Earth Rotation Service is working

The Network Earth Rotation Service ($\mathcal{NERS}$) consists ot two segments: server and client.

NERS server segment

The $\mathcal{NERS}$ server segment checks every hour for updates of input Earth orientation time series and the output of numerical weather models. If no updates happens, it sleeps for an hour. If an update has happened, the server initiates re-computation of the EOP message. The EOP message consists of six parts:

1. The $\mathcal{NERS}$ configuration: names of the model, URLs of input data used by the server, date of their last update etc.

2. The table of UTC minus TAI function.

3. The coefficients of expansion of IERS C04 time series into B-spline basis for the interval since 197.01.01 to the date of their last availability, typically 30–35 days in the past. The coefficients are computed using IERS C04 time series and provide their interpolation.

4. The coefficients of expansion of Euler angles E1, E2, E3 into B-spline for the interval of end of IERS C04 time series availability through 48–72 hours in the future. These coefficients provide the short-term forecast. The coefficients are estimates with least square using input Earth orientation parameter and the atmospheric angular moment (AAM) time series computed from the numerical weather models in the data assimilation and the forecast modes. The contributing series of E(t) and the AAM are assigned specific weights. The weights are adjusted to provide the best quality of the forecast. The AAM dominates forecast 24–72 hours in the future, while the EOP time series dominates at scales 36 hours and further in the past.

5. The coefficients of expansion of Euler angles E1, E2, E3 into B-spline for the interval from 72 hours to 6 months in the future. These coefficients provide the long-term prediction. The accuracy of the long-term prediction is significantly worse than the

accuracy of the short-term prediction. It is assumed that the long-term prediction will be used only in emergency situation when short-term forecast is unavailable.

6. The coefficients of small quasi-harmonic variations of Euler angles E1, E2, and E3. These are computed from analysis of space geodesy data and are updated 4–6 times a year.

The message is formatted as a binary file and is accessible for downloading via the HTTP interface.

NERS client segment

The *NERS* client segment provides a library that computes the Earth rotation matrix or the Earth orientation parameters from the NERS message and several executables. The client library performs three major functions:

*   It manages the local copy of the *NERS* message. When the *NERS* gets a request to provide the Earth's rotation matrix, it first checks the local copy of the message. If the message does not exist, the client automatically downloads it from the *NERS* server. If it exists, it check its age. If the age is old than the threshold specified in the control file, the client checks the age of the message at the server.

If the message at the server is newer, the client will automatically download it from the server and replaces the local copy.

- It reads, parses the local copy of the *NERS*, and using the coefficients computes the Earth rotation matrix or other Earth orientation parameters.
- It supports internal bufferization. A typical use case is computation of the Earth's rotation matrix in a cycle for a number of epochs within the specified time range. In order to minimize computation time, the client expands the requested parameter over B-spline basis within the specified time range. The client will uses these B-spline coefficients for a consequent request to compute the Earth's rotation matrix or other EOPs. It will also check the age of these B-spline coefficients, and if the age exceeds the threshold, it will check whether the *NERS* message is newer.

The executables provide the command-line interface to *NERS* library. They parse input parameters, call routines of *NERS* library and print out the output. These executables serve as examples or can be called from other programs or interpreters when fast execution time is not required.

NERS Internet services

The $\mathcal{NERS}$ supports several Internet services:

- Web interface to [computation of the EOP value](#) on the specified moment of time.

- Web interface to [computation of the EOP time series](#) on the specified time interval and time step.

- Web interface to [computation of the EOP values](#) at the current moment of time that is automatically updated every 10 seconds.

These services have a web form that runs $\mathcal{NERS}$ executables at the server. They can be used interactively by filling the form manually, of using via [wget](#), [curl](#), or other tools for automatically retrieval the results of parsing form as it [is explained here](#).

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