Summary of the Second Earth Orientation Parameters Prediction Comparison Campaign achievements in terms of Earth rotation parameters

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Abstract

The purpose of the Second Earth Orientation Parameters Prediction Comparison Campaign (2nd EOP PCC) was to re-assess the current possibilities of EOP prediction and to identify the most promising forecast approaches. The campaign, which lasted from September 2021 to the end of 2022, involved over 20 institutes from around the world that regularly provided predictions of all EOPs to the campaign office. The received forecasts were continuously evaluated by comparing them with reference data, primarily the 14 C04 series provided by the International Earth Rotation and Reference Systems Service (IERS). During the campaign, we evaluated many different EOP forecasts that were developed based on various advanced prediction algorithms, ranging from simple approaches based on the least squares method to more sophisticated methods applying widely understood machine learning techniques in combination with additional datasets like effective angular momentum (EAM) functions. In this presentation, we provide a summary of the achievements of the 2nd EOP PCC by presenting detailed prediction evaluation results. Specifically, we focus on Earth rotation parameters, that include polar motion (PM), difference between universal and universal coordinated time (UT1-UTC) and its time-dependent derivative, length-of day (LOD). We cluster all the participating predictions, denoted with individual IDs, into groups according to the exploited method and the use of EAM data. Then, we present mean absolute error (MAE) for each individual prediction and all clusters as well. We present how MAE changes for individual methods and groups of methods depending on the analysed parameter, considered period, and the prediction horizon. The results achieved in the campaign are confronted with those received for predictions routinely delivered by IERS. To summarize the results, we present the most promising approaches for each parameter by showing the ranking formulated based on several criteria, such as the number of outlier predictions, the range of differences between prediction and reference, MAE value, and the change in MAE over time. We conclude the presentation with plans for future activities concerning predictions submitted in operational phase of the 2nd EOP PCC but also regarding to the predictions submitted in post-operational phase.

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