

3.6.1.2 Institut Géographique National (IGN)

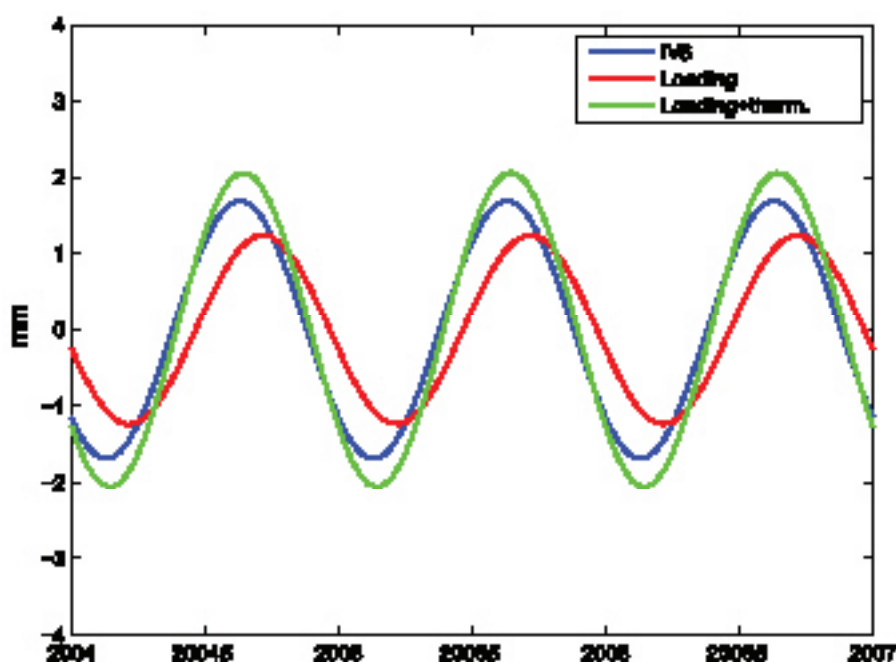
Report for 2008

This report summarizes the activities of the IGN combination centre during the year 2008. Some results are also presented in the ITRS Centre section, see 3.5.5, that complete this section.

Data analysis

With interaction of IERS Analysis Centres (AC), individual solutions from the different techniques are frequently evaluated and tested in order to improve the individual analyses as well as the ITRF combination. GPS solutions from MIT, NGS and GFZ Analysis Centres (ACs) have been analyzed to study the origin and scale information of some GPS terrestrial reference frames (Altamimi and Collilieux, 2008). Such analysis are regularly conducted for the combined solutions delivered routinely by the international technique services, namely, the International VLBI Service (IVS), the International Laser Ranging Service (ILRS), the International GNSS Service (IGS), and the International DORIS Service (IDS) (Altamimi, 2008a, 2008b, 2008c, Collilieux and Altamimi, 2008). The study of translation and scale parameter time series is of primary importance for the ITRF datum definition. Collilieux (2008) has built synthetic position time series that have been combined accordingly to ITRF combination procedure. It has been shown that translation and scale factor non-linear variations can not be fully explained by a loading displacement model. However, scale factor annual variations has been mostly understood thanks to that methodology, see Figure 1.

Fig. 1. Blue: IVS scale factor annual variations. Red: Scale annual variation due to loading displacement of VLBI stations (Loading model from Tonie van Dam, University of Luxembourg). Green: Scale annual variation due to loading displacement of VLBI stations and thermal deformation of VLBI telescopes.



Combination test Combination tests have been performed to study the impact of local ties (Altamimi, 2008c). Assuming that total tie errors are at the level of 4 mm, it is proved that 16 minimum well distributed co-location sites are needed for to tie the technique global frames at the millimetre level. Ideally 32 sites are needed for redundancy and reliability.

- References**
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Report for 2009

This report summarizes the activities of the IGN combination centre during the year 2009. These activities are mainly related to the ITRF2008 pre-analysis using the TC submitted solutions presented in the ITRS Centre section, see 3.5.5.

Data analysis

With interaction and communication with the Combination Centers of the TCs, the IERS IGN Combination Center operated pre-analysis of the individual TC solutions submitted to the ITRF2008. These pre-analyses showed some deficiencies in some TC solutions and therefore the Combination Centers of the TCs generated updated solutions which caused a certain delay in the ITRF2008 production process. The first step consists in operating data analysis of each individual technique solution, allowing to evaluate the individual station behaviour regarding linear and non-linear station motions. Discontinuities in the station position time series are then localised and introduced in the accumulation (rigorously stacking) of the time series. Sites with multiple stations and discontinuities are then constrained to have a unique velocity, except sites where Earthquakes have taken place. This first step is also an efficient tool to evaluate the temporal behaviour of the frame parameters, especially the physical ones: origin and scale. The two ITRS CCs have also operated comparisons between their intra-technique cumulative solutions.

ITRF2008P combination test

A preliminary combination test was generated, called ITRF2008P and made available to the TCs for evaluation. From this preliminary combination an assessment of the ILRS SLR origin temporal behaviour is illustrated by Figure 1. This figure shows that the origin components around the three axes are much more scattered between the start of SLR data in 1983 and 1993, compared to the period afterward. This feature is to be related to the use of one satellite (LAGEOS I) data in the first period, whereas the second period makes use of the two LAGEOS satellites data.

The assessment of the scale agreement between VLBI and SLR submitted solutions is illustrated by Figure 2. From this figure we can see that the level of agreement between the two solutions is about 1ppb. The figure also shows the scale of the IDS DORIS solution, which is situated in between VLBI and SLR scales, although it is closer to VLBI than to SLR. As also illustrated by this figure, the ITRF2005 scale is about 1 ppb higher than ITRF2008P.

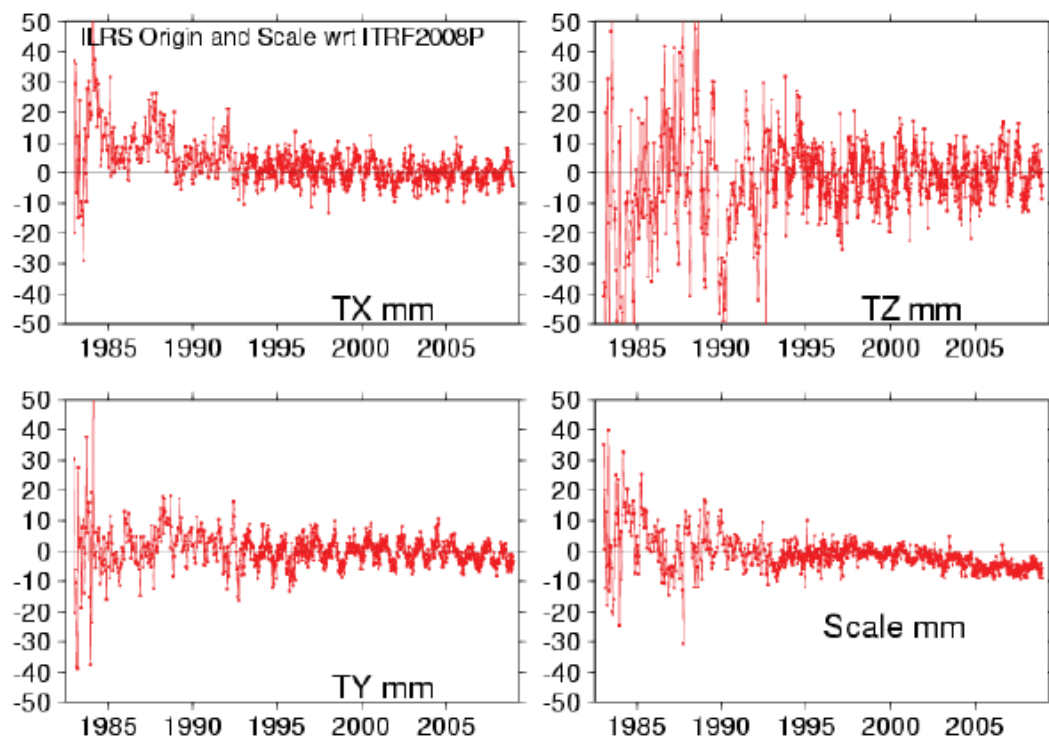


Fig. 1: ILRS SLR origin and scale factor components with respect to ITRF2008P

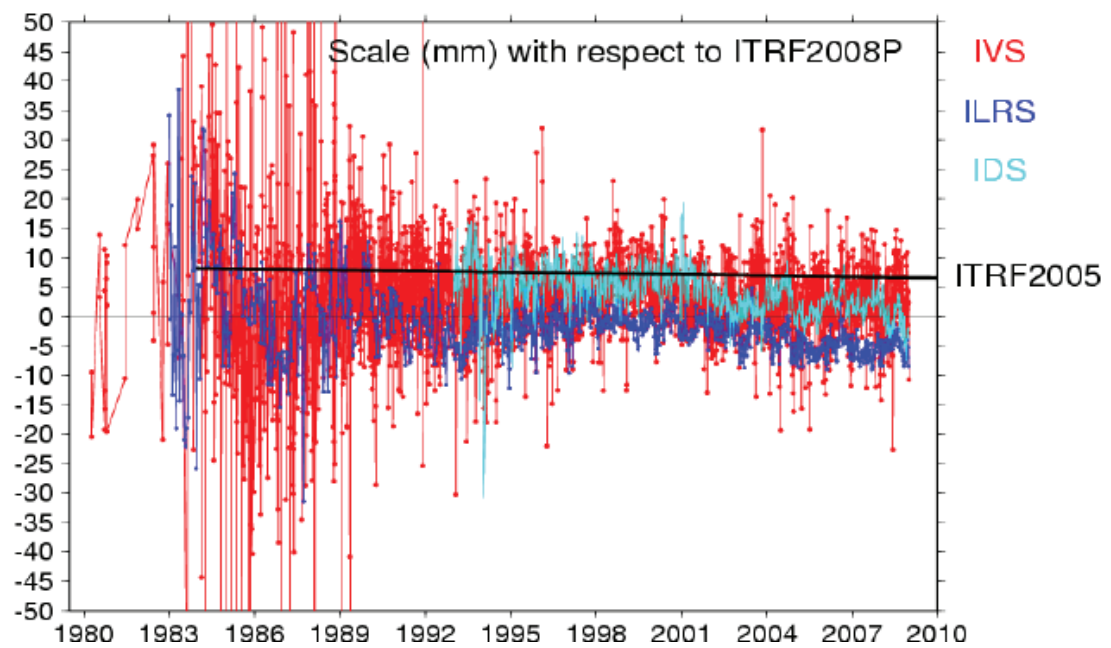


Fig. 2: VLBI, SLR and DORIS scale temporal variations with respect to ITRF2008P

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