

## **Proposed Pilot Study on determination of potential range bias in the ILRS stations**

**Context.** Discussions within the AWG on systematic effects in laser range measurements gave rise many years ago to the continuing development of procedures by several ACs and AACs to quality-check the data from the network, in some cases on timescales close to realtime. These techniques all rely on the existence of a-priori station coordinates taken from the latest realisation of the ITRF. Leading up to AWG preparations for the ILRS submission to each ITRF, further painstaking work has been carried out by the Analysis Representatives to provide coordinate time series for each station as free as possible from bias. For a few years the NSGF AC, having experienced the impact of historical bias at Herstmonceux as revealed by a system upgrade, has set out to determine whether or not any or all of the ILRS stations have produced biased data at some level during the last two decades. The underlying principle of the approach that we developed is that it is imperative to allow the observations from each station to determine in a simultaneous dynamical solution both its coordinates and an estimate of any range bias. Note that it is not intended to detect ephemeral bias in just a few passes or for a few days; rather we are interested in long-term effects. In this way potential bias, which may otherwise have been absorbed in station coordinates taken from the ITRF, remains free to be determined independently using the LAGEOS satellites.

**Next steps.** At the Matera 2015 ILRS Technical Workshop, several action items were discussed regarding the identification, mitigation and communication of systematic issues in the Network. **Specifically, the NSGF AC was tasked**, in consultation with other interested groups, primarily DGFI and GRGS, **to draft a pilot project to be undertaken by all the ACs** to inform a decision ultimately to be taken by the AWG leadership on how to mitigate the bias issue in the ILRS routine products. As a result, three steps are proposed:

1. All ACs to use their code to determine daily EOPs and weekly station coordinates and weekly range bias for ALL tracking stations using the LAGEOS satellites for the test period of 2005-2008 inclusive. Station range bias values should be determined BOTH from combined LAGEOS+LAGEOS-2 ranges AND from LAGEOS and LAGEOS-2 separately; i.e., two solution runs of four years each
  - a. To aid the subsequent comparisons of the results, and to determine independent bias values, it is recommended that no a-priori bias be applied from, for example, the data handling file.
2. Each AC to experiment with the averaging intervals necessary to determine **from their weekly solutions** best estimates of underlying station bias, ideally taking account of the epochs of known technical changes at each station.
3. Each AC to report their results and recommendations at the AWG meeting to be held during EGU 2016 in Vienna.

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