ITRF2008: ILRS Support for Optimal SLR POD

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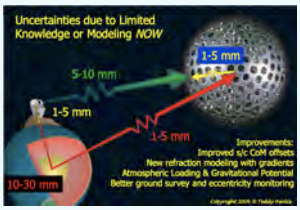
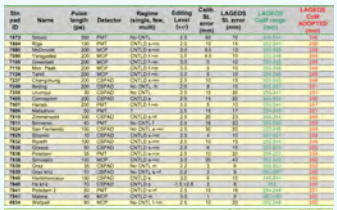
Abstract

With the recent release of the ITRF2008 the ILRS AWG put in operational mode a number of additional products that will contribute to the optimal use of ITRF2008 for Precision Orbit Determination (POD). The ILRS AWG contribution to ITRF2008 was based strictly on the current IERS Conventions 2003 and our internal standards. The main areas of improvement in our ITRF2008 contribution were careful evaluation and remedy of tracking station systematic errors, extending the data span used in the analysis by an additional ten years of LAGEOS data, and the careful consideration of target characteristics. The new re-analysis extends from 1983 to 2009, covering a 25-year period, the longest for any of the contributing techniques; although the network and data quality for the 1983-1993 period are significantly poorer than for the latter years, the overall SLR contribution reinforced the stability of the datum definition, especially in terms of origin and scale. An evaluation of the commission error from the past and present ITRF on the mean sea level rate indicates a very significant improvement, although we are still far from reaching the accuracy levels required by GGOS. As a companion to the release of the new TRF, a number of online live documents keep track of each station's systematic errors, in order to achieve the highest accuracy possible. ILRS requires that all stations track the two LAGEOS satellites in order to be able to precisely calibrate them over time at the few millimeter level. The systematic errors that are thus obtained should be applied to all tracking data from each site for the specified period, unless stated otherwise in the data base. The AWG ACs that contribute to the daily quality control (QC) of all SLR data, are issuing reports which are delivered electronically and should be consulted for very detailed characterization of each station's performance. The new TRF and the accompanying ancillary data will contribute significantly towards the improved POD for missions with very stringent accuracy requirements such as those monitoring long-term sea-level change.

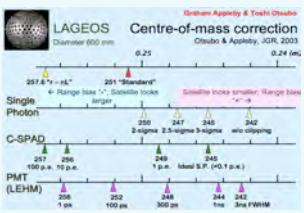
The ILRS Network

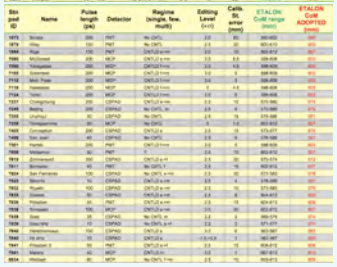
SLR MEASUREMENT ERROR BUDGET ESTIMATES



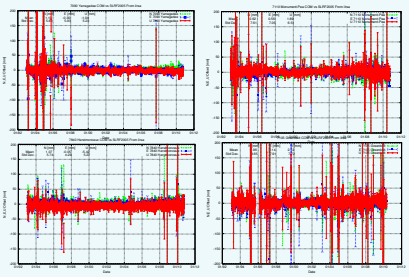


SLR's EQUIVALENT TO GNSS' ANTENNA PHASE CENTER

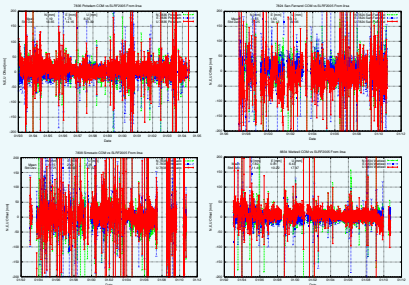




QUALITY AND STABILITY VARIES …

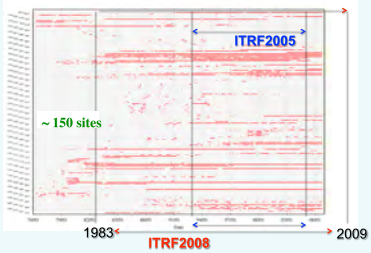


… OVER THE NETWORK AND OVER TIME!

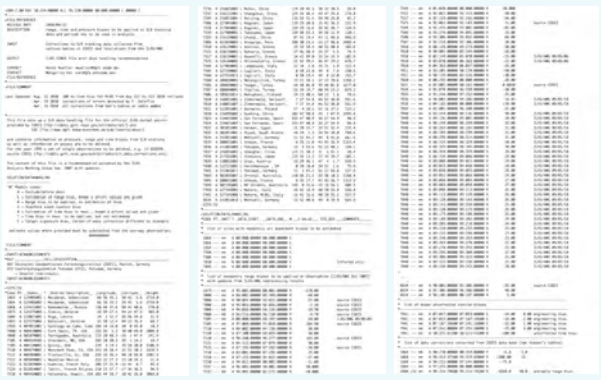


TARGET ARRAYS FOR OTHER SATELLITES THAN LAGEOS EXHIBIT SIMILAR VARIATIONS THAT SHOULD BE ACCOUNTED FOR HIGHEST QUALITY POD!

ITRF2008 IS BASED ON A MUCH LONGER SLR DATA SET, INCLUDING THE HISTORICAL LAGEOS 1 DATA SINCE 1983



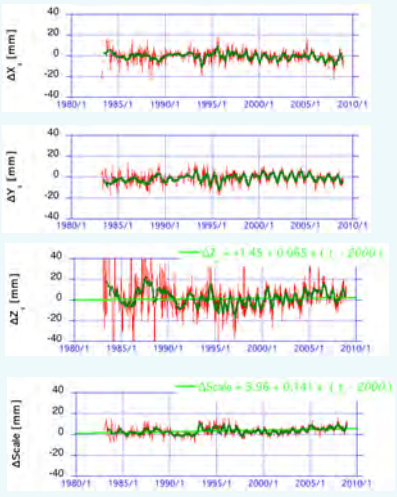
THE ILRS MAINTAINS AN ONLINE DOCUMENT THAT LISTS ALL KNOWN SYSTEMATIC CORRECTIONS FOR ALL SITES (PART OF THIS FILE IS SHOWN BELOW)



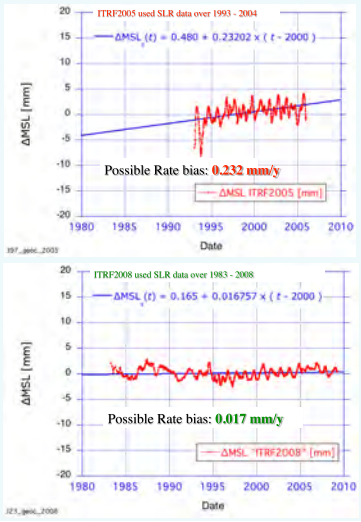
CONSULT THIS FILE OFTEN AT:

http://www.dgfi.badw.de/typo3_ilrs/fileadmin/data_handling/ILRS_Data_Handling_File.snx

THE NEW ITRF2008 HAS AN IMPROVED AND MORE STABLE DEFINITION OF THE ORIGIN AND SCALE IN BETTER AGREEMENT WITH SLR



THE MORE STABLE ORIGIN WILL INCUR SIGNIFICANTLY SMALLER ERROR ON MSL RATE ESTIMATES FROM ALTIMETRY AND TIDE GAUGES



Geocenter Error Effect on GLOSS Network

- MSL rate bias noted by color of site marker (mm/yr)
- Noise increase shown by error bars
- Top figure is for ITRF2005, bottom is for ITRF2008