

Introduction

The aim of ERIS, as part of the research unit "Earth rotation and Global Dynamic Processes (FOR 584)", is to describe the rotation of the "System Earth" taking into account the influence of the various sub-systems of Earth, e.g. ocean, atmosphere, etc.

Up to now ERIS provides:

- **Observational and analytical data:** structured access to all relevant and available data produced by several institutions and organisations
- **Methodological information and interactive tools:** Interactive analysis and visualization of data allowing to execute typical and frequently needed operations on the available datasets

ERIS follows a holistic approach to describe the Earth rotation by aggregating datasets and models coming from various fields of geosciences in heterogeneous formats. ERIS will provide standardization of data and metadata and connect them with (at least) standardized description of models. This will enable the application of interoperable tools for enhanced network based data access, data visualization and data analyses, etc.

To realize this ambitious approach the main tasks of ERIS are:

- Data - Standardization and networking
- Interactive Tools - From Data to Knowledge
- Simulations and descriptions - Illustration of Earth rotation

The main modules of ERIS, included in the Web portal *Earth Rotation and Global Dynamic Processes*

www.erdrotation.de

Data - Standardization and networking

- XML based data formats
- ISO conform metadata
- Availability via Catalogue Service Web
- Personalized access to protected data, DOI's for data series

Up to now the portal has prototype character.

Simulations and descriptions - Illustration of Earth rotation

- Parametrized model descriptions
- Modular simulation / visualization engine
- Interactive use via Web portal

Interactive Tools - From Data to Knowledge

- Data selection
- Data visualization
- Data analysis
- Several geodetic / astronomical tools: Reference systems and time systems

Enhanced with information based on scientific publications and dynamically connected with the other components.

Data preparation

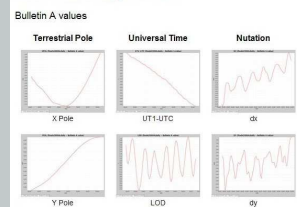
- Transformation of data series (EOP, AAM, OAM etc.) into standardized data formats based on XML
- Generation of several output formats like PDF or HTML from XML versions (realized by applying the XML technology XSLT)
- Generation of metadata for scientific data, using schema-validated XML, too
- Development of interfaces for data networking
- The most important EOP series are actually presented - available for download in different file formats and completed by links to metadata files.

Geodetic and astronomic tools (SOFA)

Data visualization

- Generation of data plots of all versions of the data series presented
- For each series a compendium of plots of all parameters is presented
- Single plots for each parameter are accessible

Plots: Finals Daily IAU2000



Specialized data reader

- Extraction of a single day from EOP data series by entering date as Gregorian date or as MJD
- Access to data series of the IERS data archive (Bulletin A and B, Finals Daily, Finals Data, Finals All, C04)

EOP Reader

This reader presents the EOP-Parameters of a given day. You can choose among most of the series available in the IERS:

- Bulletin A
- Bulletin B
- C04 yearly (IAU 1980)
- C04 yearly (IAU 2000)
- C04 all (IAU 1980)
- C04 all (IAU 2000)
- C04 95
- Finals Daily (IAU 1980)
- Finals Daily (IAU 2000)
- Finals Data (IAU 1980)
- Finals Data (IAU 2000)
- Finals All (IAU 1980)
- Finals All (IAU 2000)

Result

EOP Reader

EOP-Data taken from C04 05:

Date: 11.2008

MJD: 54666

X Pole [arcsec]	-0.000518	err X Pole [arcsec]	0.000012
Y Pole [arcsec]	0.258431	err Y Pole [arcsec]	0.000015
UT1-UTC [sec]	-0.2732645	err UT1-UTC [sec]	0.0014714
LOD [sec]	0.0016341	err LOD [sec]	0.0000019
nutation dx [arcsec]	-0.000433	err dx [arcsec]	0.000002
nutation dy [arcsec]	0.000823	err dy [arcsec]	0.000127

Back to input form

Interactive data analysis tool (screenshot showing a preliminary design)

Application flow via three main steps, accessible via tabs:

- **Data** – load data files
- **Procedure** – run analysis operations
- **Output** – results as data and visualizations

typical and frequently needed operations

Procedures that will be incorporated (in progress):

- Basic statistics (mean, maximum, median, etc.)
- Polynomial, sinus and spline approximations
- FIR filters (high-pass/low-pass/band-pass, Moving-average, derivation)
- Up / down sampling and shifting of the time axis
- FFT, short-time FFT and power spectrum
- Correlation and autocorrelation
- Time / frequency analysis with wavelets

chosen data file

available parameters in the chosen data series

storage of intermediate results

results

Median: 0.025160500000000002

Mean: 0.026337914329483934

Std. Deviation: 0.132152221714752

Min.: -0.30619

Max.: 0.32442

- apply to data series of the ERIS and IERS data archives as well as to own data
- architectural framework based on a classical client-server-approach
- development will be finished in Sept. 2008 and the tool will be available for public use in the beginning of 2009

Future Work:

- **Extended EOP reader:** Extraction of time sections and parameters and export of the resulting data in different file formats
- **Models and simulations:** Simulation and visualisation of basic models of Earth rotation Comparison of simulated data with observational data