

IERS Workshop on Combination, GFZ Potsdam, 10 – 11 October 2005

Session 2

Weekly solutions: station coordinates, non-linear station behaviors, systematic effects, etc.

Erricos C. Pavlis (1), Richard Biancale (2)

(1) *Joint Center for Earth Systems Technology, UMBC and NASA Goddard SFC, USA*

(2) *CNES, France*

Introduction

With the exception of the VLBI technique, all space geodetic techniques are by now delivering to IERS weekly solutions (WS) in the form of SINEX files. Some of the techniques (e.g. IGS) had a lot of experience with this production process, while others are still working on fine-tuning their system (e.g. ILRS). This session of the IERS CPP workshop will focus on the problems and issues faced by all techniques in striving to deliver timely weekly products of high and consistent quality. We would like to hear about the status of the process within each technique's pool of ACs and the way each of them has attempted to address and solve problems. The session is not so much about results, as it is about the means by which we all get our results. This paper will not look or sound so much as a position paper either, but rather a list of some of the issues that we would like to have discussed during the session. The reason is quite obvious, not a single technique can prescribe to others how to do their analysis, although each one of us can certainly benefit from the corporate wisdom of the entire group. We thus do not attempt to propose any "fixes" to the current state-of-the-art, but rather to open the discussion to all, so that we hear about the problems and the solutions from those who feel they have something to contribute to the discussion of the issues to be raised during the session. At this time, all of the techniques reached the point of contributing to the ITRF2004 pool of data and have had some feedback about their contributions. It is therefore high time to discuss what we have learned during this process and what is still outstanding problems. How we can modify the current procedure (if deemed appropriate) and what should we try to improve.

State of things

We would like to know which techniques do provide weekly solutions at the moment, which will be doing so soon (and by when), and which cannot do so (and why), and of course the repercussions of all these vis-à-vis the ITRF2004 development process.

Contributors must provide information on the quality of their WS as operational products and compare that to solutions for similar intervals but generated under a more relaxed schedule, where analysts have the time to repeat the solution several times and to investigate any problems in depth. Is the result worth the delay? Can we improve the product significantly by delaying the delivery by (say) one week? Are we likely to pick-up more data, are they going to be significant? Do we really need the update of the TRF at the end of each week? What would happen if we had a two-tier process: a rapid product (pretty much what we do now) and a more definite one, a week later, with more definite contributions from all techniques. Is this of interest to the community? Would the various techniques' ACs and CCs be able to

respond to such a request? Is the SINEX approach the only one we want to adopt? Are we neglecting other ways of weekly TRF development and maintenance? Alternatives?

Modeling and Analysis

IERS recently overhauled their standards, models and conventions, all encapsulated in the IERS Conventions 2003. Some of the ACs implemented all or part of these new models, procedures, etc., others only in part, and perhaps there are some who are still using older versions. As we are gearing towards highly sophisticated TRF definitions and we push the accuracy to the limit, consistency and fidelity of the underlying models, etc. across techniques and within each technique is crucial. We would request each of the ACs from all techniques to produce a standard file describing the models, constants, procedures, parameterization, statistical information, etc. that are implemented and used in their operational production line. Similarly, we would like to have a summary of the procedures that the various CCs use in their combination process, the tests that they perform on the incoming solutions, the problems they possibly face with contributions from the individual ACs and how they cope with that, and the standards with respect to which they “test” the incoming contributions. It is of interest also to state the actions they take when they discover any problems, so that we can ensure that these are consistent across techniques and CCs.

The individual ACs are the first place where the data is analyzed, everyone else on the rest of this long chain of processing towards the final TRF are dealing with reduced forms of the data, covariance or normal equations matrices. It is therefore of interest to hear and discuss the problems (if any) that are encountered at these ACs and the means by which they resolve them. These may include, data quality/quantity/timeliness issues, ancillary information timely availability and fidelity (e.g. local site information, system information, target information, etc.), model availability and implementation in their s/w, automation level of their processing, QC procedures of their products, etc. As we have now moved to weekly processing as the main building block of the TRF, we welcome comments from the individual contributors on the stability of their solutions (network and data adequacy), the relative quality of the parameters they adjust for (level of sensitivity across the spectrum of their parameters), and the measures taken to assure that the contributed information contains as much information gleaned from the data as possible, yet without compromising the quality of the solution in general (theoretical and practical estimability of the solve-for parameterization). Along these lines, it is important that we evaluate the relative weight of the applied constraints across techniques, on all of the estimated parameters (“looseness” of contributed SINEXs).

It would be beneficial to all participants if all ACs and CCs could submit the pages with the description of their present procedures, standards, models, etc. in advance of the meeting. We can then distribute them and discuss them during the meeting and perhaps even conclude with some concrete and sound recommendations for all, as well as to individual contributions.