

3.4.2 International Laser Ranging Service (ILRS)

Introduction The International Laser Ranging Service (ILRS), established in 1998, is responsible for the coordination of SLR/LLR missions, technique development, operations, analysis and scientific interpretation. Within the organizational structure of the IERS, the ILRS is one of several Technique Centres, having accompanying responsibilities for the generation and quality assurance of Earth Orientation and related products that are generated within the laser technique. A clear example is the contribution to the implementation of the terrestrial reference system (i.e. the ITRF), where the laser technique provides unique information on the exact location of the earth's geocentre and (shared with VLBI) absolute scale. Another area, where SLR plays an important role, is gravity field development. Although the solutions rely heavily on radiometric observations, the SLR measurements by virtue of their absolute, unbiased character provide a unique tool to validate the orbital and gravity field solutions and independently assess their quality. As an illustration, Figure 1 shows the SLR support of the GRACE satellites, launched in March 2002, clearly indicating that the ILRS community has been able to pick up these dedicated and critical satellites in their operational configuration shortly after launch and with an impressive and consistent monthly data yield.

Activities in 2002 Although the ILRS activities cover a broad spectrum, this overview concentrates on analysis activities, for obvious reasons. The ILRS Analysis Working Group (AWG) is the entity which is responsible for the coordination of these activities, including the development of quality control procedures as well as official ILRS analysis products. Two AWG workshops were held in 2002, notably in Nice/France (April) and in Lanham/USA (October). Here, analysts and program managers meet to discuss analysis and data product issues, initiate projects and/or campaigns and evaluate their results.

With the development of (an) official ILRS product(s) and the quality control (QC) issue (of observations and products) in mind, the AWG has initiated a number of pilot projects. They are clearly developing with time. One pilot project concerns the harmonization of semi real-time QC results, the quality assessment of the SLR observations in particular. In 2001 it was recognized that the model for station coordinates plays a major role in the diversity of quality "verdicts" that are generated and distributed to the stations each week. To better unify this, the AWG has strongly recommended to use the ITRF2000 solution as a common element in the weekly (or more frequent) analyses. At the time of writing, almost all of the relevant analysis centres have switched to this model. Although no a posteriori evaluation has been made yet, it is expected that this

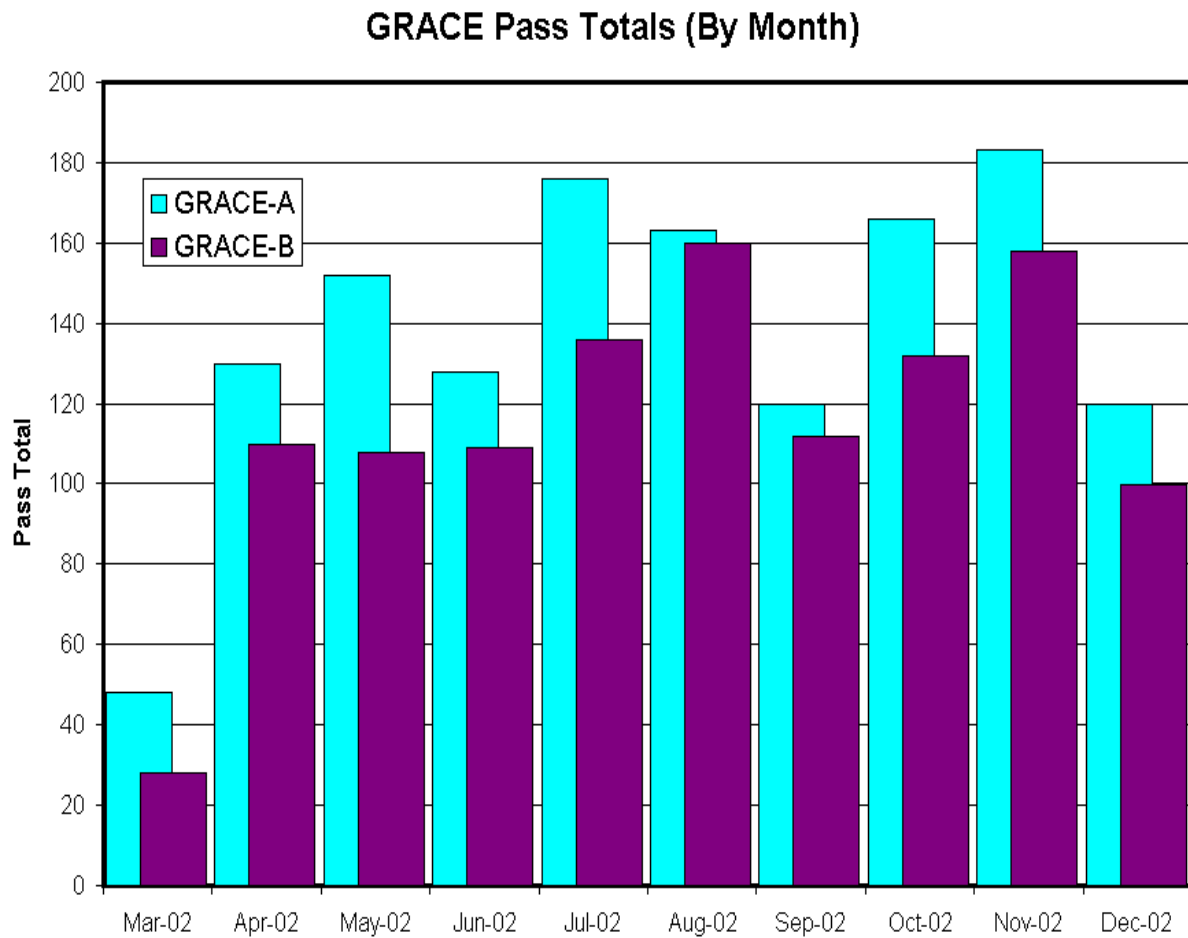


Figure 1: Overview of the monthly number of SLR passes on the GRACE satellites (courtesy Van Husson).

will also have consequences for the semi real-time EOP solutions which are generated and submitted to IERS.

The second project is aimed at quality control of the software that is used within the SLR/LLR community. Its purpose is to benchmark the various computer programs and to detect blunders and other possible problems. It focuses on satellite orbits and specific parameter solutions, which may evolve into (the development of) an official ILRS product for satellite orbits. This project has seen first results in 2002, and is in the process of setting acceptance/rejection criteria as a contribution to a third project.

This third project focuses on two traditional products, i.e. station coordinates and EOPs. The purpose here is to develop an official ILRS solution, currently for EOPs and station coordinates (the former to be included in the IERS Bulletin A). In the future, the analysis system may evolve further to provide official “full rate” EOPs, station coordinates and other parameter solutions.

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At the moment, an official Call for Participation has been released and about 10 reactions have been received, either for the role as an official analysis centre (responsible for the direct computation of solutions for EOPs and station coordinates, following specific guidelines) or for the role of official combination centre (individual solutions coming from various analysis groups have to be combined into one single official ILRS product). An overview of the reactions is given in Table 1. It must be emphasized, however, that its content just reflects the response to the Call for Participation, and no selection and/or screening has been applied yet.

Table 1: Overview of the various reactions to the ILRS Call for Participation for contributions to the official ILRS operational product on EOPs and other parameters.

institute	analysis contribution	combination contribution
ASI	+	+
DGFI	+	+
Geosciences Australia	+	
NASA/JCET	+	+
NCL		+
NERC	+	

Related to this and to the interests of the IERS, it has been decided to consider solutions for the x-pole and y-pole coordinates and excess Length of Day (LOD) as the prime products of the ILRS analysis activities concerning EOPs. This deviates from the historic situation, where solutions for UT1-UTC were submitted as representative parameters. However, it must be realized that the UT time difference is directly correlated with the right ascension of the ascending node of the satellites(s), so by definition it cannot be observed by any of the satellite techniques. To improve the quality of the EOP results, the ILRS is pursuing a dedicated tracking campaign of the Etalon satellites (which are analysed in addition to the (standard) LAGEOS spacecraft). Analyses have convincingly shown that the quality of the EOP solutions improves dramatically if even a small amount of Etalon data is included in the data reduction process. In principle, the Etalon campaign is open-ended.

The analysis activities within the ILRS, related to the IERS, are not restricted to just these pilot projects. The ILRS community is providing input to other projects, like the SINEX Campaign, the EOP Alignment Project and the future (IAG) IGGOS Project. Results on these projects can be found elsewhere.

Outlook The AWG pilot projects, that can be considered as the focal point of the ILRS analysis activities, will proceed with the momentum that they have shown so far. The harmonization project is expected to show significant convergence from 2002 onwards. The benchmarking/orbits project has embarked upon a strict and ambitious scheme. A first round of results revealed a number of shortcomings, and the current activities will undoubtedly yield a better consistency of the results. The project on station positions and Earth orientation is entering the phase of official product combination. By the time of writing, analysis groups and combination centres are gearing up to serve the IERS community with a consistent and high-quality product on EOPs as a beginning. The ILRS AWG expects this official product to be available in mid-2003.

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