

Modeling Improvements in the ILRS Reprocessing for ITRF2013

E. C. Pavlis¹, V. Luceri², M. Kuzmich-Cieslak¹, D. König¹ and G. Bianco²

1) GEST/UMBC, Baltimore, Maryland, USA

2) ASI/CGS, Matera, Italy

The development of the new realization of the International Terrestrial Reference Frame (ITRF) "ITRF2013" prompted a revision of the internal standards and procedures of the International Laser Ranging Service (ILRS). This resulted in an improved product contribution from the eight ILRS Analysis Centers. Over the past year the ILRS Analysis Working Group (AWG) worked on designing an improved ILRS contribution based on recently made available ancillary models for key ingredients of the data analysis process. The ILRS approach is based primarily on the current IERS Conventions 2010 and our internal ILRS standards, with a few documented deviations that ILRS feels are necessary in order to keep our products at a high standard. The "model modernization" is one of the two actions in our approach to meet the stringent goals imposed by the Global Geodetic Observing System (GGOS), the other action being the modernizing of the engineering components (ground and space segments). The nature of the Satellite Laser Ranging (SLR) contribution is such that monitoring systematic errors at individual stations is of paramount importance in order to safeguard the accuracy and fidelity of our contribution. The origin and scale of the ITRF depend nearly solely on accounting for undocumented station discontinuities and improving the satellite target signature models, both of which directly affect the ITRF scale. The latter has been addressed with the adoption of *mm*-level models for all of our targets so far. For the station systematics, the AWG had already embarked on a major effort to improve the handling of such errors prior to the development of ITRF2008. Starting from that model, a re-examination of the systematic errors for all sites and for the entire period covered by the ILRS analysis (1983-2013), yielded an updated version of the data base we maintain, and formed the new standard to be used by all ACs during the reprocessing phase. The new process benefited extensively from the results of the quality control that ILRS provides on a daily basis as a feedback to all stations, and the recovery of systematic error corrections from the data themselves, through targeted investigations. The contribution of the early data (1983-1990) is significantly poorer than for the recent years of course due to less accurate systems and a very poor global distribution of the stations. However, it contributes to the overall stability of the datum definition, especially in terms of the stability of its origin and scale. As the more recent and higher quality data accumulate, the significance of the early data will progressively diminish in future ITRF realizations. As in the case of ITRF2008, station engineers and analysts have worked together to determine the magnitude and cause of systematic errors that were noticed during the reanalysis, rationalize them based on events recorded at the stations, and develop appropriate corrections whenever possible to avoid deletion of the data altogether. This presentation will give an overview of the new models and the process of systematic error determination, along with examples from the various steps and a measure of their effectiveness in improving the ILRS endproduct.