

3.7.3 Working Group on Prediction

Introduction

The IERS Working Group on Prediction (WGP) was tasked to determine what Earth orientation parameter (EOP) prediction products are needed by the user community and to examine the fundamental properties of the different input data sets and algorithms (see IERS website <<http://www.iers.org/MainDisp.csl?pid=167-1100082>>). The task to determine what prediction products are needed by the user community has been answered by means of the EOP prediction survey developed by the WGP. Broad participation in the survey was solicited by IERS from those on the IERS mailing lists, those who receive IERS Rapid Service/Prediction Center (RS/PC) products, and any others thought to have an interest in EOP predictions (see IERS Message No. 104). The task to understand fundamental properties of input data sets and algorithms is in progress. A repository for data sets and results was established at the University of Luxembourg, input data sets were identified and placed in the repository, algorithms were identified, and information on various algorithms was gathered. A session on “Prediction, Combination, and Geophysical Interpretation of Earth Orientation Parameters” was part of the 2007 Journées meeting in Meudon, France. At the close of that session, a panel drawn from the membership of the WGP discussed critical issues that need to be resolved for progress to be made in EOP prediction.

WG Meetings

Because the Journées meeting is an important forum for researchers in the fields of Earth rotation, reference frames, astrometry, and time, significant WGP participation was anticipated and one purpose of the scheduled EOP prediction panel discussion was to solicit input and suggestions from the other conference attendees on the topics being considered by the WGP. The WGP met on 18 September 2007 after the closing of the Journées conference to discuss feedback from the panel discussion, plans for the repository, and comparison criteria for algorithms.

Additional informal meetings among the WGP members were held at the 2007 April European Geophysical Union (EGU) meeting in Vienna and at the 2007 December American Geophysical Union (AGU) meeting in San Francisco. Survey results, input data considerations, algorithm considerations, methodology for making comparisons, and future plans were discussed.

EOP Prediction Survey Results

Given the variety of high-precision applications that need EOP predictions, the first task of the WGP was to determine whether the current IERS products are adequate or whether modifications and/or improvements are necessary to meet more stringent requirements. To understand the needs of various users, the survey re-

spondents were asked to characterize what type of user they were and then to specify their requirements in terms of desired accuracies and characteristics of EOP predictions. Although each category of user has different needs, the survey confirmed that most users need polar motion accuracies of 1 milli-arcsecond or better and UT1–UTC accuracies of 0.1 millisecond or better. The survey also confirmed that there is a large group of operational users that need daily predictions, tabular data, one-day spacing, and predictions up to 30 days. Although some users would like long-term predictions, the terms of reference under which the IERS RS/PC operates has been reconfirmed by the survey results. However, there is a need for increased accuracy and the efforts of the WGP to examine algorithms and incorporate potential new sources of data appears to address that need. In addition there seems to be a growing interest in daily and sub-daily predictions which require more timely measurements of EOP quantities and some increased processing capability.

WG Activities

The EOP prediction survey results were summarized in a paper given at the EGU Meeting in Vienna. Although much work on input data sets and algorithms has been accomplished, significant effort remains to complete a comprehensive assessment of the current state-of-the-art. Several questions remain such as loss of information if all data sets are reduced to a common epoch and the sensitivities of missing data sets to the prediction process. Geodetic data sets are available but additional geophysical data sets are needed for testing. In terms of algorithms, additional tests need to be run to determine their robustness in the event of certain pathological situations and their reliability in an operational setting. Specific algorithm questions remain with respect to problems associated with individual prediction methods. Future plans include determining optimum parameters for combination prediction algorithms, geophysical causes of prediction errors, and examining pathological timeframes for prediction. Other areas of investigation/issues are identified in the papers of session IV of the Journées meeting (esp., *Proc. Journées Systèmes de Référence Spatio-Temporels* 2007, pp. 200–201). The expectations of the WGP are to have definitive user requirements, a comprehensive look at prediction methods, a comprehensive look at new data sets, and to produce an IERS technical note describing current-state-of-the-art EOP prediction.

For a detailed summary of the activities of IERS Working Group on Prediction through September 2007, see *Proc. Journées Systèmes de Référence Spatio-Temporels* 2007, pp. 145–150.

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Future Meetings

In order to minimize travel costs, the WGP will continue to utilize the opportunity to meet in conjunction with major conferences such as the EGU in the spring and the AGU in the fall. However, most interaction among the members will continue to be by electronic means.

William Wooden