Internal sub-campaign within the 2nd EOP PCC to evaluate ML-based approaches

(EOP PML)

Introduction

Considering the significant increase in interest in using machine learning (ML) methods for Earth Orientation Parameters (EOP) forecasting, we plan to organize a special internal sub-campaign as part of the post-operational phase of the Second Earth Orientation Parameters Prediction Comparison Campaign – EOP PML. The purpose of EOP PML is to analyse ML approaches in EOP forecasting in more detail. To objectively evaluate the ML-based forecasting methods themselves without analysing the impact of input data selection, we propose that willing participants submit their EOP forecasts by adhering to even stricter rules than those imposed for the 2nd EOP PCC.

The forecasts submitted by participants of EOP PML will be included in the analyses routinely conducted by the campaign office as part of the 2nd EOP PCC. This includes routine analysis and comparison with predictions provided by the regular campaign contributors. These ML-based predictions that will follow the stricter rules will therefore contribute to the overall database of predictions and will be analysed according to the current rules (to compare with existing methods). Additionally, they will also be analysed separately (to evaluate the method itself). Thanks to this, on the one hand, we will be able to continue all 2nd EOP PCC activities with increased number of submissions and, on the other hand, will be capable of evaluating the ML methods in a more detailed and objective manner.

Sub-campaign rules

- EOP PML is not a new EOP PCC, but a part of the post-operational phase of the 2nd EOP PCC.

- EOP PML **is dedicated exclusively to EOP predictions computed based on ML methods.**

- Participants should follow all the rules defined for the 2nd EOP PCC (see document with all instructions here: http://eoppcc.cbk.waw.pl/file-format/) for file naming, units, deadlines for submission of predictions, etc.

- The only difference from the regular 2nd EOP PCC submissions are the **rigidly defined input data and prediction horizon** (given in the table below).

- We plan **two scenarios for EOP predictions: without the use of EAM data and with the use of EAM data.** Each participant can take part in one selected scenario or in both of them. We note that it is also possible to enter the regular campaign with new IDs at any time without adapting to the stricter rules for input data and forecast horizon of EOP PML.

- The rules imposed on sub-campaign submissions are listed in the table below:

	Prediction horizon	Input EOP data	Input EAM data
Scenario 1	**10 days into the future** (plus data for day zero – each prediction file should contain data for 11 days, i.e. observed EOP for day zero followed by predictions for next 10 days)	IERS 20 C04 solution (https://datacenter.iers.org/products/eop/long-term/c04_20/eopc04_20.1962-now) + finals.daily (IAU2000) data produced by USNO and dissaminated by the IERS (https://datacenter.iers.org/products/eop/rapid/daily/finals2000A.daily)	None
Scenario 2	**10 days into the future** (plus data for day zero – each prediction file should contain data for 11 days, i.e. observed EOP for day zero followed by predictions for next 10 days)	IERS 20 C04 solution (https://datacenter.iers.org/products/eop/long-term/c04_20/eopc04_20.1962-now) + finals.daily (IAU2000) data produced by USNO and dissaminated by the IERS (https://datacenter.iers.org/products/eop/rapid/daily/finals2000A.daily)	AAM+OAM+HAM+ SLAM data + 10-day predictions of AAM+OAM+HAM+ SLAM from ESM GFZ (http://rz-vm115.gfz-potsdam.de:8080/repository)

For training dataset, "historical" AAM, OAM, HAM, and SLAM 10-day forecasts can be used. Those data was processed by GFZ for most of the days since May 2023 until now. The data can be accessed via GFZ's FTP archive (ftp://esmdata.gfz-potsdam.de/EAM/archive_forecast) or via the FTP link at http://rz-vm115.gfz-potsdam.de:8080/repository. The archive also contains historical AAM, OAM, HAM, and SLAM 6-day forecasts (from January 2016 until October 2024).

Old 6-day EAM forecasts were renamed to filenames ESMGFZ_*_2024_???F6.asc. The new 10-day EAM forecasts got filenames ESMGFZ_*_2024_???F.asc.

How to join and participate in the sub-campaign:

- Both the 2nd EOP PCC and EOP PML are open to all participants, but the sub-campaign is dedicated exclusively to EOP predictions computed based on ML methods.

- To take part in EOP PML, all interested (both already registered participants of the regular 2nd EOP PCC and new contributors) should register again using the **registration form**, which can be found on the EOP PCC webpage: http://eoppcc.cbk.waw.pl/participant-registration/. In case of interest in participating in the sub-campaign dedicated to the evaluation of ML methods, please check the appropriate box(es) ("Participation in Scenario 1 of EOP PML without EAM" "Participation in Scenario 2 of EOP PML with EAM"). If these boxes are not checked, the registered method will only participate in the regular 2nd EOP PCC activities.

- In reply we will send numerical candidate identifier (ID) and information about an individual account for uploading data, which will be used in the data submission process. One ID applies to one prediction method in one scenario. In the case of registering one method but for two scenarios, two IDs will be provided (one per each scenario). In the case of registering multiple methods, the registration form should be filled the necessary number of times. This is because in the registration form a brief description of the method and the EAM data used (if applicable) should be provided.

- To send the files with predictions, it is necessary to follow the deadlines defined in the document with general rules for participation in the 2nd EOP PCC (http://eoppcc.cbk.waw.pl/file-format/, every Wednesday before 20 UTC), as well as the submission instructions posted on the campaign website (http://eoppcc.cbk.waw.pl/data-submission/).

- Please keep in mind that the names of files with predictions based on new 20 C04 data, i.e. all from the sub-campagn, must have a suffix "_2020" added to the file name, e.g. "eoppcc_999_59976_2020" or "eoppcc_999_59976_p_2020". This rule is not written explicitly in the document with general rules for participation in the 2nd EOP PCC (http://eoppcc.cbk.waw.pl/file-format/) because the transition between 14 C04 and 20 C04 took place after the end of the operational part of the campaign.

- Registration for the EOP PML is open, and **the first submission of predictions in the EOP PML is scheduled for Wednesday, November 6, 2024 (before 20:00 UTC)**.

- Any new candidate is welcomed at any time. We accept and encourage collaborative efforts across different institutes.

Useful links:

- EOP PCC website: http://eoppcc.cbk.waw.pl/

- Registration form: http://eoppcc.cbk.waw.pl/participant-registration/

- Document with general rules for participation and file format specification: http://eoppcc.cbk.waw.pl/file-format/

- Instructions for data submission: http://eoppcc.cbk.waw.pl/data-submission/

- IERS 20 C04 solution: https://datacenter.iers.org/products/eop/long-term/c04_20/eopc04_20.1962-now

- finals.daily (IAU2000) data produced by USNO and disseminated by the IERS: https://datacenter.iers.org/products/eop/rapid/daily/finals2000A.daily

- EAM data produced by GFZ: http://rz-vm115.gfz-potsdam.de:8080/repository

Contact

In the case of further questions, please contact EOP PCC Office via e-mail (eoppcc@cbk.waw.pl) or contact form (http://eoppcc.cbk.waw.pl/contact/).