

**ILRS Governing Board Meeting
2017 ILRS Technical Workshop**

**October 01, 2017; 16:00-18:00 UTC
Riga, Latvia**

Prepared by Mike Pearlman, Julie Horvath, Kate Stevenson, and Scott Wetzel

The agenda for the meeting is given in Attachment 1; the attendees list is provided in Attachment 2.

Opening Remarks

No comments on the agenda.

Pippo gave the introduction. Many companies are advertising SLR systems at good process on the web.

NASA announced that David McCormick is leaving SGP; Stephen Merkwitz will replace David as one of the NASA representatives on the ILRS Governing Board. Evan Hoffman was at the meeting, standing in for Stephen.

Those present were reminded that Session 5 of the workshop (the wrap-up session) on Thursday was open to all on the workshop participants; all sessions and Standing Committees and Study Groups were expected to give a 5 to 7 minute summary focusing on the important points of their sessions or meetings.

ILRS Overview

The updated ILRS Terms of Reference provides for two additional, appointed Governing Board members, elected by the Board to expand the geographical representation and technical expertise. The election will be held at the end of the meeting in closed session.

A new station policy statement has been adopted, better defining station responsibilities and requirements and clarifying the difference between an operational and an engineering station. The ILRS Network Application Form has also been updated to reflect current capabilities and constraints within the ILRS. While operating under the auspices of the ILRS, stations agree to range only to satellites that have been authorized by the ILRS and its components (e.g., the Space Debris Study Group), adhere to the ILRS restricted tracking procedures, keep site logs and configuration files current, and maintain aircraft avoidance and other ILRS safety procedures. The new form includes a required signature acknowledging concurrence to the ILRS station policies.

Under the new Quality Control Board (QCB), several Analysis and Associate Analysis Centers are providing daily feedback to the stations on data issues; the Data Systematics Pilot Project, in process, provides an online tool to reveal and understand data biases and their sources, and a web-based performance tool based on the inputs to the Report Card is now available. The QCB has also implemented an on-line forum tool to post and exchange ideas, and has studies going on the consistency of NP formulation at the stations, the benefit of low elevation data, etc.

An update to the ILRS site log format has been drafted to add more information about station configuration and operation; the draft is in review by the NESC and DFPSC; discussions are planned during the workshop in an effort to bring it to closure. A new ILRS process for parallel data submission for system configuration updates (e.g., data from the NASA event timer upgrade) has been successfully

tested with the event timers at several of the NASA stations. New strategies are being examined to rate station performance underscoring value to the users rather than just gross data volume.

Several new stations have been added to the network and several more are in process. An ILRS engineering station has been established by the DLR in Stuttgart, Germany, and the Russian station at Hartebeesthoek and the KASI station at Gamak Mountain are in quarantine validation (no data submitted by either so far). Equipment for the AGGO and San Juan stations, both in Argentina, are still held up with customs issues. Metsahovi and Wuhan should be operational in 2018. The Russians have conversations underway with Mexico, Tahiti, and Indonesia. NASA is continuing its plans for core sites at McDonald, Hawaii, and with NMA at Ny-Ålesund, and is developing the plans for replacing the rest of the NASA legacy SLR network with SGSLR systems.

We still have large geographic voids in Africa, South America, and Oceania that need to be filled. The Russian network is seeking locations for their production SLR systems; a few are ready or near ready for deployment if they can find sites. We need to help find partners and locations. One possibility is Malindi working with the Italians. Pippo mentioned that ASI has just renewed its agreement on the site.

Only about 40% of the stations have met the total pass/year criterion of 3500 passes. Similarly, about 40% have met the 600 pass/year criterion for the reference frame satellites. Many of the remaining stations are having little or no real impact on the ILRS data products. A few are in the process of upgrading or replacement, so hopefully they will eventually become strong participants.

The ILRS is now tracking nearly 100 satellites with many more on the horizon (e.g., the GPS constellation), leaving the network pretty saturated. One purpose of the workshop is to examine more effective tracking strategies to moderate the load. We may have to be more selective in targets.

We are encouraging implementing new systems and upgrades to overcome the present mix of new and old technologies, and thereby trying to get more standardization in system hardware and operations. Stations should be improving data quality (reducing system biases) as the ILRS strives for mm accuracy.

Committee Reports

The **Analysis Standing Committee** met on October 01. The ITRF2014/SLRF2014 is now complete. The future Pilot Project for systematic error estimation is moving forward. Next will be the Pilot Project for estimation of low-degree gravity field harmonics and observational level modeling of atmospheric loading corrections, expected to be in process by next summer. Several new stations, and stations restarting operations after prolonged downtime, have been validated through the quarantine process. This includes the new parallel data process used by the NASA systems to validate the data from the new event timer. Site log issues and recommendations were brought to the attention of the new site log formulation process. The ILRS contribution to the 2016 IERS Annual Report is under IERS CB review. Abstracts for the Special Issue on Laser Ranging of the Journal of Geodesy are with editor in chief. We will be notified soon when the official Springer site will open to accept submissions (in about 1-2 weeks). The expected due date is in the January/February 2018 time frame. The next meeting of the ASC will take place in Vienna, tentatively on Friday, April 13, the week of the 2018 EGU General Assembly.

The **Missions Standing Committee** meeting will be held on Tuesday afternoon. There are many new missions asking for SLR tracking; the committee will discuss ways to streamline the review procedures for the MSRF. The committee is looking to strengthen its connection with the GGOS Standing Committee

on Satellite Missions (J. Mueller). The mission section on the ILRS website needs to be updated, in particular the section on the GNSS satellite.

The **Data Formats and Procedures Standing Committee** will meet on Monday afternoon. Changes to the CPF, CRD, and site log formats are required to satisfy new mission and operations information and diagnostic requirements. Formats should also be updated to accommodate debris tracking where possible. Manuals need to be updated; the SC is targeting completion by the end of 2017.

The **Networks and Engineering Standing Committee** will meet prior to the MSC meeting in Tuesday afternoon. The on-line forum should be stimulating activity and interest; committee members and SLR colleagues are encouraged to use it for reports, questions, photos, etc. Don't be shy. The current status of the site log upgrade and the need to support decommissioned ILRS targets for safety issues was also reviewed. Top priorities and areas of focus for the Networks and Engineering SC include systematic biases, accuracy and scheduling, new technique development, site surveys, greater network collaboration, etc. Plenty to work on.

The **Transponder Standing Committee** will meet on Tuesday morning before the main session. The main activity of the committee at the moment is time transfer, with ACES on the horizon. Some think that Laser Comm is a very fast-moving community and there would be great benefit and synergy of working together. Time transfer would help with variable system delays by performing closure measurements. This could help with the ITRF scale problem, if one exists.

The **Space Debris Study Committee** will meet on Wednesday morning before the main session. Their agenda was left flexible, but reports on spacecraft and orbital dynamics and predictions were scheduled. There was some feeling that the tracking of space debris was not welcome in the ILRS, but that was resolved in the past meetings.

GGOS Activities

GGOS provides a forum for the IAG Services to inform and plan together; its primary task is to work with the services to maintain and improve the reference frame toward the 1mm accuracy station position requirement specified in the GGOS 2020 book. GGOS is updating the GGOS 2020 document based on progress over the last decade. Aside from the reference frame, focus areas within GGOS include Unified Height System (L. Sanchez); Geohazards (J. LaBrecque); Sea Level Change, Variability and Forecasting (T. Schoene); and Geodetic Space Weather (M. Schmidt). The GGOS Bureau of Networks and Observations is working to foster expansion of the space geodesy network. Projections of future network capabilities are being estimated using simulations with anticipated network improvements. The Bureau helps to find new partners (stations) and maintain the site requirements document for planning.

Future workshops

The 21st Workshop on Laser Ranging will be held in Canberra, Australia, November 05-09, 2018. The meeting will be held at the main campus at the school of naval research; they are planning for 200 people. The program will include a tour of Mt. Stromlo (with all of the changes at the site) and a barbeque on Friday, a banquet at the National Arboretum, and a partner's program. A draft program should be made available on the ILRS website shortly. The Program Committee will meet on Thursday, after the last workshop session.

Other Business

It has been a number of years since we did a period (annual or bi-annual) ILRS Report. The general sense is that it is of value and we should do something maybe every 5 years or so. The problem at the moment is to find someone who is willing to lead the effort. The Central Bureau will work on this.

The next ILRS Governing Board meeting will be held on November 04, 2018, prior to the 21st International Workshop on Laser Ranging in Canberra, Australia.

Closed Session

Zhang Zhongping (China) and Andrey Sokolov (Russia) were elected by the GB as the two new members.

Attachment 1

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Agenda

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| • Opening Remarks | G. Bianco | 5 min |
| • Workshop Overview and Schedule | K. Salmis/M. Pearlman | 10 min |
| • ILRS Report/ILRS Status and current topics | M. Pearlman/C. Noll | 20 min |
| • Standing Committee/Study Group/Board Briefs (2 charts each, focus on what will be discussed at your committee/study group meeting) | | |
| – Analysis SC | E. Pavlis/C. Luceri | 5 min |
| – Missions SC | T. Otsubo/S. Wetzel | 5 min |
| – Data Formats and Procedures SC | H. Mueller/R. Ricklefs | 5 min |
| – Networks and Engineering SC | M. Wilkinson/G. Kirchner | 5 min |
| – Transponder SC | U. Schreiber/J. McGarry | 5 min |
| – Space Debris Study Group | G. Kirchner | 5 min |
| – Quality Control Board | M. Pearlman | 5 min |
| • GGOS Activities | M. Pearlman | 5 min |
| • Future Workshops (21 st IWLR) | M. Fulton | 10 min |
| • Other Business | G. Bianco | |
| Closed Session: | | |
| • Election of GB appointed members | M. Pearlman | 20 min |

Attachment 2

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Attendees

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