

ITRF2020: The International Laser Ranging Service (ILRS) Contribution

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Abstract

The ILRS completed the reanalysis of the entire period of useful data from geodetic spherical targets spanning 1983 to end of 2020. The combined products were submitted to ITRS for the development of the ITRF2020. The main period that is supported by all four target satellites (LAGEOS, LAGEOS-2 and the two Etalons) was already used in a preliminary release of an ITRF2020 model in May 2021. For the period 1983-1993 with only LAGEOS data the reduction was in of 15-day arcs with 3-day averaged EOP. Due to the lack of a priori estimated mean biases for the 1983-1993 period, we adjusted a 15-day average bias at all stations to accommodate systematic and target signature errors. Otherwise the reanalysis used the same improved modeling of the 1993-2020 data. The adoption of predetermined mean biases ensured the results are minimally affected by systematic errors in the data. The 2021 ILRS contribution to ITRF2020 minimized the scale difference between SLR and VLBI below 2 mm (ITRF2014 $\sim$ 9 mm). The reanalysis incorporates an improved “target signature” model (CoG) for better separation of true systematic errors from errors in describing the target’s signature. The ILRS Analysis Standing Committee—ASC devoted its efforts on developing the new analysis approach over the past 5 years. The robust estimation of persistent systematic errors at the millimeter level, while still considering information provided by the stations, permitted the adoption of a consistent series of long-term mean corrections for each station for the period 1993-2020, that are now pre-applied. The use of this approach for this reanalysis led to improved results, reflected in the new time series of the TRF origin and especially in its scale. Seven official ILRS Analysis Centers contributed to the weekly time series and six ACs contributed to the 15-day series for 1983-1993, all computed according to the ILRS ASC guidelines. The series were combined by the ILRS Combination Center to obtain the official ILRS product contribution to ITRF2020 spanning a 38-year period. The presentation will provide an overview of the analysis procedures and models, and it will demonstrate the level of improvement with respect to the previous ILRS product series; the stability and consistency of the solution are discussed for the individual AC contributions and the combined SLR time series.

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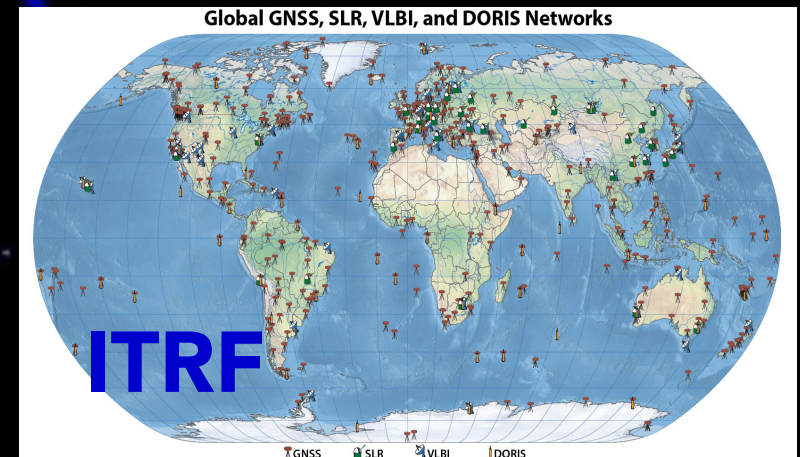
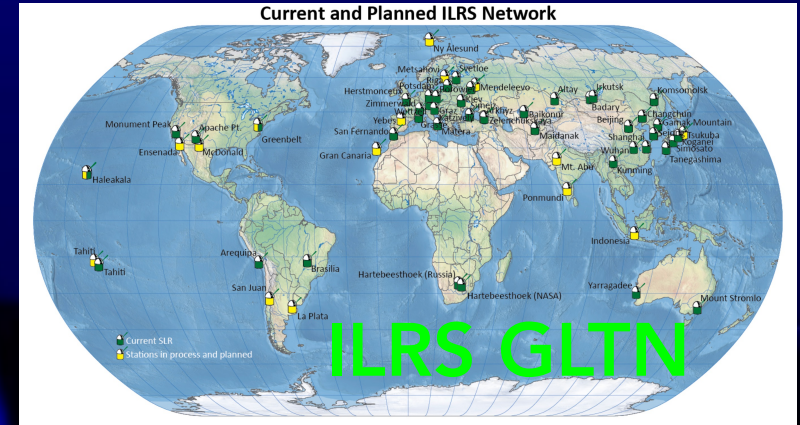
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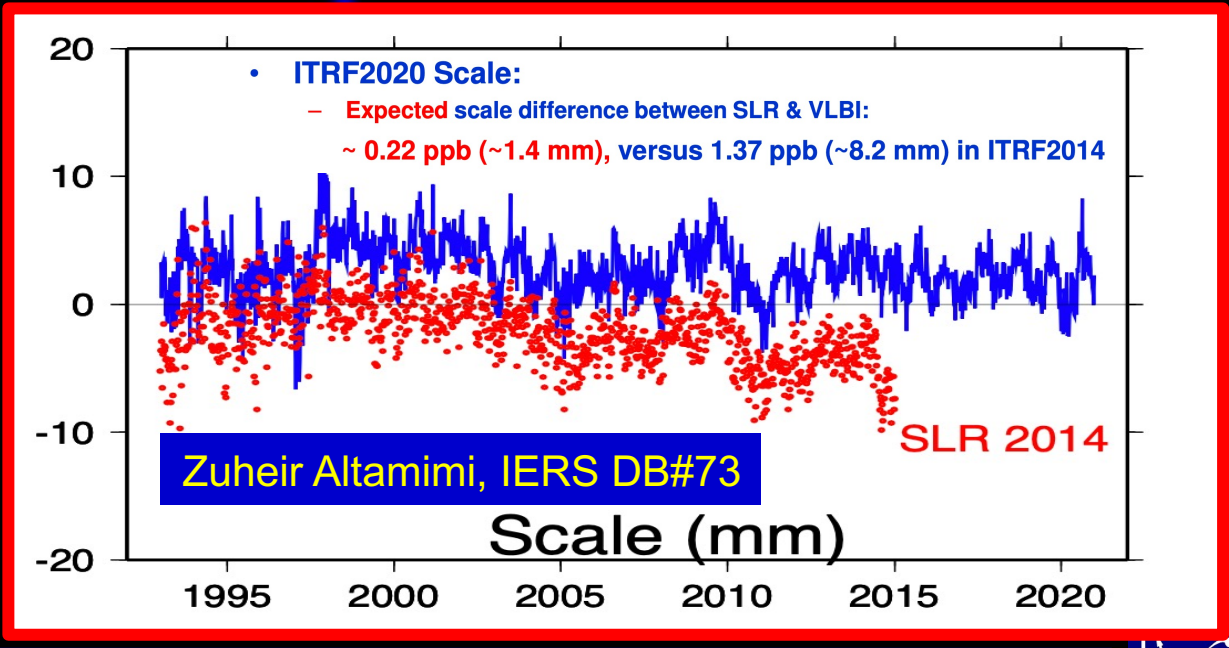
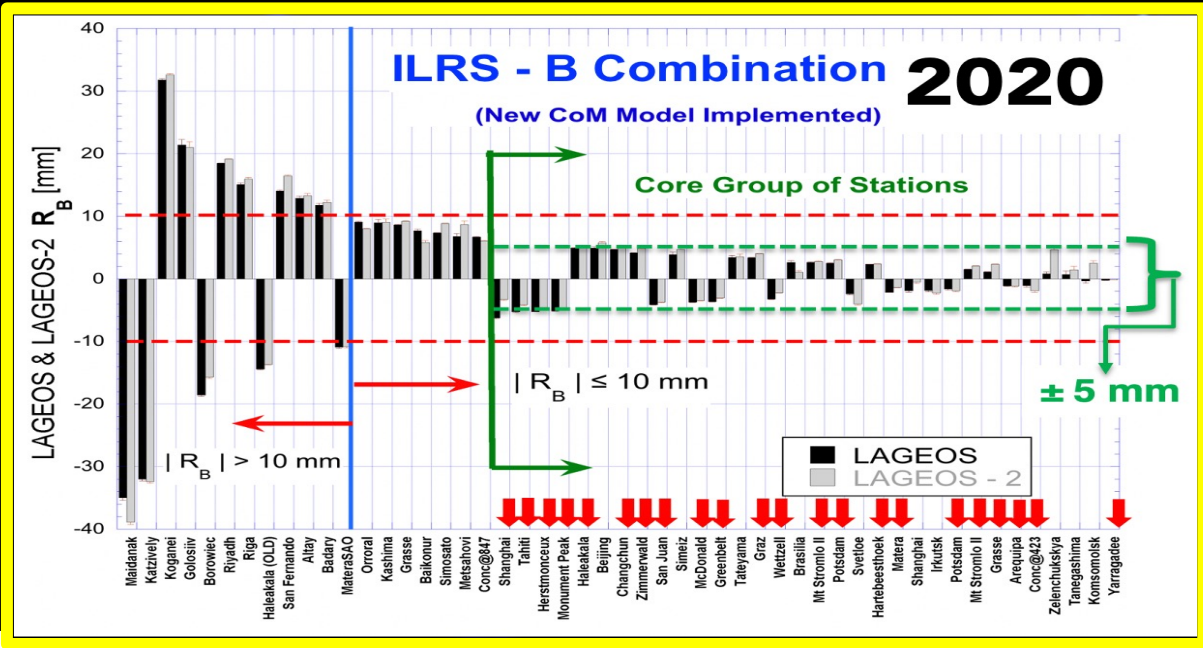
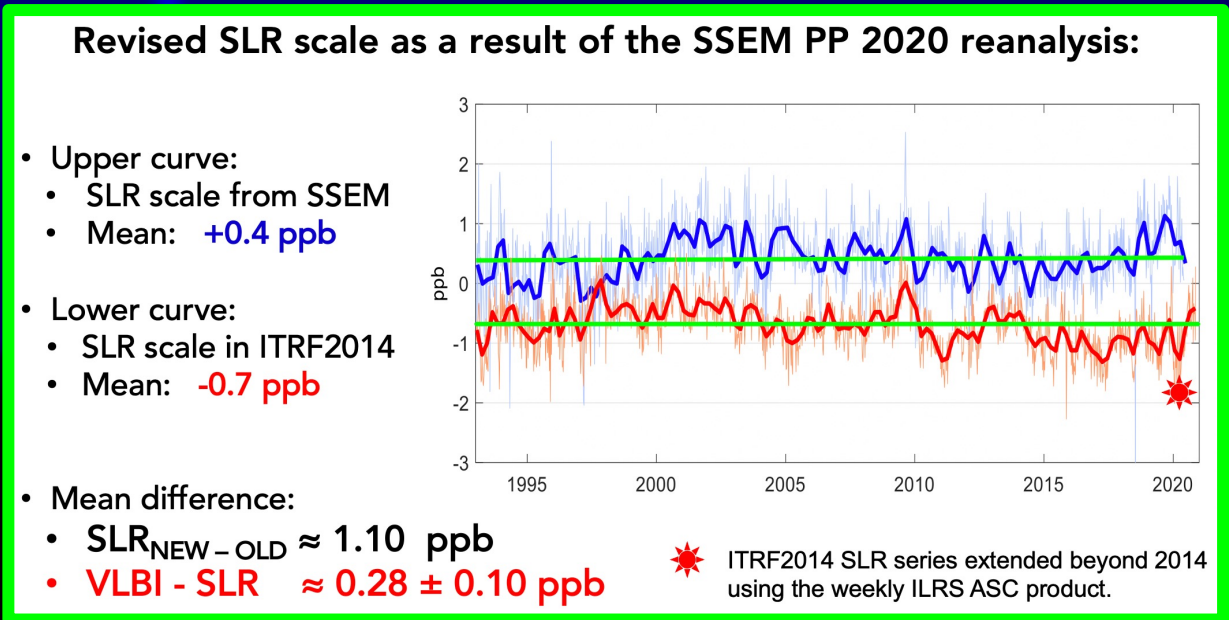
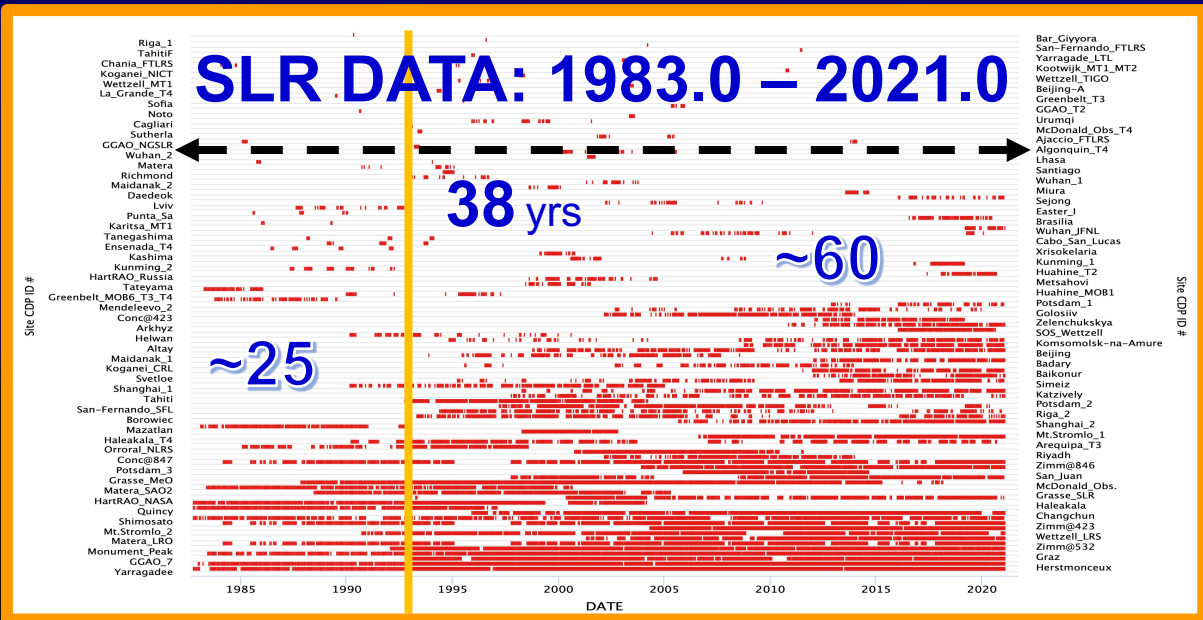


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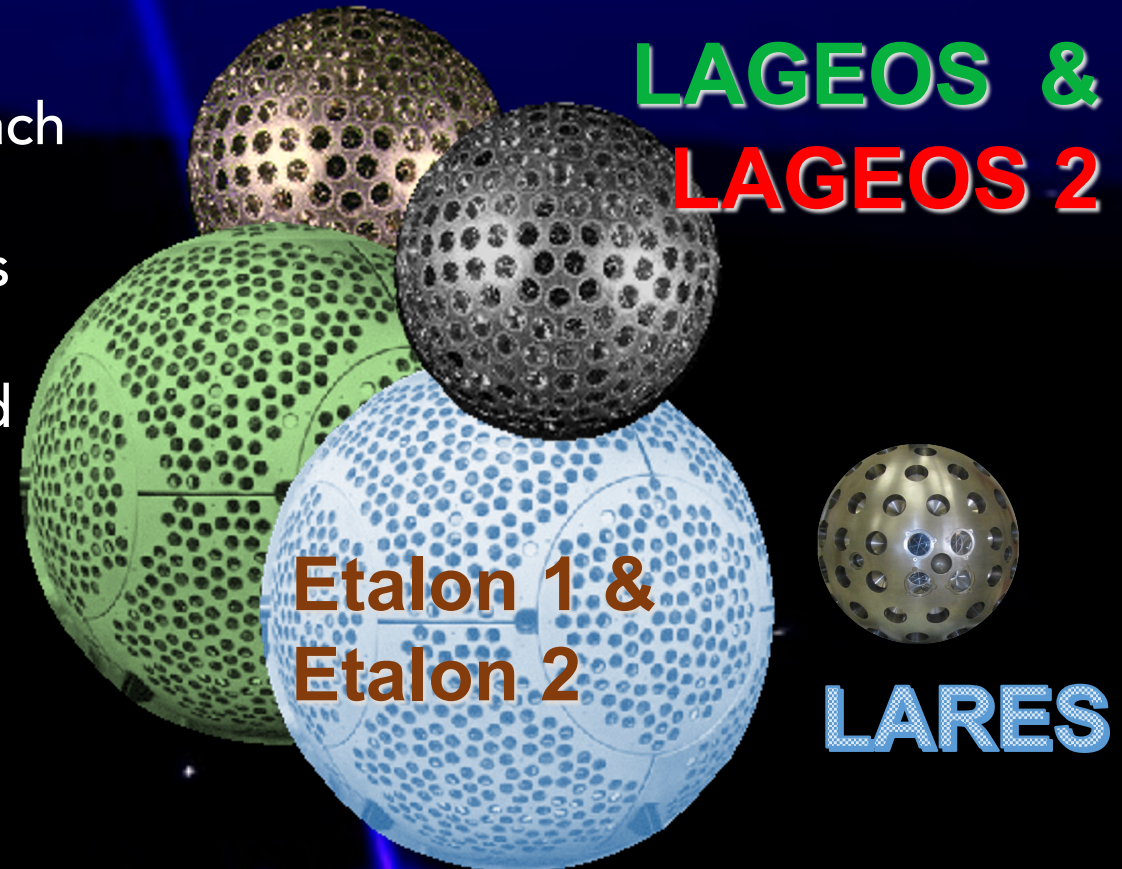




Based on the ITRF2020P results, the new ILRS contribution limits the systematic scale difference **VLBI - SLR** to ≈ 0.22 ppb (~ 1.4 mm) ☀

☀ Zuheir Altamimi, IERS DB#73

- The ILRS ASC established a new analysis approach for its contribution to ITRF2020;
- It will be implemented in the operational series after adoption of ITRF2020;
- The complete SLR series for the **38-year** period **1983 – 2021** was submitted to ITRS in early November 2021;
- Based on the initial ITRF2020P combination ITRS has corroborated the ILRS results on the scale difference between SLR & VLBI.



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