	9	(1000, -710, -1010)	X-axis direction of satellite pitch, Z-axis away from nadir	
ETALON 1 & 2	129.4 cm diameter sphere	2,134	576	sphere	details
GFO1	hemisphere	9	(-245, -764, -493)	Y axis anti-parallel with velocity	
GFZ1	20 cm diameter sphere	60	58.5	sphere	details tbd
GLONASS	120x120 cm square array	396	151	yy	
GPS 35 and 36	23.9x19.4 cm square array	32	220	yy	
LAGEOS-1	60 cm diameter sphere	426	251	sphere	details
LAGEOS-2	60 cm diameter sphere	426	251	sphere	details
TOPEX/Poseidon	150 cm diameter annulus	192	(1064, 419, 825)*	X-axis in direction of velocity, Z-axis nadir	function of s/c station geometry

Washington DC Laser Ranging Workshop Website

13th International Workshop on Laser Ranging
"Toward Millimeter Accuracy"

Instructions for preparations of papers for the proceedings from the Thirteenth International Workshop on Laser Ranging are available. **Reminder:** Papers for these proceedings were due **DECEMBER 31, 2002.**

The workshop proceedings are sorted by session:

- Scientific Achievements, Applications, and Future Requirements
- Laser Technology Development
- Improved or Upgraded Systems - Poster Session
- Timing Devices
- Detectors and Optical Chain Components
- Automation and Control Systems
- Lunar Laser Ranging
- Station Performance Evaluation
- System Calibration Techniques
- Station Operational Issues
- Target Design, Signatures, and Biases
- Atmospheric Correction and Multiwavelength Ranging
- Advanced Systems and Techniques
- Surveying Primer (splinter session presentation by Jim Long)

Phase II: Met. Data

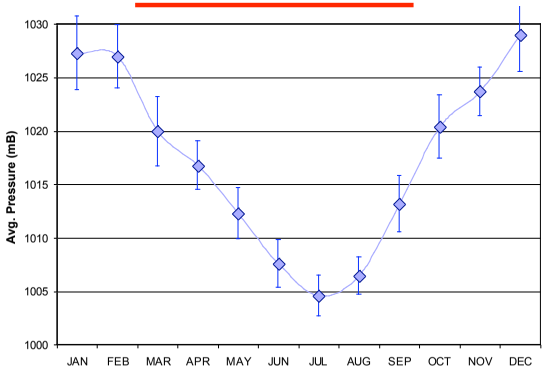
Chart Set#1	Chart Set#2	Chart Set#3
Phase I	Phase II	Phase II
(Current)	(New)	(New & Default)
Pass-by-Pass	**Seasonal**	**Aggregate OMCs**
Pressure	Pressure	Pressure
Temperature	Temperature	Temperature
Humidity	Humidity	Humidity

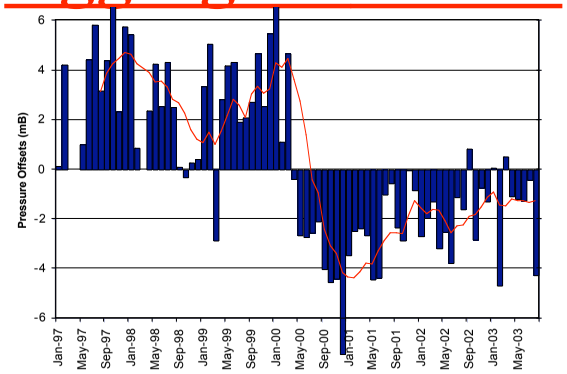
New Met. Charts for Phase II

Seasonal

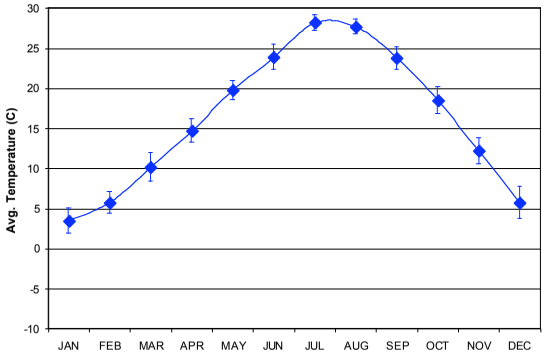
Aggregate OMCs

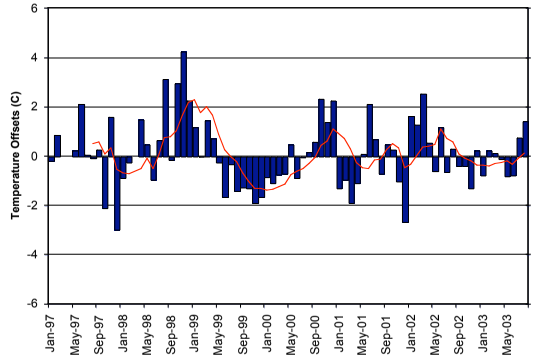
Pressure



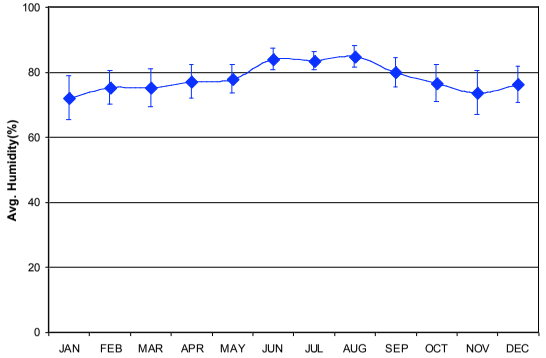


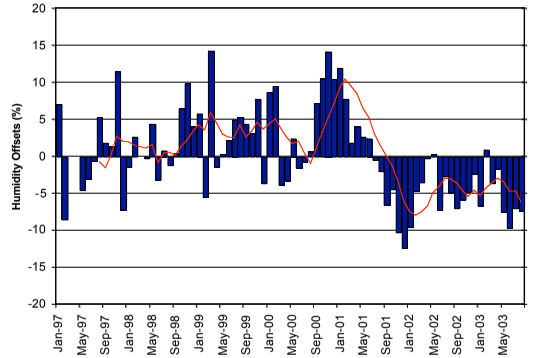
Temperature





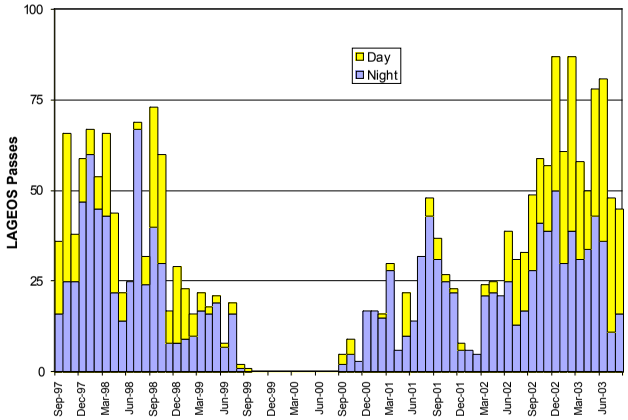
Humidity



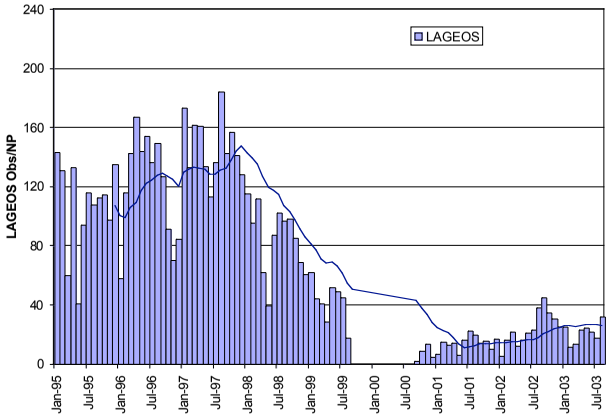


New Data Quantity Performance Charts for Phase II

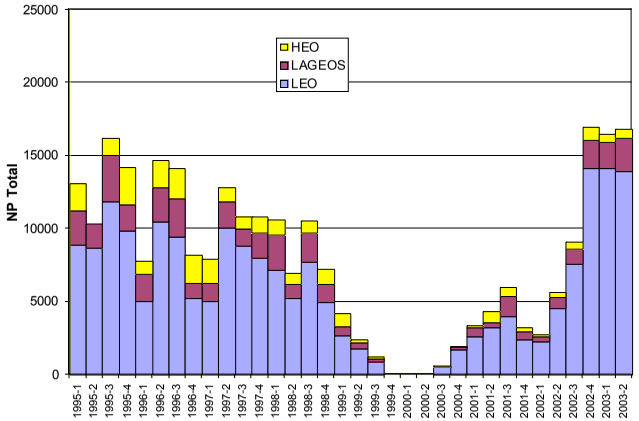
LAGEOS Passes



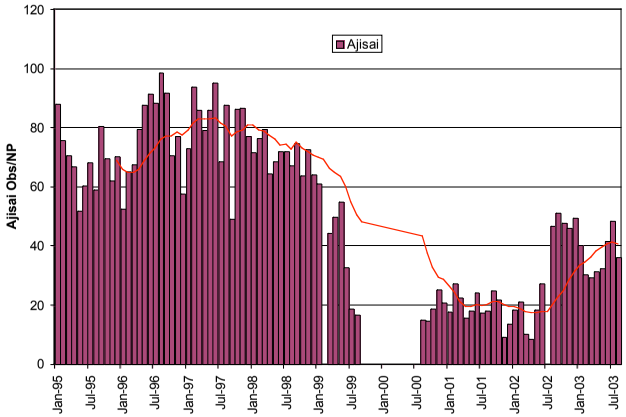
LAGEOS Return Rate



Total NPs



Ajisai Return Rate



Critical ILRS Site Log Developments

All Global Site Logs Now Available from ILRS Web Site

- All System Site Logs now easily downloadable for review & updates.
- Available and accessed through individual station's ILRS URL.
  - http://ilrs.gsfc.nasa.gov/stations/
- Condensed instructions to facilitate understanding and rapid completion.

Increasing expectations from the ILRS CB to have accurate and current Site Logs available for use.

Responsibilities to maintain and update Site Logs when configurations and environments dictate, is that of each participating ILRS Station.

International Laser Ranging Service

ILRS Data Analysis Survey

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

2003 ILRS Data Analysis Survey

1. What general areas of study are underway at your center that rely on laser ranging data?
2. Which targets are you currently using in your analysis work?
3. What are your applications for each target?
   - Artificial Satellites
     - Earth Orientation (EOP)
     - Reference Frame (GM, Earth center of mass)
     - Gravity Field (static and time varying)
     - Tides
     - Comparison with other techniques
     - Improved orbit development
     - Station position/motion
     - POD (mission specific)
     - Q/C of stations
     - Spacecraft models
     - Gravitational physics tests, relativity
     - Other
   - Lunar Reflectors
     - Lunar rotation
     - Lunar composition
     - Lunar Love numbers
     - Excitation of librations
     - Precise solar system ephemerides
     - Other
4. Are you receiving sufficient data volume?
5. Are you receiving sufficient data coverage?
6. Are the data of sufficient accuracy for your applications?
7. What other satellites do you plan to use in the future?
8. What do you need that you are not getting?
9. How do you access the data (CDDIS, EDC, etc)? Is it easy?
10. What other comments or suggestions do you have regarding the ILRS data?

Analysis Center Responses

- Sent to Analysis and Associate Analysis Center in July 2003
- Received 21 responses (total of 28 ACs and AACs)
- SLR Analysis Centers
  - DUT/DEOS (Netherlands)
  - U. Texas/CSR (USA)
- SLR Associate Analysis Centers
  - ASI (ITALY)
  - BKG (Germany)
  - CLG/BAS (Poland)
  - CODE (Switzerland)
  - CRL (Japan)
  - DGFI (Germany)
  - ESA/ESOC (Germany)
  - FFI (Finland)
  - GA (Australia)
  - GFZ (Germany)
  - GSFC/RITSS (USA)
  - IPA (Russia)
  - NASDA (Japan)
  - NERC (UK)
  - Newcastle (UK)
  - OCA/CERGA (France)
  - Shanghai (China)
- LLR Analysis Centers
  - IfE/FESG (Germany)
  - JPL (USA)
- No Responses
  - GAOUA (Russia)
  - Graz (Austria)
  - IA (Russia)
  - IMVP (Russia)
  - MCC (Russia)
  - Paris LLR (France)
  - U. Texas LLR (USA)

Areas of Investigation

Artificial Satellites

- Science
  - Reference Frame (GM, Earth CoM)
  - Earth Orientation Parameters (EOP)
  - Gravity Field (static and time varying)
  - Tides
  - Station position/motion and deformation
  - Gravitational physics tests, relativity
  - Atmospheric density
  - Time transfer
- Orbit
  - Improved orbit modeling
  - Mission-specific POD
  - Calibration/validation of altimetry
- Engineering
  - Q/C of stations
  - Comparison with other techniques
  - Spacecraft models
  - Refraction models

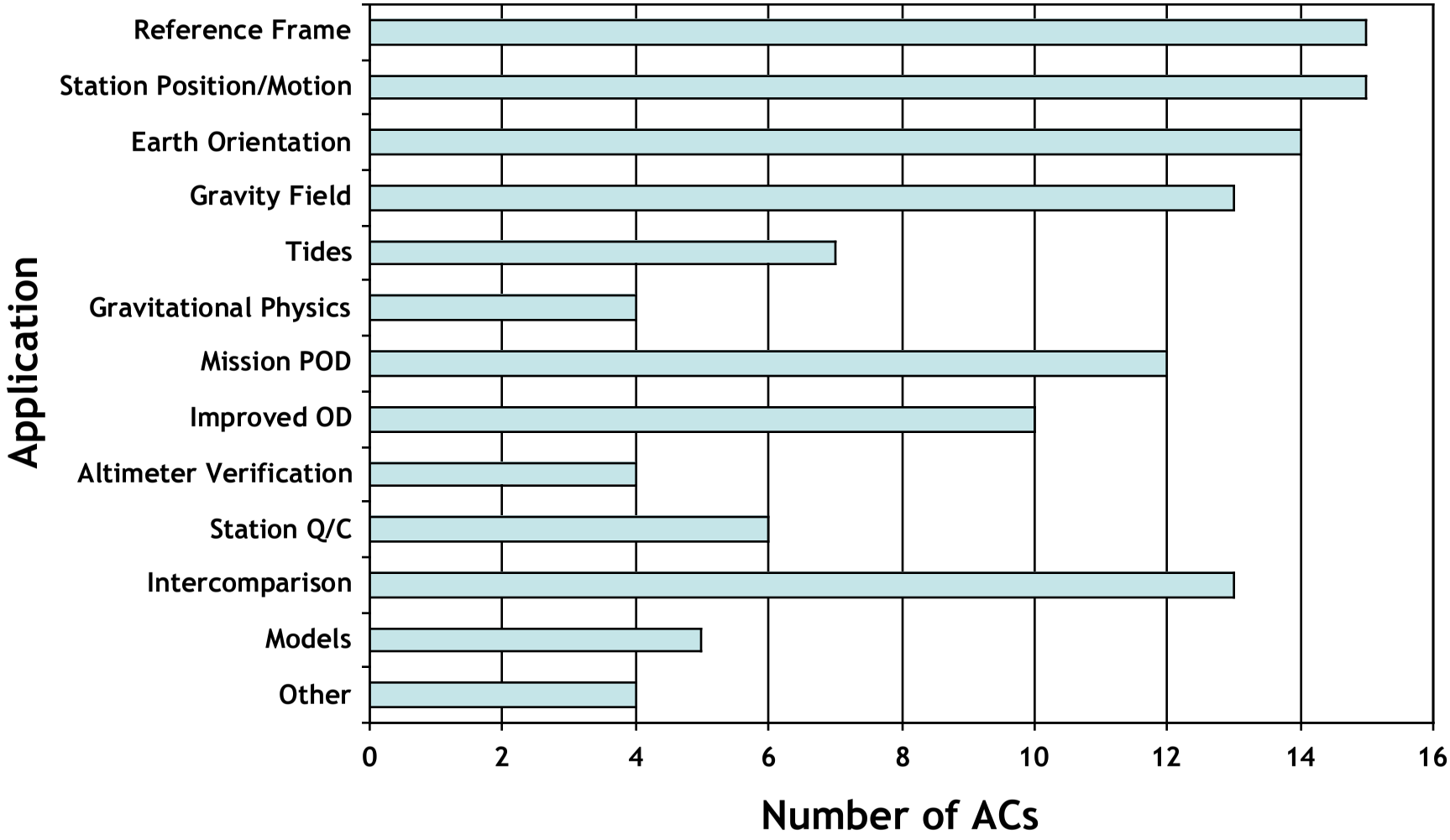
Areas of Investigation

Lunar Reflectors

- Lunar rotation
- Lunar composition, properties of core
- Lunar tides: Love numbers and tidal Qs
- Precise solar system ephemerides
- Excitation of free librations
- Lunar reference frame and reflector positions
- Lunar moments of inertial and gravitational harmonics
- Gravitational physics tests: relativity, equivalence principle, dG/dt
- Astronomical constants: obliquity, GM (Earth+moon)
- Tidal dissipation

Areas of Investigation

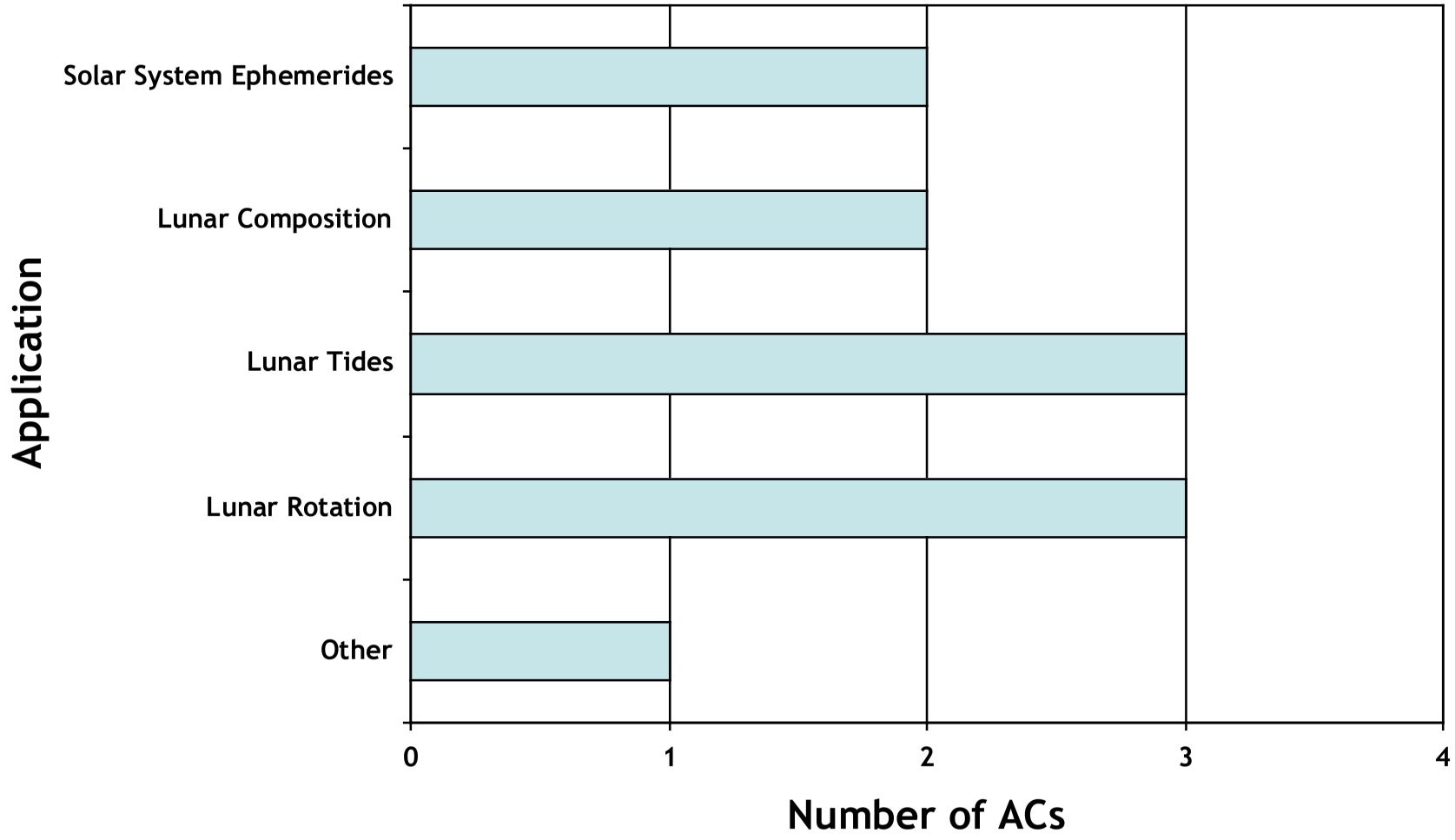
Artificial Satellites



Other includes atmospheric density, global deformations of Earth's crust, time evolution of EOP, relativity.

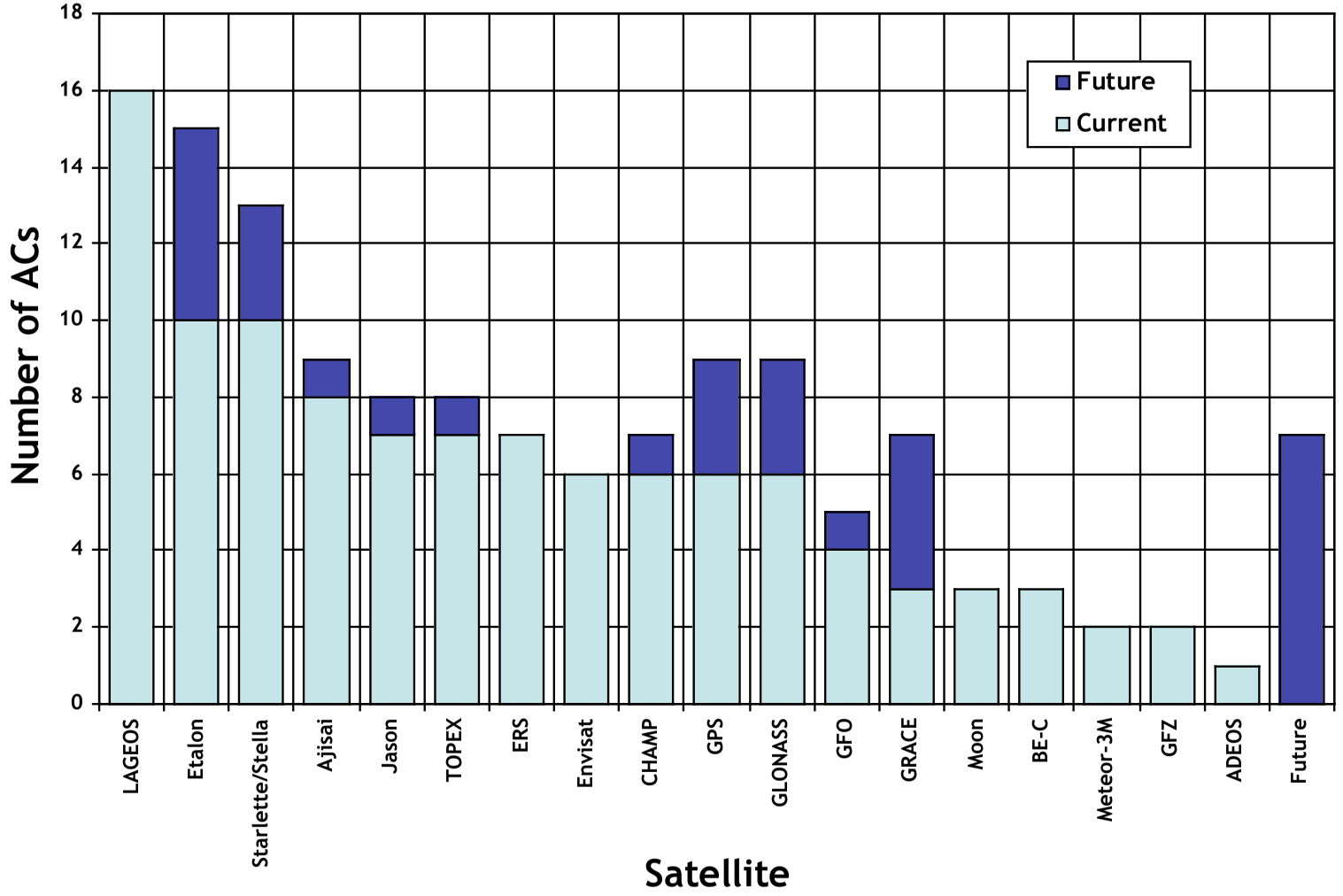
Areas of Investigation

Lunar Reflectors



Other includes lunar reference frame and reflector positions, lunar moments of inertial and gravitational harmonics, gravitational physics tests, astronomical constants, tidal dissipation

Satellite Usage



Questionnaire Responses
(SLR)

- Data volume
  - Generally, sufficient data (but could always be larger)
  - Dependent on satellite and region
  - Adequate LAGEOS
  - Need more tracking on Jason-1, GRACE, Etalon
  - Too much ERS tracking
  - Data volume sufficient for long-term analysis but not for short-term resolution of EOP
- Data coverage
  - Generally, sufficient (but could always be better)
  - Need more SLR stations colocated with VLBI
  - Pacific and Southern Hemisphere coverage not sufficient; more data from Arequipa; more data from inland areas (e.g., Maidanak)
  - Use mobile systems to increase coverage

Other Questionnaire Responses

(SLR, continued)

- Data accuracy
  - Generally, sufficient (but could always be better)
  - Quality of data from core stations is sufficient; other stations are downweighted
- New requirements
  - Site coordinates (in ITRF2000) and eccentricities need to be updated and distributed
  - Accurate site ties to VLBI and/or GPS
  - Regular submission of SINEX files by Acs (more complete info)
  - Access to historical info on range and timing bias by station
  - Better data distribution in space and time
  - Special issues of scientific journals on SLR (e.g., JGR, etc.)
- Data access
  - Access through CDDIS or EDC works fine
  - DCs should use same directory structure and post data with same file naming conventions

Other Questionnaire Responses

(SLR, continued)

- Suggestions and comments
  - Generate summaries of logfiles on a daily basis
  - Edited NPT data
  - CoM correction information and instruction on use
  - Modify NPT format to accommodate CoM, station parameters
  - Consistent file naming through the years
  - Create yearly NPT data files
  - Proper SINEX formats from ACs
  - Clarify corrected data in data files vs. use of data corrections file
  - Faster data delivery to data centers/users
  - Don't modify SLR format unless VERY necessary
  - Create new working group on use of mobile systems
  - Identify SLR R&D issues of the future
  - New applications of SLR for calibration of time transfer from Earth to space
  - ILRS is doing a good job!

Questionnaire Responses
(LLR)

- Data volume
  - Insufficient data on small lunar reflectors
- Data coverage
  - Insufficient LLR data and from small lunar reflectors in particular
  - Need more LLR-capable stations in the southern hemisphere
- Suggestions and comments
  - Push LLR as well as SLR analysis

ILRS E-Mail Exploders

- Currently:
  - In August 2003, excessive spam and virus-infected messages forced suspension of ILRS e-mail exploders at CDDIS
  - ILRS e-mail exploders (with the exception of *ilrspred* and *urgent*) continue to be operated through host ilrs.gsfc.nasa.gov (i.e., CDDIS)
  - CB personnel review all incoming e-mail prior to distribution (except for predictions and urgent email)
  - Only legitimate e-mail is distributed to ILRS associates
  - New procedure prevents the distribution of spam
  - *ilrspred* and *urgent* are operated (and not "moderated") through EDC
- Future Plans:
  - Investigate alternatives to moderated email:
    - majordomo or listserv software at CDDIS
    - Filtering software (e.g., Challenge/Response Spam Filtering)
  - Any modifications must wait for new CDDIS Linux server operations (mid-2004)

SLR Data Resupply Policy

- Data can be resupplied by stations within 30 days of the date of the data
- Data centers will replace these data in the on-line archive
- Replacement data older than 30 days should not be forwarded to operations centers
- E-mail should be issued about data older than 30 days detailing the problem and supplying the correction information
- Problem data older than 30 days will NOT be removed from the archives
- CB will maintain webpages with data problem/correction information
- Stations must ensure the release flag in the normal point data is updated if data are resupplied
- Should there be a mechanism for deleting bad data?

14th International Workshop on Laser Ranging

- San Fernando, Spain
- June, 7-11, 2004
- AWG meeting to be held before workshop
- ILRS General Assembly and Working Group Meetings to be held during week of workshop
- Preliminary Organizing Committee formed:
  - Jose Martin Davila, Jorge Garate, John Degnan, Michael Pearlman, Carey Noll, Peter Shelus (?), Francis Pierron, Stanislaw Schillak, Ulli Schreiber, Yang Fumin, Ben Greene (?)

14th International Workshop on Laser Ranging
Prelminary Agenda

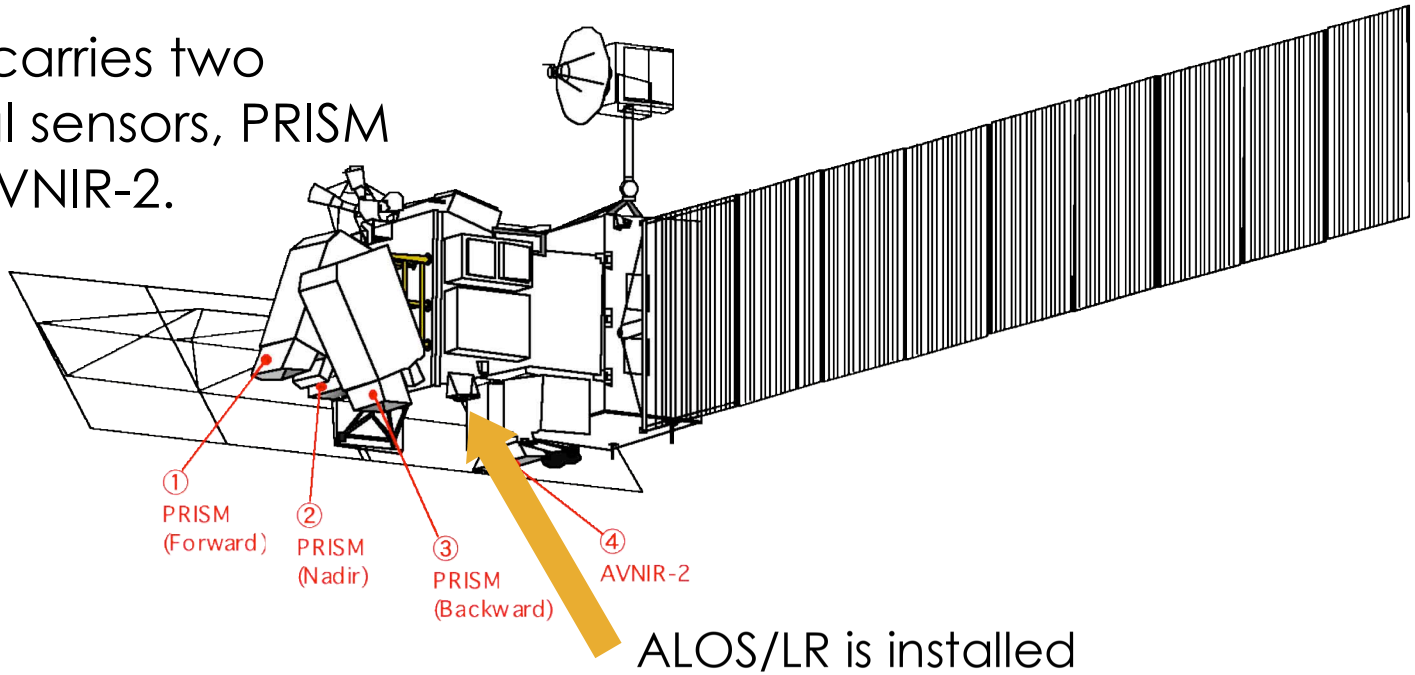
- Monday
  - Scientific Achievements, Applications, and Future Requirements
- Tuesday
  - Laser Technology Development
  - Improved or Upgraded Systems
  - Timing Devices
  - Detectors and Optical Chain Components
  - Automation and Control Systems
- Wednesday
  - Lunar Laser Ranging
  - Station Performance Evaluation
  - System Calibration Techniques
  - Station Operational Issues
- Thursday
  - Target Design, Signatures, and Biases
  - Atmospheric Correction and Multiwavelength Ranging
  - Advanced Systems and Techniques
- Friday
  - ILRS General Assembly
  - Workshop Summary/Resolutions/Closure

Information on ALOS: Dynamic Priorities for satellite with time-restricted observation:

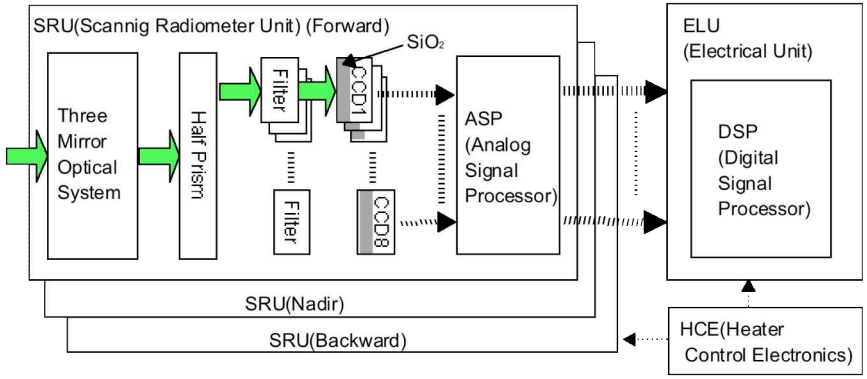
- ADEOS-II ceased operation at the end of October, because of a malfunction in power-system.
- ALOS (Advanced Land Observing Satellite) will be launched next June.
- As with ADEOS-II, ALOS has sensitive sensors to be protected from optical damage
  Differences from ADEOS-II
  - Small interference area (its duration is from 5 to 10 seconds) => we need precise prediction
  - Plural interference area => station is required to perform a complex operation (see slides in appendix)
- The operational procedure for the safety of the satellite is based on ADEOS-II and was proposed by JAXA.
- Station operates based on the time table which lists permitted period, distributed by JAXA and reported to JAXA actual operation time (laser start and stop time) and/or full-rate data.
- GB requests that JAXA organize a preparatory experiment for station qualification where before the campaign starts stations shall track a current satellite (such as Ajisai) with time-restricted operation as proposed by JAXA.

ALOS Overview

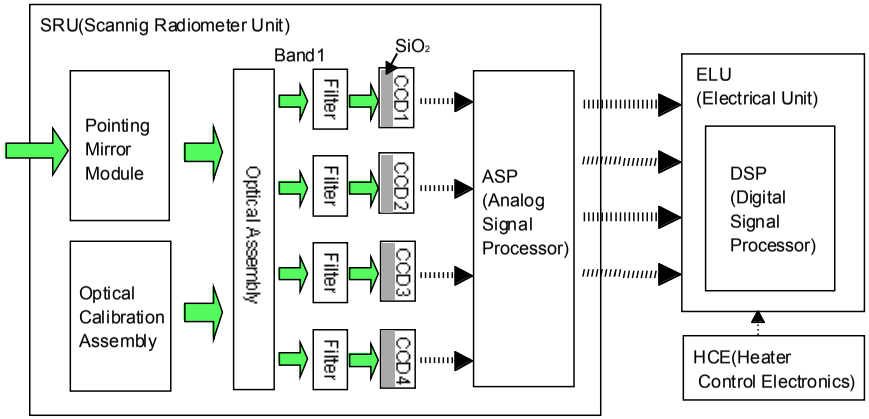
ALOS carries two optical sensors, PRISM and AVNIR-2.



ALOS/LR is installed



PRISM Block diagram

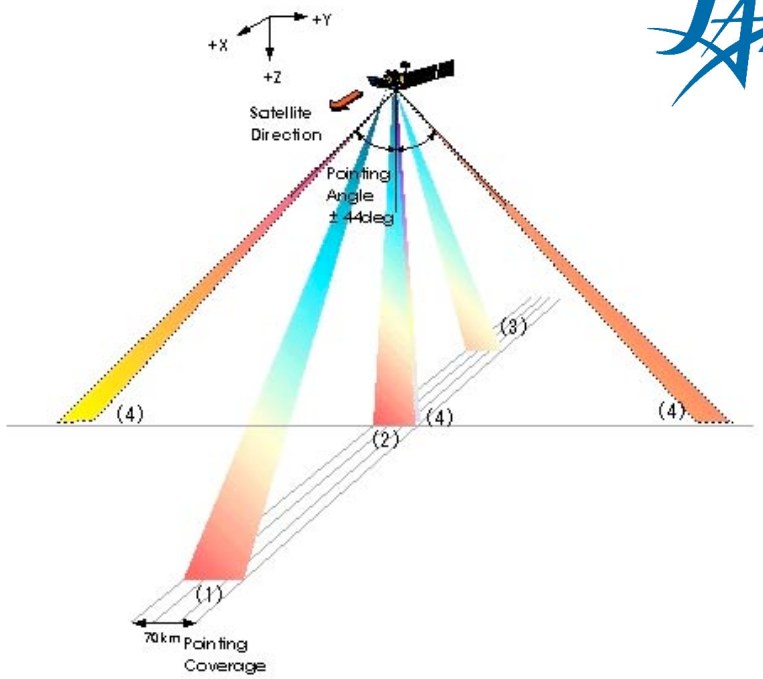


AVNIR-2 Block diagram

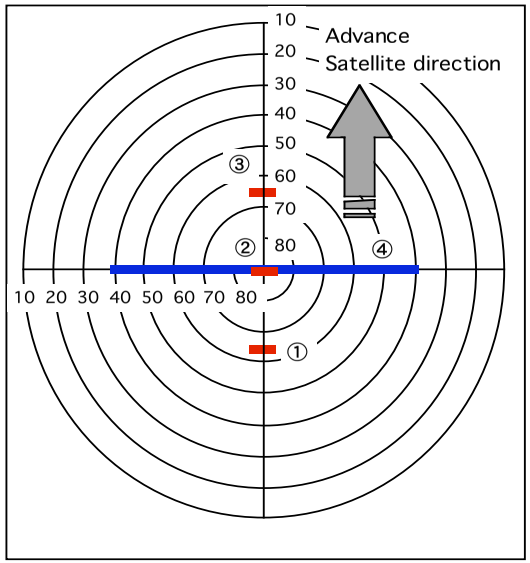
Restricted Area of ALOS

The characteristic of restricted area
- The view restriction domain is narrow than ADEOS-II
- Plural areas are existing

---> We need precise restriction information for ALOS operation.
---> It was required complicated conditions to SLR operation for SLR



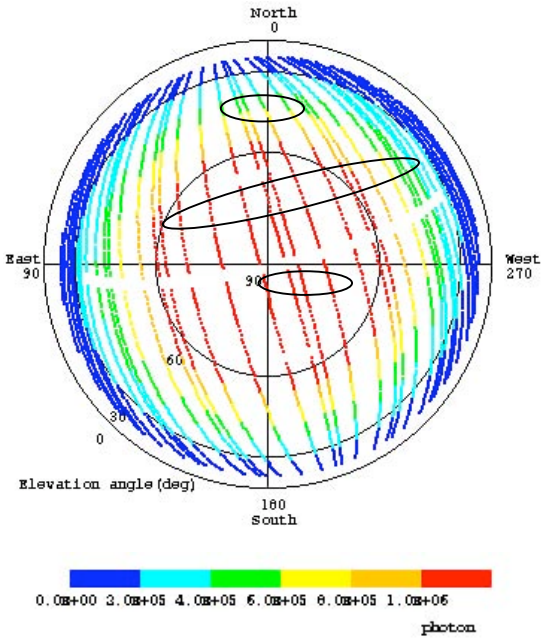
Each number indicated in Figure equivalent to meet restrictions of each sensor.
(1),(2) and (3) shows the transmitting restriction area by PRISM sensor and (4) is a transmitting restriction area by AVNIR-2. PRISM sensor consists of three components in order to acquire 3D geometric information. Therefore, the restriction area has separated into three. On the other hand, AVNIR-2 carries out its observation with +/- 44 degrees scan width. Above of a figure is +X axis as an advance satellite direction.
Therefore, SLR station must be controlled its Laser transmission precisely in order to satisfy this conditions.

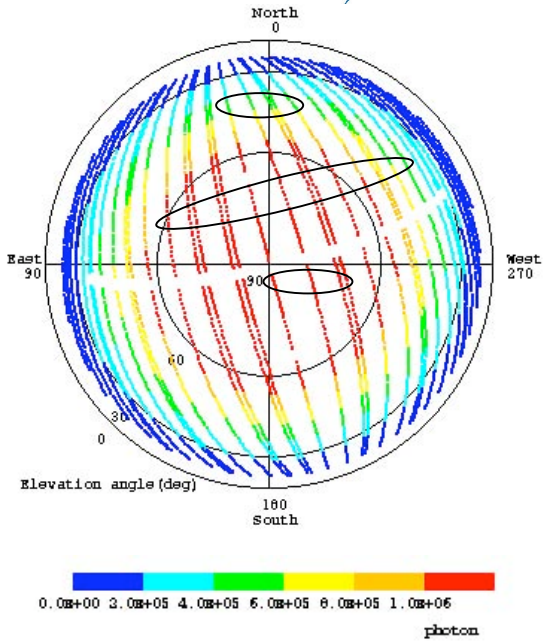


The influence on SLR Operation

The summary of passes about ALOS during 46 days recurrent cycle at Herstmonceux (HERL/7840) is shown on this table(example).

- It will not pass through a SLR restriction area when the elevation angle of observation is 32 degrees or less.
- It will surely pass through a SLR restriction area at one time from 32 to 80 degrees elevation.
- It will surely pass through a SLR restriction area second or three times exceeds 80 degrees elevation.





The number of times which crosses SLR restriction area per pass	The number of pass which is exceeding 20 degrees elevation(%)	Max elevation of zone at SLR station (degrees)
NONE	53(35.1)	<32.4
1	90(59.6)	32.4<81.8
2	2(1.3)	81.8<83.4
3	6(4.0)	83.4<
Total	151(100)	-

	Minimum	Maximum	Average
Crossing time of SLR restriction area (seconds)	5	10	7.7

Operation procedure(PROPOSAL)

It is required of the SLR stations support to ALOS to allow the operation procedure to keep the safety of satellite sensor.
This procedure is based on the actual operation result for ADEOS-II.

- IRV will deliver to the station directory
- keep SLR permitted period based on SLRSUP information which is generated by JAXA
- Inform to JAXA about your tracking plan before the SLR tracking
- After the tracking ALOS, inform to JAXA about tracking result (actual laser start/stop time)
- QLNP will send to JAXA directory