

3.6.1.2 Institut Géographique National (IGN)

The IGN ITRS Combination Centre concentrated its activity during the year 2007 on the analysis of new, post ITRF2005 data. More specifically two main analyses were performed:

- Assessment of the IVS VLBI scale behaviour using new re-processed 24-session solutions where the mean pole tide correction was applied;
- Assessment of the quality of local ties in an ITRF-like combination.

Assessment of IVS VLBI and ILRS SLR scales with respect to ITRF2005

After the release of the ITRF2005 it was discovered that the IVS VLBI solutions included in the ITRF2005 construction did not include the mean pole tide correction as recommended by the IERS Conventions 2003. This correction seems to produce a constant offset of 0.5 ppb on the VLBI TRF scale. The IVS generated a new VLBI time series of 24-hour sessions that include the mean pole tide correction. This new series was analysed by the usual stacking procedure. Figure 1 illustrates the IVS VLBI scale behaviour over time with respect to ITRF2005 showing clearly the 0.5 ppb offset. We note the poor VLBI scale estimate in the early dates, whereas it stabilizes after 1988. These new results demonstrate that the scales of IVS VLBI and ILRS SLR solutions included in the

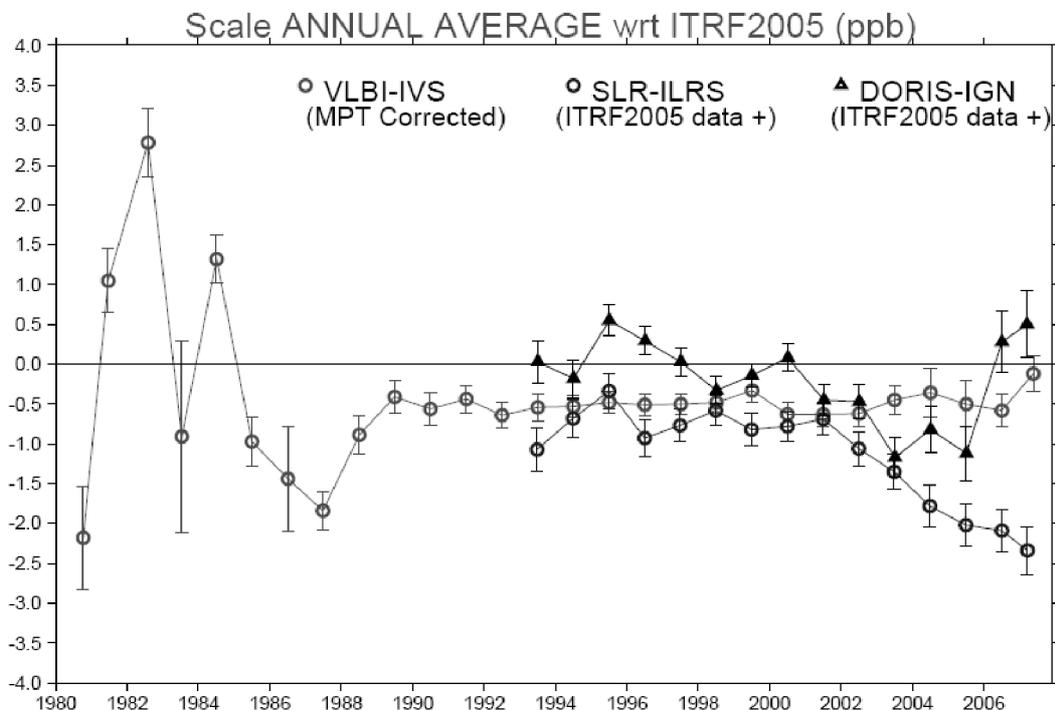


Fig. 1: IVS (mean pole tide correction applied), ILRS (ITRF2005 augmented by recent data) and DORIS-IGN (ITRF2005 augmented by recent data) scale annual averaged variations with respect to ITRF2005.

ITRF2005 combination could not be equal. In addition, data supplied for ITRF2005 augmented by recent weekly solutions from ILRS and DORISIGN were also stacked with respect to ITRF2005. The ILRS SLR scale behaviour shown in Figure 1 after or around the year 2002 still exhibits a significant drift which is certainly due to many factors, including the ILRS network changes, the geographic distribution of SLR observations and the range bias effects. From Figure 1, it could easily be seen that fitting a line over the ILRS scale yields a scale bias of about 0.5 ppb at epoch 2000.0 with respect to the new IVS VLBI solution. The ILRS is working on new reprocessed solutions where the range bias corrections have been re-evaluated for all ILRS stations. Figure 1 displays also the DORIS IGN scale behaviour over time which seems to be close to IVS scale, although it is more scattered.

Assessment of the quality of local ties in an ITRF-like combination

In order to evaluate the quality and the impact of local ties in the ITRF combinations, we selected here the most pertinent sites connecting GPS, SLR and VLBI co-located stations. Using the local ties of these co-located stations, we elaborated an ITRF2005-like combination and computed the Weighted Root Mean Scatter of the tie residuals in East, North and Up components. This test combination involves 22 GPS-SLR and 29 GPS-VLBI tie vectors. Note that GPS network enforces the connection between VLBI and SLR,

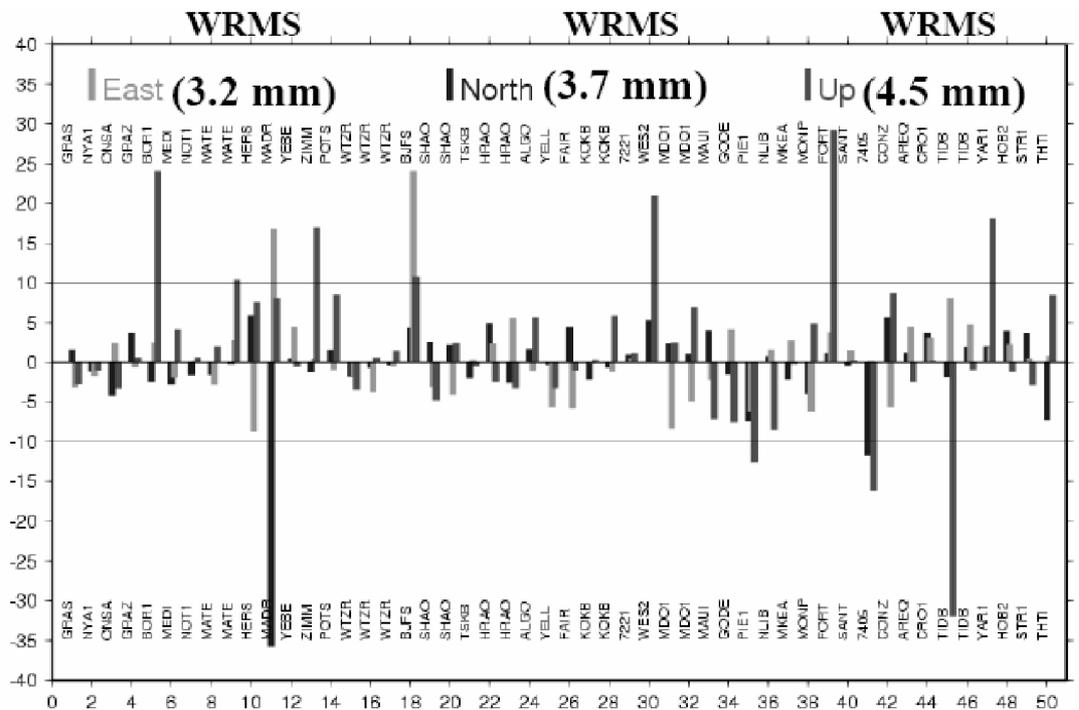


Fig. 2: Local tie residuals as results of an ITRF2005-like combination.

given the fact that there are 7 usable VLBI-SLR co-locations only, a very small number to allow reliable connection between these two techniques. As results of this test combination, Figure 2 illustrates the local tie residuals over the 51 involved sites, indicating that the local tie quality (in terms of WRMS) is at the level of 3–5 mm. Figure 2 exhibits also differences larger than 1 cm for approximately 20 % of the involved co-locations. We recall here that the usual ITRF combination incorporates the local ties with appropriate weighting in order to avoid contaminating the ITRF solution with the tie errors. Note also that the ITRF2005 combination involved about 100 SINEX files of local ties where about 45 % of them are with full variance covariance information.

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