

10/28/08

**ILRS Governing Board Meeting**  
Andersia Hotel  
Poznan, Poland  
October 15, 2008

**Agenda**

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| 1. Opening Remarks                                   | M. Pearlman         |
| 2. Review of Elections/Election of GB Chair          | M. Pearlman         |
| 3. Selection of Working Group Chairs and Co-Chairs   | M. Pearlman         |
| 4. ILRS Status/Action Items                          | M. Pearlman         |
| 5. Working Group Briefs and Recommendations          | WG Chairs           |
| • Analysis   | E. Pavlis/C. Luceri |
| • Missions   | G. Appleby          |
| • Data Formats and Procedures                        | W. Seemueller       |
| • Networks and Engineering                           | G. Kirchner         |
| • Transponders                                       | J. McGarry          |
| 6. Task Force Reports                                |                     |
| • Communications                                     | E. Pavlis           |
| • Center-of-Mass Corrections                         | G. Appleby          |
| 7. ILRS Special Issue in Journal of Geodesy (5 min.) | E. Pavlis           |
| 8. GGOS Activities (5 min.)                          | M. Pearlman         |
| 9. Current Issues (10 min.)                          | M. Pearlman         |
| • Retroreflector Standards                           |                     |
| • Station Performance                                |                     |
| • Station Standards                                  |                     |
| • Coping with Future Satellite Missions              |                     |
| 10. New Business                                     |                     |
| 11. Other Business                                   |                     |

The issues were all addressed but not necessary in the agenda order.

**Attendees:** M. Pearlman, G. Kirchner, G. Appleby, W. Seemueller, E. Pavlis, Y. Fumin, V. Luceri, G. Bianco, J. Mueller, D. Carter, Z. Altamimi, and Jan McGarry

**Governing Board**

The CB conducted the election process for the new Governing Board with the following results:

Director of the Central Bureau	Mike Pearlman (appointed)
Secretary of the Central Bureau	Carey Noll (appointed)
President of IAG Commission	Zuheir Altamimi (appointed)
IERS Representative	Bob Schutz (appointed)
EUROLAS Network Representatives	Giuseppe Bianco, Werner Gurtner
NASA Network Representatives	David Carter, Jan McGarry
WPLTN Network Representatives	Yang Fumin, Ramesh Govind
Data Center Representative	Wolfgang Seemueller
LLR Representatives	Juergen Mueller
Analysis Representatives	Cinzia Luceri, Erricos Pavlis

The Board unanimously elected Werner Gurtner as its Chair for the new term. Werner has agreed to accept the position.

The lack of new faces on the Board and as Chairs of the Working Groups is a concern. Membership on the Governing Board has been very stable since the inception of the ILRS. Some of the other Services have more elected positions giving room for more frequent changes. Two possibilities that we might want to consider are (1) requiring more frequent changes in the appointed positions or (2) adding two more At-Large positions. The latter will require a change in the Terms of Reference (TOR). The members were asked to think about this and give Mike Pearlman some feedback.

### Working Groups

The Chairs of the Working Groups remain the same for the new term. The Chairs of the Missions and Networks and Engineering Working Groups will chose their own co-Chairs.

Analysis	E. Pavlis/C. Luceri
Missions	G. Appleby/TBD
Data Formats and Procedures	W. Seemueller/R. Ricklefs
Networks and Engineering	G. Kirchner/TBD
Transponders	U. Schreiber/ J. Degnan

It was also noted that the TOR specifies that the Chair of each of the permanent Working Groups must be a member of the Governing Board. This is being violated in the case of the Transponder Working Group. All of the members present felt that Schreiber and Degnan were by far the best choices, so our options are either to make this an Ad hoc Working Group or change some of the rules.

### ILRS Update:

Some of the key items noted since the last Governing Board Meeting were:

- Newly refurbished Grasse MEO station on-line soon;
- The Tahiti station is now operational; a meeting with NASA, CNES/GRGS, and UFP will be held October 20-22, 2008 at the station to formulate a plan to improve stations performance;
- FTLRS completed Jason calibration/validation campaign in Burnie, Tasmania and is now operational in Ajaccio;
- The TROS has been moved to KASI in Korea for one year tracking campaign.
- We have been notified that the Russian Federation Stations in Komsomolsk, Altay and Baikonur will begin sending SLR data shortly;
- Two-month campaign on GPS-35 and -36 was completed; data averaged 33 passes/week;
- The Governing Board has approved mission support for COMPASS-M1;
- ILRS GB approved mission support for GOCE; launch is now scheduled for February 2009 at the earliest;
- An OICETS campaign has been scheduled for October 2008-February 2009
- The QZS-1 (test for Japanese Navigation satellite system) has been approved for tracking; launch has been scheduled for 2009;
- LRO launch now scheduled for early 2009

## **Working Group Reports**

### Analysis Working Group

Eight Analysis Centers (ASI, BKG, DGFI, GA, GFZ, GRGS, JCET, and NSGF) are providing weekly solutions to the two Combination Centers ASI and DGFI. Three other candidate centers at AIUB, ESOC and NCL are undergoing benchmarking. Operational weekly and daily products are delivered routinely. Re-analysis of the historical data is underway; most of the analysis centers are targeting completion for the end of 2008.

### Missions Working Group

The Working Group is examining options to make future missions more aware of SLR tracking and subsequently making their connection with the ILRS as early as possible. This really needs to be an ILRS wide activity, involving the expertise of the other working groups.

The OICETS Mission has identified some periods in which its optical sensors will be facing the incoming laser beams from the stations. At first they feared corruption of the onboard experiments and requested that laser operations cease, but it turns out the onboard sensor does not receive in the green and the issue is mute. However, it does point out the need for all stations to have the go/no-go capability so satellite missions can restrict tracking if necessary.

There was discussion on the usefulness of increased ETALON tracking; this will be discussed with the Analysis Working Group.

### Data Formats and Procedures Working Group

The implementation plan for the new CRD Format has been issued. HTSI is ready to accept data in the new format now; EDC will be ready by the end of November. Several analysis centers will be ready to validate normal points by the end of the year. Stations must be in compliance by April 30, 2009. The old format will be discontinued on December 31, 2009.

Details on the LR-LRO data flow have been worked out. The primary data center will be CDDIS; EDC will be operational as a backup.

### Networks and Engineering Working Group

The sun-synchronous, pendulum motion of SOHLA and the highly eccentric orbit of Astro-G will pose challenges both data acquisition and data post-processing. The Missions Working Group is working with JAXA and Toshi Otsubo to try some tests and some simulations to scope and address the issues.

Graz has been successful in using two-line elements to generate CPF files to track several satellites not currently on the ILRS roster. The Herstmonceux station has developed a fast procedure for calibrating the Stanford Counters; several stations are making preparations to ship their counters. The Working Group is assisting several stations with upgrading plans. An Ad hoc Group is planning retroreflectors array efficiency tests with Compass-M1 and the other GNSS satellites.

### Transponder Working Group

Several stations are supporting T2L2. Wettzell has been involved in proposals for timing experiments to Lunar Exploration Orbiter, Atomic Clock Ensemble in Space (ACES), Einstein Gravity Explorer mission, and the NASA lunar program. Although interest is high, funding for most is not likely.

The preparations for LRO are under way at NGSLR, MLRS, Herstmonceux, Zimmerwald, Mt Stromlo and Wettzell. Tom Murphy at the University of San Diego is the PI on a year-long NASA study for an Earth-Mars transponder. Most of the technical study is being performed by the Interplanetary Laser Communications Group at JPL.

### **Task Force Reports**

#### Communications

No report given

#### Center of Mass Corrections

The Task Force has tabulated a range of corrections for each station for Lageos. They will consolidate these ranges to single values for each station and post the results on the web for use by the analysts. Next the Task Force will address some of the other spherical satellites.

### **Station Performance**

A number of stations in the ILRS network have never provided adequate data for analysis or mission support. Stations have recently been categorized as Operational or Associate ILRS Stations based on their performance relative to the ILRS Standard (Shanghai, 1992), but the Board agreed that we should take more active measures.

**Action:** The CB will request a plan and a schedule from each of the non-performing stations to reaching Operational status. Stations not furnishing a plan or not able to reach Operational Status may remain in the ILRS but will be deleted from the ILRS map until they do qualify.

### **Feedback from the Missions and the Analysts**

We have not had recent feedback from the missions and the analysis community on the continued requirement for data from each of the satellites on the ILRS roster. The Board agreed that we should require a status report from each of the missions and from members of the analysis community on whether the present flow of data is still required and still adequate.

**Action:** The CB will conduct a survey of the Mission and Analysis Centers/Associate Analysis Centers on current data needs and report back.

### **Tracking Priorities**

In some cases we may be tracking some objects beyond the current need while neglecting others. A tool for dynamic priorities to is available on the website, but not many stations are using it.

**Action:** The CB should query the stations on plans to use the tool and work with the Working Groups to formulate some simple algorithms to encourage stations to better distribute their tracking efforts.

### **Improved Mission Support Request Form**

During the past year several missions have surprised us with requirements beyond those provided in their Mission Support Request Forms. In some cases the form may not have been sufficiently comprehensive. In others, mission may not have viewed the forms carefully.

**Action:** The CB is drafting an improved version of the Mission Support Request Form which will also require a signature of an authorized official for the Mission.

### **Retroreflector Standard**

The ILRS Retroreflector Standard for GNSS satellites has been adopted by both GGOS and the ILRS. Those responsible for each of the GNSS series should be made aware of this standard in order to ensure sufficient return signal strength from the ILRS network stations:

- Retroreflector payloads for GNSS satellites should have an “effective cross-section” of 100 million sq. meters (5 times that of GPS-35 and -36) – *Minimum Standard*;
- *It is recommended that 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 accuracy sufficient to support GGOS objectives.

### **Station Compliance**

During the past year several satellites missions have had either restricted tracking conditions or extended periods of tracking prohibition prior to requesting ILRS support. In recognition of the fact that we have a very clear responsibility to follow the satellite owners’ requirements and restrictions, the Board agreed that we should have a set of rules that all stations agree to follow. A draft set is listed below for your review and concurrence:

ILRS authorization to track any satellites is constituted and governed by an approved Mission Support Request Form. All SLR stations within the International Laser Ranging Service agree to:

- range only to satellites for which they have approval from the ILRS or the satellite owner;
- adhere to any applicable ILRS Restricted Tracking Procedures including:
  - station by station authorization;
  - time and viewing angle constraints;
  - power constraints;
  - go/no-go switch.

### **GGOS**

GGOS is now a permanent component of IAG along with Services and Commissions. As a result the GGOS structure will change and the Working Group on Ground Networks and Communications will become a Bureau for Networks and Communications. Calls for Participation have been issued for the establishment of a Coordination Office, a Bureau for Standards and Conventions, a Bureau for Networks and Communication and a Bureau for Satellite Missions. NASA is preparing to respond to

the Call of the Bureau for Networks and Communications, with Mike Pearlman as the proposed Director. The Bureau would rely heavily on the support and participation of the Services as did the prior Working Group.

### **ILRS Publication**

Erricos Pavlis has been in contact with the editor of the Journal of Geodesy regarding an ILRS Special Issue; procedures and limitations for a publication have been provided. A board of ILRS Special Issues Editors has been selected; members are Gurtner, Pavlis, Pearlman, and Luceri. Spring '09 is a realistic time-table for soliciting papers:

### **Next Meeting**

The GB will hold its next meeting at the EGU Meeting in Vienna in April; the date is yet to be determined.