

Unification of product formats

Thomas Herring and Laurent Soudarin

Overview

- Three topics to be addressed:
 - EOP formats for different product levels (Bull A, B and C04)
 - Leap second file format: Computer readable version
 - Position time series format for all techniques (Laurent to lead discussion).

EOP File formats

- Existing formats: What should be the nature of the new (additional) formats. Existing formats will be retained and the new format results generated from the existing files.
- Outcome after retreat: How should we proceed in establishing new formats and implementing them.
 - What should the contents be and how web-2.0 enabled should they be (web services)

IERS EOP products page

Earth orientation data

Data / Products

Earth orientation data

Conventions

ICRF

ICRS

ITRF

ITRS

Geophysical fluids data

Search

Service

IERS Components

FAQs

Glossary

Acronyms

Sitemap

Legal & Privacy

Contact

Earth orientation data

Home

Data / Products

Earth orientation data

Earth orientation data

All products are also available at the [IERS FTP Server](#).

Rapid data and predictions

Bulletin A		product metadata	latest version	available versions
Standard EOP data files				
finals.all (IAU1980)		version metadata	latest version	
finals.all (IAU2000)		version metadata	latest version	
finals.data (IAU1980)		version metadata	latest version	
finals.data (IAU2000)		version metadata	latest version	
gpsrapid.out		version metadata	latest version	
Daily EOP data files				
finals.daily (IAU1980)		version metadata	latest version	
finals.daily (IAU2000)		version metadata	latest version	
gpsrapid.daily		version metadata	latest version	

Monthly earth orientation data

Bulletin B		product metadata	latest version	available versions
Bulletin B (IAU1980)		product metadata	publication ceased	available versions
Bulletin B (IAU2000)		product metadata	publication ceased	available versions

Current format problems

- Every product has different formats some of which must be read under format control (i.e., columns run together and so simple column extraction is not possible, Bulletin A).
- Some products have headers (C04/Bulletin B) others do not (Bulletin A: meta data needs to be consulted)
- Units are different between different products
- Potentially, additional “observed” data are not in files.

Date formats

- Current Y M D and MJD are given in Bulletin A and C04 but MJD resolution is different. Integer in C04, 2-decimal places in Bull-A. Both do not given hr mins sec.
 - Recommend Y M D hr min and MJD to 4-significant digits to allow 1 min resolution. This extension will allow sub-daily EOP values.
 - Is this the appropriate time resolution?
- Easily generated from current formats since these are daily values.

File contents

- Current C04 and Bulletin-A have x/y-pole, UT1, LOF, dX/y for nutations with sigmas for each.
- Precisely how the nutation values are generated is not easily discerned from current documentation (VLBI values are irregularly spaced).
- Current system is a little inconsistent in that UT1 and its derivative (LOD) appear, but derivatives of x/y pole do not appear.
 - Since many systems now provide estimates of pole rates (with sigmas), should these values appear in files? (GPS estimates are not constrained to be consistent with pole values and are thus a data type that is currently ignored).
 - This change is more difficult since new data type is needed.

Other content issues

- Current methods of generating the Bulletins are merger of data sets. How easy should it be to compare directly the data and final Bulletin values?
- Can we have one format for both the bulletins and data? Nominally, this would allow easy comparison of data and tables. Epoch times are different in many cases (GPS values at mid-night), but with appropriate values in bulletin files, they could be easily interpolated to data epochs
- Indication of status of values especially status as predicted value, non-definitive etc. Done in Bulletin-A
- Usefulness of old “printed” formats.

Suggestions

- A concise summary of how each product is generated, what its nominal purpose is (e.g., Bulletin B versus C04 for post-processing) and measures of accuracies of the input contributions. These summaries can be found searching around ftp areas etc but should be made more prominent.
- Clear indication of date of generation of the product when this is not clear in file name.
 - Fixed number of header records that given this information (e.g., SINEX style header line; gives start, stop times and date of product generation).
- File naming convention that is clear and can be machine generated (e.g., finals.2000A.daily is easily generated but age of product is not clear. Bulletin number NNN indicates an age but not clear how to generate date.
 - Should “age” be in file name or as header record?
- Comparison statistics and graphics in an easily accessible and marked location (e.g., like orbit and clock rms differences generated by the IGS).
- These topics and implementation plans will be discussed at the retreat and with the new leadership of the IERS.

Issued to be resolved

- Content of common format files:
 - How to express dates, times, resolution of time
 - Which angles and rates to be included
 - How should sigmas be computed and interpreted e.g., should we account for deficiencies in short period models (diurnal and semidiurnal) in sigmas? What about impact from loading and other non-secular signals in certain regions (some effects can have large spatial scales).
 - Data versus merged product results? (Data “corrected” for frame alignments? Values of offsets and rates applied?)
 - Bulletin B/C04 differences? Do we need both?
- Who will generate these uniform formatted files? What will happen to current formats? (Most likely keep for legacy users)
- Naming convention of files? How should this be approached? Time-tagged file but with link to generic name?
- Implementation of web services? (Brian with ultra rapid users)
- Other issues to be considered?

Leap second file

- Suggestion has been made that this file be more computer readable.
- Current contents (next slides)
- **Issues:** Change in the way TAI-UTC was handled until 1972 (two parts to file? Or add zero rate term to current file?)
- Who will update and keep current files?

Start of current file

UTC-TAI.history

RELATIONSHIP BETWEEN TAI AND UTC

Limits of validity(at 0h UTC)				TAI - UTC			
1961	Jan.	1 -	1961 Aug. 1	1.422	818	0s +	(MJD - 37 300) x 0.001 296s
	Aug.	1 -	1962 Jan. 1	1.372	818	0s +	" "
1962	Jan.	1 -	1963 Nov. 1	1.845	858	0s +	(MJD - 37 665) x 0.001 123 2s
1963	Nov.	1 -	1964 Jan. 1	1.945	858	0s +	" "
1964	Jan.	1 -	April 1	3.240	130	0s +	(MJD - 38 761) x 0.001 296s
	April	1 -	Sept. 1	3.340	130	0s +	" "
	Sept.	1 -	1965 Jan. 1	3.440	130	0s +	" "
1965	Jan.	1 -	March 1	3.540	130	0s +	" "
	March	1 -	Jul. 1	3.640	130	0s +	" "
	Jul.	1 -	Sept. 1	3.740	130	0s +	" "
	Sept.	1 -	1966 Jan. 1	3.840	130	0s +	" "
1966	Jan.	1 -	1968 Feb. 1	4.313	170	0s +	(MJD - 39 126) x 0.002 592s
1968	Feb.	1 -	1972 Jan. 1	4.213	170	0s +	" "
1972	Jan.	1 -	Jul. 1	10s			
	Jul.	1 -	1973 Jan. 1	11s			
1973	Jan.	1 -	1974 Jan. 1	12s			
1974	Jan.	1 -	1975 Jan. 1	13s			
1975	Jan.	1 -	1976 Jan. 1	14s			
1976	Jan.	1 -	1977 Jan. 1	15s			
1977	Jan.	1 -	1978 Jan. 1	16s			
1978	Jan.	1 -	1979 Jan. 1	17s			
1979	Jan.	1 -	1980 Jan. 1	18s			

End of current file

1980	Jan.	1	-	1981	Jul.	1	19s
1981	Jul.	1	-	1982	Jul.	1	20s
1982	Jul.	1	-	1983	Jul.	1	21s
1983	Jul.	1	-	1985	Jul.	1	22s
1985	Jul.	1	-	1988	Jan.	1	23s
1988	Jan.	1	-	1990	Jan.	1	24s
1990	Jan.	1	-	1991	Jan.	1	25s
1991	Jan.	1	-	1992	Jul.	1	26s
1992	Jul.	1	-	1993	Jul.	1	27s
1993	Jul.	1	-	1994	Jul.	1	28s
1994	Jul.	1	-	1996	Jan.	1	29s
1996	Jan.	1	-	1997	Jul.	1	30s
1997	Jul.	1	-	1999	Jan.	1	31s
1999	Jan.	1	-	2006	Jan.	1	32s
2006	Jan.	1	-	2009	Jan.	1	33s
2009	Jan.	1	-	2012	Jul	1	34s
2012	Jul	1	-				35s