

3.6.1.2 Institut Géographique National (IGN)

The IGN ITRS Combination Centre and the IGN Combination Research Centre concentrate their activities on software enhancement, new combination strategy development and regular analysis of Global TRF solutions as well as time series (weekly/monthly) solutions of TRF and EOP. The experience gained in time series analysis leads to the conclusion that the upcoming ITRF solution should combine TRF and EOPs, based on times series (weekly or monthly) of TRF and EOP of the individual techniques. It is preferable to use weekly solutions in order to better monitor station non linear motions. The EOP parameters resulted from this combination would be used then to recalibrate the current IERS C04 series, so that ITRF and IERS EOP consistency will be ensured.

Data analysis and Software enhancement

With interaction between IGN ITRS CC and Technique Centers as well as their individual Analysis Centers (AC), individual VLBI, SLR, GPS and DORIS solutions are frequently evaluated and tested, in order to improve the individual analyses as well as the ITRF combination. Thus both the individual ACs as well as the IGN ITRS CC regularly test new analysis strategies. This cooperation between the individual ACs and the ITRS Center is vital for quality control and improvement of IERS products. To achieve this goal, the software package Combination and Analysis of Terrestrial Reference Frames (CATREF), developed by the ITRS Center, is regularly updated and enhanced in order to perform proper analysis of the different solutions performed by the ACs. In particular modeling of the Earth Orientation Parameters (EOP) is now included in the CATREF software, to be able to combine concisely and coherently station positions/velocities and EOPs.

Contribution to the IERS Workshop 2002

The contribution of our centre to the IERS Workshop was concentrated on multi-technique combination of time series of station positions and Earth Orientation Parameters. Time series of TRF and EOP solutions for the year 1999 submitted to the SINEX combination campaign were analysed:

- SLR: ILRS Pilot Project Monthly Solutions provided by ASI, CSR, DGFI and JCET analysis centres
- GPS: IGS weekly combined solutions
- VLBI: GSFC and BKG 24h-session SINEX files
- DORIS: IGN/JPL weekly solutions

The strategy adopted for TRF and EOP time series analysis is basically to:

- Apply minimum constraints equally to all loosely constrained solutions (all SLR solutions)

- Use as they are the minimally constrained solutions (GPS, VLBI, DORIS)
- Perform per-technique combinations (TRF + EOP), all expressed in ITRF2000 using equations of minimum constraints
- Combine the per-technique combinations adding Local ties
- Estimate variance components and iterate as necessary

Figure 1 illustrates the polar motion post fit residuals, per technique, as result from the combinations for the year 1999.

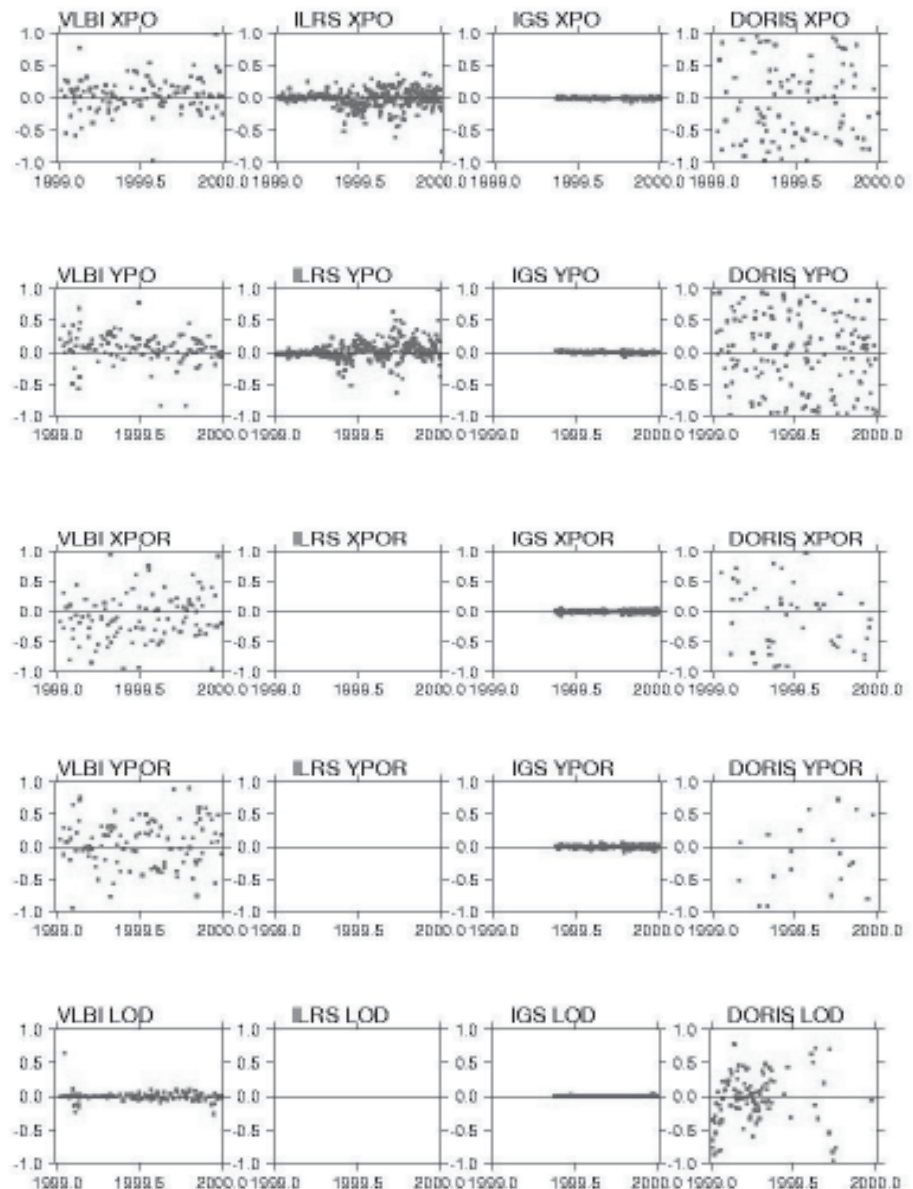


Figure 1: Post fit residuals as results from 1999 TRF and EOP multi-technique combination

For further information, see also the report of the ITRS Centre at IGN (section 3.5.5).

Publications

Altamimi Z., P. Sillard and C. Boucher, ITRF2000 : A New Release of the International Terrestrial Reference Frame for Earth Science Applications, JGR, 107(B10), 2214, doi:10.1029/2001JB000561, 2002.

Altamimi Z., P. Sillard and C. Boucher, ITRF2000 : From Theory to Implementation, V Hotine Marussi symposium, Matera, Italy, 2002.

Altamimi, Z., P. Sillard and C. Boucher, The Impact of a No-Net-Rotation Condition on ITRF2000, GRL, 30(2), 1064, doi:10.1029/2002GL016279, 2003.

Altamimi Z. and C. Boucher, Multi-technique Combination of Time Series of Station Positions and Earth Orientation Parameters, Proceedings of the IERS Workshop, Munich, 2002 (IERS Technical Note No. 30), Frankfurt am Main 2003, in press.

Altamimi Z., C. Boucher, H. Drewes, R. Ferland, K. Larson, J. Ray, M. Rothacher, Combination of station positions and velocities, Proceedings of the IERS Workshop, Munich, 2002 (IERS Technical Note No. 30), Frankfurt am Main 2003, in press.

*Zuheir Altamimi, Claude Boucher, Martine Feissel-Vernier,
Patrick Sillard*