IERS Working Group on Prediction

Charter

Introduction

The current Prediction Comparison Campaign (PCC), led by Harald Schuh of the Technical University of Vienna, has shown that an interest exists in the Earth orientation community to explore the potential of different prediction methods. This investigation promises to offer insight into how algorithms work under a set of real-time initial conditions. While this is an important step, it still leaves several important areas unexplored: What are the desired Earth orientation prediction products?; What is the importance of the input data?; Which input data create an optimal prediction?; What are the strengths and weaknesses of the prediction algorithms?; Are there unique interactions between series and algorithms that are beneficial/harmful? These questions are not only of academic interest, but are crucial for improving the IERS prediction of Earth orientation. Answering them could lead to an improved product for the IERS.

This IERS WG on Prediction is designed to build upon the foundation laid by the PCC and also investigate the new data sets from the Combination Pilot Project. A major task of the working group will be to determine what prediction products are useful to the user community in addition to making a detailed examination of the fundamental properties of the different input data sets and algorithms. It should be noted that the Working Group will not repeat the PCC's efforts. Taken together, the PCC and the Working Group create the potential for advancing the Earth orientation community's understanding and allow for the creation of state-of-the-art prediction. It is expected that new improved products resulting from this analysis will replace some of the existing prediction products.

In order to maximize the efforts of the participants, the Working Group will confine its efforts to the prediction of the polar motion components x and y and the Earth rotation measure UT1-UTC. This WG shall work closely with the IERS WG on Combination, the PCC, the Combination Research Centers, and the Technique Services.

Goals and Objectives

The major goals and objectives of the WG are listed below.

1) Determine the desired Earth orientation prediction products

There have been many advances in Earth orientation since the current prediction products were implemented. It is not clear whether the current products are meeting the needs of the Earth orientation community. For example, with the creation of the latest advances in precession/nutation theory, is there still a desire for celestial pole offset predictions? Also what length of predictions would be most useful to the Earth orientation community?

2) Determine the importance of the input data

There are several different potential data sets (VLBI, SLR, GPS, DORIS, LLR, AAM, OAM, HAM). For each of these different sets, there are often data available from different analysis centers. Are these data sets interchangeable (after initialization) or are certain data sets inherently better?

3) Determine which types of input data create an optimal prediction

In order to create the best predictions, it is important to know which of the data sets allow for the best prediction. This will be a function of the noise of the series, the smoothing of the series, and the exact geophysical phenomenon being measured in the series. The right combination of geophysical signals will need to be used to create the best predictions.

4) Determine the strengths and weaknesses of the prediction algorithms

Past experience indicates that it is unlikely that one algorithm would perform better than all others for all circumstances. Therefore, it is useful to know the circumstances that affect specific algorithms. (These circumstances can range from specific prediction conditions to the length of predictions.) Are there ways to mitigate these problems?

5) Determine the interactions between series and algorithms that are beneficial or harmful

It is possible that there might be qualities of certain input series that might make them particularly well suited or poorly suited for certain algorithms. The causes of these interactions should be understood in order to obtain the maximum benefit from each series.

Proposed Structure

Chair of the Working Group
2 Sub-groups
- Sub-Working Group on Input Data
- Sub-Working Group on Algorithms

Working Plan

It is expected that the Working Group can finish its work within the two-year limit stipulated by the IERS. Most of the work will be carried out through e-mail with occasional gatherings being convened in conjunction with other meetings such as the European Geosciences Union or the American Geophysical Union. The proposed working plan is given below:

Month	Action
Mar 2006	Finalize WG participants and organize WG
Apr 2006	Define problems, determine methods to answer questions, assign responsibility, first meeting at the EGU
Oct 2006	Work on providing initial answers to questions
Dec 2006	Summarize progress for presentation at scientific forum and IERS DB
Feb 2007	Reassess progress, refine existing questions or pose additional questions, assign responsibility
Oct 2007	Work on providing definitive answers to questions, meeting at the Journees 2007
Dec 2007	Summarize answers and make recommendations based on results, presentation to IERS DB

Working Group Chair:

William Wooden

Sub-Working Group Chair:

Input Data: Tonie Van Dam

Algorithms: Wieslaw Kosek

List of Members

Data Subgroup:

- Jianli Chen
- Olivier de Viron
- Daniel Gambis
- Richard Gross
- Brian Luzum
- Jim Ray
- David Salstein

Algorithms Subgroup:

- Thomas Johnson
- Maciej Kalarus
- Hansjoerg Kutterer
- Sebastien Lambert
- Zinovy Malkin
- Harald Schuh

Berndt Richter (IERS CB)

Markus Rothacher (IERS AC)