

ILRS Governing Board Meeting

Technical University of Vienna
SEM 124
Gusshausstr. 27-29
1040 Wien

Monday, April 14, 2008
17:00-20:00

Agenda

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

Attendees: C. Noll, M. Pearlman, G. Kirchner, G. Appleby, W. Seemueller, E. Pavlis, Y. Fumin, V. Luceri, G. Bianco, J. Mueller, B. Schutz, D. Carter, Z. Altamimi

M. Pearlman opened the meeting and reported that W. Gurtner had a personal emergency and had to leave Vienna yesterday. He then reviewed the agenda.

C. Noll reported on the current status of the ILRS (see presentation). Two letters of support to ILRS stations were issued in 2008 (to Simosato and NERC for Herstmonceux). G. Appleby thanked the CB for preparing and sending the letter and stated that this letter was used for their five-year review with NERC and was well received.

C. Noll reviewed the current data replacement policy and presented plans for a new policy. Changes to the current policy to allow data replacement after the “30 day window” have been implemented to accommodate stations (such as APOLLO) where continually improved system modeling can have a significant impact on the data quality or where engineering justification can be found for quantifying station range biases over extended periods of time. The preferred remedy is the posting of a data corrections table, but if a table proves to be too complicated, the stations may apply for a waiver to replace the data in the Data Centers. Permission to routinely post updated data files has been granted to the APOLLO station, with previous files left in tact. G. Kirchner stated that he may want to replace the Graz kHz data set, starting from 2004; a new post-processing technique may better identify uncertainties in the data and provide better accuracy. The MLRO had requested that replacement of their data over an extended period of time in 2007. P. Bianco reviewed the range bias analysis they have completed on their 2007 data set (see presentation), which highlighted a six-month time interval with range biases that arose from the application of incorrect system constants (verified through engineering analysis). V. Luceri initially sought replacement of all of the data, but in the final analysis a correction table with bias values for four intervals over the six-month period proved to be sufficient. B. Schutz asked how analysts would be notified that data have been replaced. It was pointed out that most analysts would download the latest data prior to any re-analysis, and that notification would be sent to known data users, posted on the ILRS Web site, and placed in the replacement data/bias file also on the ILRS Web site.

Action: G. Bianco and V. Luceri will provide MLRO range bias correction tables and document the system’s problems in 2007 for the ILRS Web site and SLRMail.

E. Pavlis presented recent Analysis Working Group activities (see presentation). Delays in data transmission from Mt. Stromlo are excluding their data from some products, particularly the daily product under testing for use by NEOS. The combined AC range bias report shows improved agreement among institutions as harmonization is underway. Except for MCC, all of the Analysis and Associate Analysis Centers have submitted their analysis descriptions and strategy forms to the AWG. This process of harmonization should give station operators better confidence in the results provided.

The notion of station classification was discussed. The ACs use the term “core station” as a means of identifying those that are included in the reference frame development, while the Central Bureau has been designating “operational stations” as those that satisfy the “Shanghai” Convention as seen on the Quarterly Report Card. Stations may be in one category, but not the other. It was agreed that the CB would continue to identify operational stations in the current manner and that the notion of core would remain internal to the ACs and therefore would not be publicized.

A guest editorial board, under E. Pavlis, has been established for the ILRS special issue of the Journal of Geodesy. Next, a table of contents needs to be developed along with allocation of space to ensure that important items are covered including LLR. The goal is to have this issue completed by early next year.

Action: The editorial board will develop a table of contents for the ILRS special issue for the Journal of Geodesy.

W. Seemueller reviewed items from the Data Formats and Procedures Working Group meeting held on April 14. The main topic of discussion was the Consolidated Ranging Data (CRD) format. E. Pavlis presented the revised schedule for implementation that has been formulated (see presentation) which projects full transition by April 2009. During the transition period, stations will send in data in both CRD and the current ILRS normal point format. Operations Centers (EDC and HTSI) will QC the new CRD data and then validate their contents with the normal point data in the current ILRS format. Selected ACs will test the QC'ed data in routine analysis. After stations pass the analysis process, they will be allowed to cease transmission of data in the ILRS normal point format.

G. Appleby reviewed items from the Missions Working Group. Several missions have been approved for tracking by the ILRS network. GOCE (approved by the ILRS GB in 03/2008) will utilize SLR for orbit validation and will require a 50 m prediction accuracy, probably several times per day because of its very low altitude. Prediction generation and accuracy requirements were discussed with the prediction provider (ESA/ESOC). ESOC will use CHAMP GPS data to generate test predictions which HTSI will compare to those currently issued by GFZ. The QZS-1 satellite (also approved by the ILRS GB in 03/2008), a test satellite for the new Japanese Navigation System, is in a nearly GEO orbit. Tracking support will come from the stations located in the Pacific region.

G. Kirchner reviewed items from the Networks and Engineering Working Group. The ILRS network is expanding. We expect new stations in Korea; KASI is developing both a fixed (~1 meter telescope) and a mobile station (40 cm telescope). Staff from Graz is assisting KASI; 4-5 people will visit Graz again soon. The AOGS meeting in Busan in June will include a presentation by Kirchner on SLR. Zimmerwald now has a 0.1 kHz laser; Herstmonceux is operating at 2kHz. Metsahovi is developing new software for their station, but have a long way to go. The Graz station has had some success using two-line elements to track retired objects (e.g., Westpac). Westpac is similar to Starlette and Stella, but its design with recessed cubes restricts visibility to one cube at a time. Graz has obtained 1-3 mm RMS on Westpac (Starlette RMS is typically 3-5 mm). They have also tried tracking other satellites such as Reflector, to determine orientation/motion of satellite, but the two line elements did not work very well and returns were very sparse. The Chinese have provided the Graz station with predictions on COMPASS M1 and ranging has been very successful. Y. Fumin reported that the Mission Support Request Form for COMPASS M1 will soon be submitted to the ILRS. Data yield on the COMPASS retroreflectors should be considerably better than those on GPS.

M. Pearlman asked if it was time to establish an ILRS working group on LLR. J. Mueller stated that perhaps a good opportunity to start this working group will come when the Grasse system is back online (later this summer) and when APOLLO becomes active in the ILRS.

E. Pavlis reported that we had little update from M. Torrence on the Communications Task Force.

G. Appleby discussed activities in the Center of Mass Task Force (see presentation). Analysis shows that the return pulse from LAGEOS is stretched; thus the LAGEOS center of mass is dependent on the detector used at the stations and the return signal strength. The task force has come to closure on modeling for single photon systems; 245 +/-1 mm is the optimum value. Systems with MCP detectors may have a smaller range of possible CoM values than was originally thought, because a study of the data shows that return signal strength does not vary as widely as first thought. The best estimate is 248 +/-2mm, which agrees to within 1 mm with ground tests performed on LAGEOS-2 prior to launch. The task force suggests continuing the use of 251mm for all systems (except Herstmonceux) until the Analysis Working Group validates the change for both the single photon and MCP systems; Herstmonceux will continue using 245 (single photon value). E. Pavlis stated that the ACs will probably adopt the recommended values for the next re-analysis campaign (after ITRF 2008).

M. Pearlman gave a presentation on retroreflector array analysis (see presentation). Discussion continues with the appropriate agencies on the inclusion of retroreflectors on the GPS III series. Hollow Zerodur test cubes are undergoing thermal tests at GSFC; the plan is to conduct full environmental testing at the ILFN in Frascati. We still need to develop standards for LEO and synchronous satellites.

G. Appleby reported on the Stanford counter work done by P. Gibbs at NSGF (see presentation). Tests have checked the bias characteristics for these counters. The Stanford counters from five stations in the ILRS network have already had their counters calibrated at NSGF. The testing procedure is a quick process once the NSGF staff receives a counter from a station. Four other stations have been approached to have their counters calibrated. So far Beijing has agreed and San Juan has begun discussions. The AWG will use these corrections in the next re-analysis.

Action: The CB will contact the other two stations to ascertain their interest in participating.

M. Pearlman reported on NRL's Precision Expandable Radar Calibration Sphere (PERCS). NRL (same group involved with ANDE-RR) will launch this satellite as a test of expandable structures in space and as a target for radar calibrations. NRL will also use the satellite to study electromagnetic radiation in the atmosphere and properties of orbital dynamics, and to study imaging in space with laser beams. PERCS deploys to a 10 m wire frame sphere with cubes in corners. The mission will be launched in the 2010-2011 timeframe in a 600 km orbit with high inclination (~75 degrees) and will therefore be visible by the entire ILRS network. NRL is consulting with GSFC on the cubes to ensure sufficient link. NRL will soon submit a mission support request form for PERCS.

M. Pearlman reported that a meeting of the organizing committee for the 16th International Workshop on Laser Ranging was held earlier in the day at the EGU. The

program is similar to those of recent workshops. The Program Committee also helped work through some budgetary issues.

M. Pearlman discussed recent GGOS developments. GGOS has been accepted as a permanent entity within IAG (it was considered a project before this time). The Ground Network and Communications Working Group (GN&CWG) will become the Networks and Communications Bureau in the future GGOS structure; a GGOS Bureau is a coordinating activity that can have standing committees, etc. The charter for this Bureau is similar to the current WG charter with expanded tasks; the Bureau will continue to be tasked with coordination of geodetic networks and techniques. GGOS will issue a call for proposals for all Bureaus, which include the GN&C, Geodetic Standards and Conventions, and Space Missions. A call for the GGOS Coordinating Office will also be issued soon. These calls will be issued in the late summer with responses due in late fall. The N&C Bureau will promote communications between services and supporting organizations and will develop databases of ground networks, products, co-location survey vectors (formalize what is currently done at IGN, HTSI, etc.), and meteorological instruments and data. The Bureau will help to develop models to predict future network configurations, estimate size of the fundamental network that is needed and the network required to the reference frame. The N&C Bureau will work with the new Space Missions Bureau to ensure that sufficient POD is accomplished. The Bureau will also work with the IGFS to determine network requirements. Terms for the Bureaus will be for four years. A meeting of the current GN&CWG will be held on April 16 at TU Vienna.

Z. Altamimi reported on a meeting in early April of the US National Research Council (NRC) committee on geodetic infrastructure. The NRC has formed a committee to study and report on requirements for a national high precision geodetic infrastructure, which would interface with that of the international community. A. Altamimi and J. Ries from the ILRS community are on this committee, which is tasked to create a report on “why we need to renew the infrastructure”. It is important that the ILRS have input to this committee; and Altamimi urged the ILRS to provide a document with significant points on SLR strengths, applications that need SLR in general, requests to track satellites for other applications, technology innovation, etc. D. Carter asked if the chair of the committee (B. Minister) will look for contributions from outside the committee. Z. Altamimi stated that he must follow NRC policy of autonomy, but he believes the ILRS can get inputs in through representatives or the chair of the committee. This input should probably be in the form of concise, scientific bullets on SLR; stating that reference frame origin and scale result from SLR is not sufficient for a justification. During the initial meeting, the first day was devoted to US agencies that currently contribute to the geodetic infrastructure (NASA, NOAA/NGS, NSF, USGS, NGA, and others). The following day was used to determine the input that will be required from outside sources (e.g., E. Pavlis for ILRS/SLR analytical model). The next meeting will be held in early June in Boulder; there will be additional meetings in September and November.

Action: The ILRS must provide input material for the NRC Committee.

D. Carter gave an update on the Next Generation SLR (formerly SLR2000) (see slide in ILRS status presentation). The staff is now focused on completing the prototype through additional funds from HQ. Two operators have been hired and are undergoing training.

The GB will hold its next meeting on Wednesday evening, October 15 during the Laser Workshop in Poznan

The meeting was concluded at 20:00.