

Earth Features

De Wiki

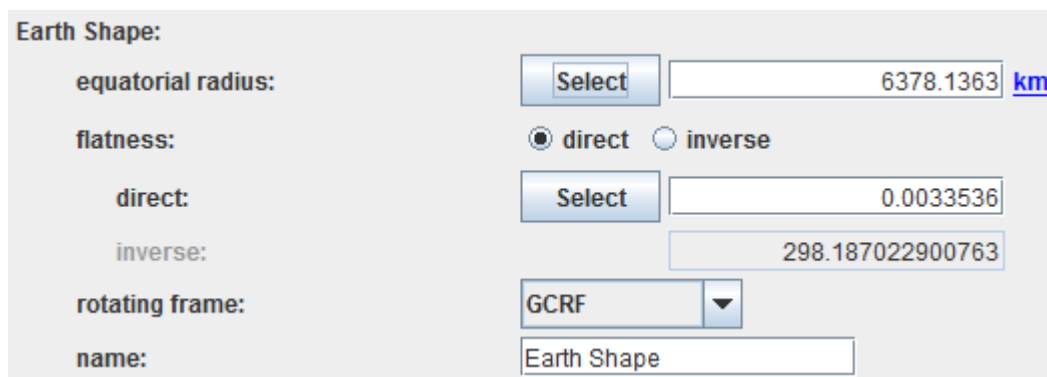
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Earth shape

First, the user will have to define some data relative to the Earth shape and its rotating frame as shown on the next image:



The screenshot shows a configuration window titled "Earth Shape:". It contains several input fields and controls:

- equatorial radius:** A "Select" button followed by a text box containing "6378.1363" and a unit dropdown set to "km".
- flatness:** Two radio buttons labeled "direct" (selected) and "inverse".
- direct:** A "Select" button followed by a text box containing "0.0033536".
- inverse:** A text box containing "298.187022900763".
- rotating frame:** A dropdown menu currently showing "GCRF".
- name:** A text box containing "Earth Shape".

Frames configuration

Frames configuration is, by default, relatively simple as it has been considered the best ratio between precision and CPU time. Anyway, it is possible to make it more complex. Nevertheless, be careful about the EOP corrections as it needs some data provided by [\[PATRIUS_DATASET\]](#) (included in the jar). So, if the data for a given epoch are not available, the propagation will exit with an error status.

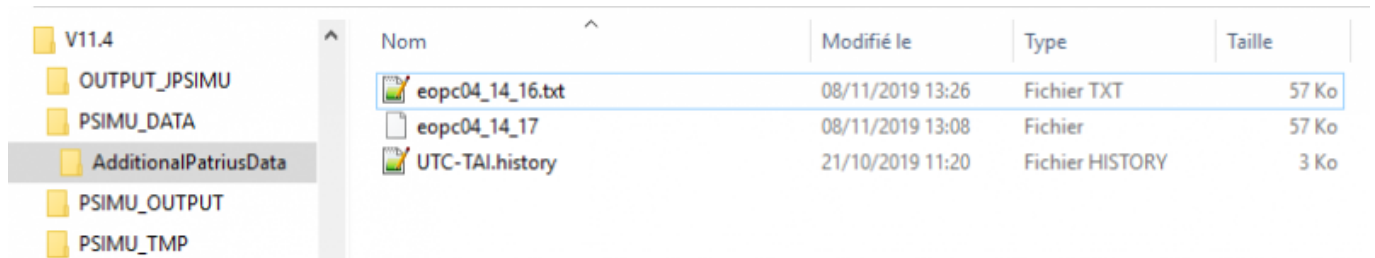
Note : in V11.0, by default configuration is the complex (factory) one.

How to update data

Nevertheless, in order not to wait for a new **PSIMU** version, it is always possible to put additional data (as EOP parameters or a new UTC/TAI gap) to the ones included Inside the [\[PATRIUS_DATASET\]](#) .jar file. This file may be used externally (when used **psimu-xx.x.jar**) or internally (when used **psimu-xx.x-jar-with-dependencies.jar**).

Since V11.4 version

Since this V11.4 version it is really simpler to take into account additional data: we have just to add them in the directory defined by the **ADDITIONAL_PATRIUS_DATA** variable of the psimu.properties file (no need to respect the original hierarchical structure of [PATRIUS_DATASET](#) but be careful to respect the exact names)!

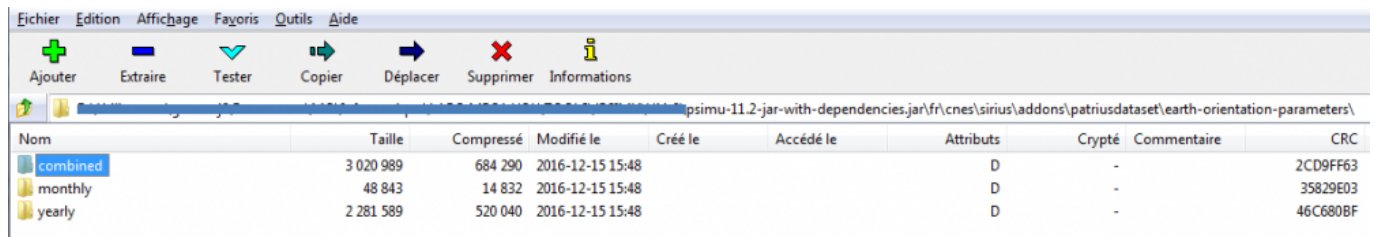


Nom	Modifié le	Type	Taille
eopc04_14_16.txt	08/11/2019 13:26	Fichier TXT	57 Ko
eopc04_14_17	08/11/2019 13:08	Fichier	57 Ko
UTC-TAI.history	21/10/2019 11:20	Fichier HISTORY	3 Ko

For versions previous to V11.4

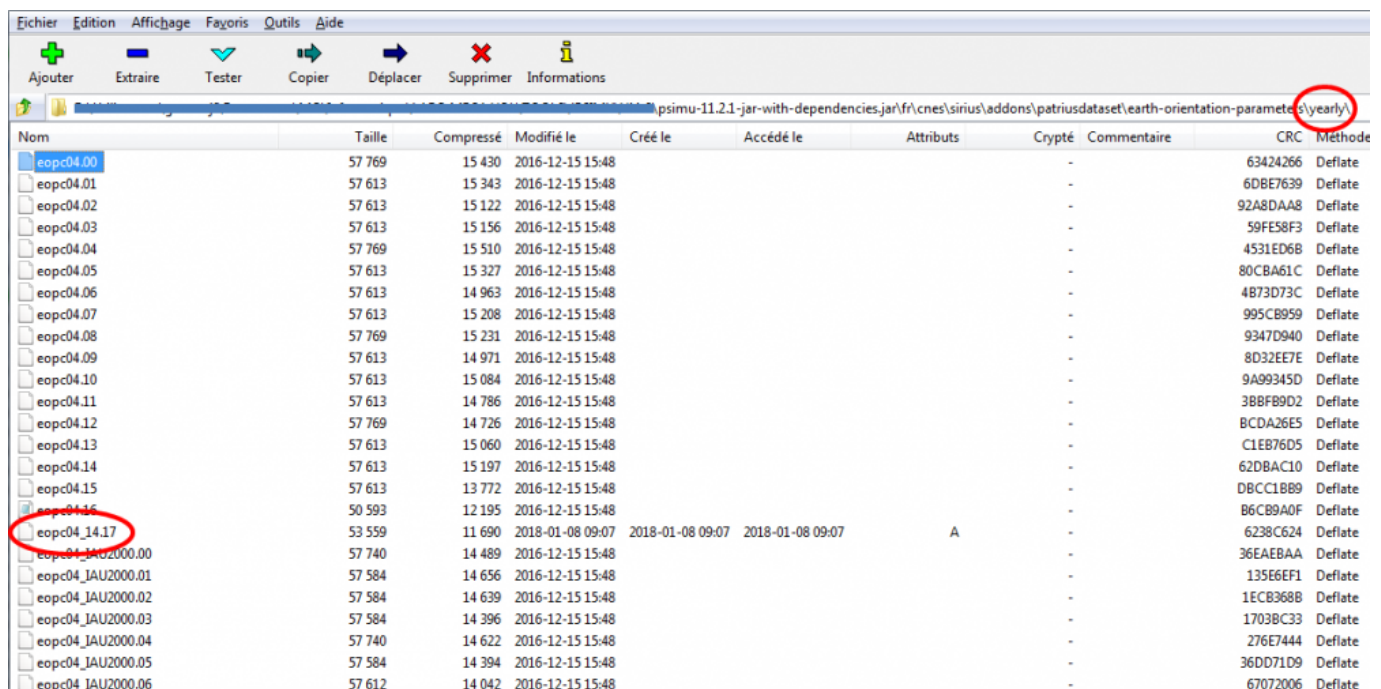
Let us show how to add, for example, some **EOP** data for year 2017.

- First, open the jar file using an application allowing to work with compressed files as [7-Zip](#)
- Then go through the .jar tree to reach the *fr/cnes/sirius/addons.patriusdataset/earth-orientation-parameters* directory ...



Nom	Taille	Compressé	Modifié le	Créé le	Accédé le	Attributs	Crypté	Commentaire	CRC
combined	3 020 989	684 290	2016-12-15 15:48			D	-		2CD9FF63
monthly	48 843	14 832	2016-12-15 15:48			D	-		35829E03
yearly	2 281 589	520 040	2016-12-15 15:48			D	-		46C680BF

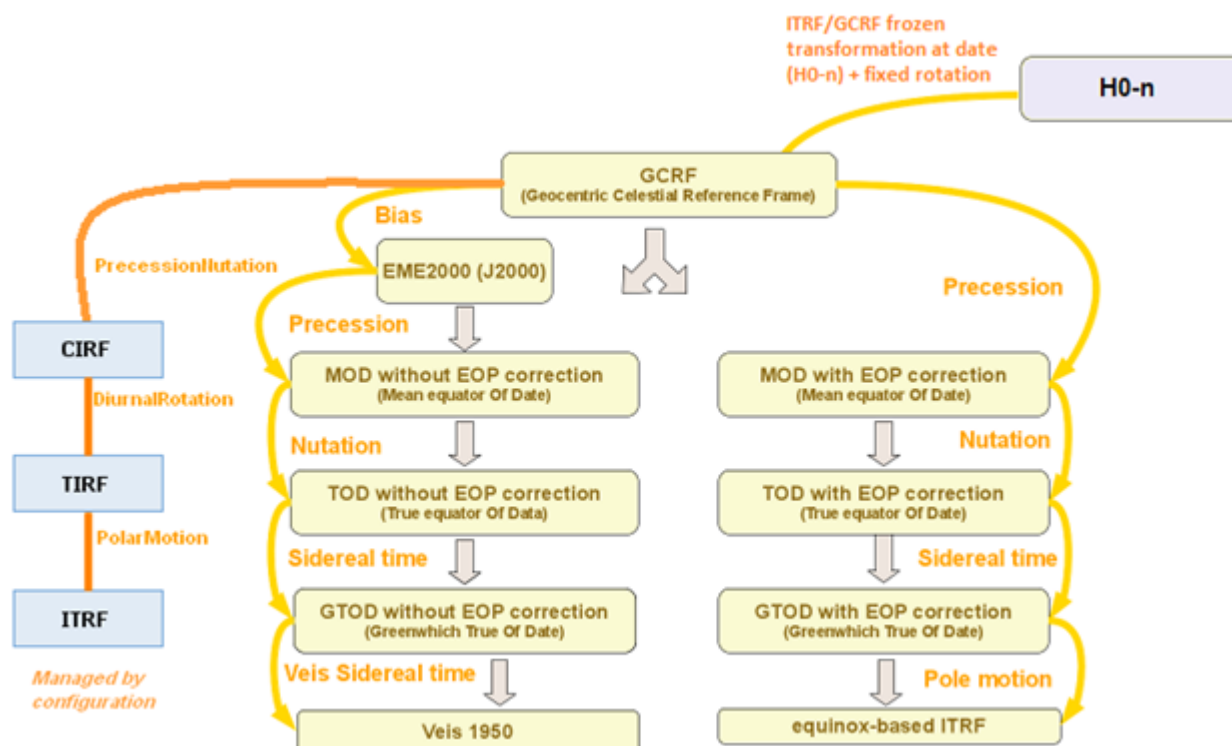
- At last, add inside the *yearly* subdirectory, a file obtained from the [IERS site](#) ... now you are able to propagate during all the year 2017 !



Nom	Taille	Compressé	Modifié le	Créé le	Accédé le	Attributs	Crypté	Commentaire	CRC	Méthode
eopc04.00	57 769	15 430	2016-12-15 15:48				-		63424266	Deflate
eopc04.01	57 613	15 343	2016-12-15 15:48				-		6DBE7639	Deflate
eopc04.02	57 613	15 122	2016-12-15 15:48				-		92A8DA08	Deflate
eopc04.03	57 613	15 156	2016-12-15 15:48				-		59FE58F3	Deflate
eopc04.04	57 769	15 510	2016-12-15 15:48				-		4531ED68	Deflate
eopc04.05	57 613	15 327	2016-12-15 15:48				-		80CBA61C	Deflate
eopc04.06	57 613	14 963	2016-12-15 15:48				-		4873D73C	Deflate
eopc04.07	57 613	15 208	2016-12-15 15:48				-		995CB959	Deflate
eopc04.08	57 769	15 231	2016-12-15 15:48				-		9347D940	Deflate
eopc04.09	57 613	14 971	2016-12-15 15:48				-		8D32EE7E	Deflate
eopc04.10	57 613	15 084	2016-12-15 15:48				-		9A99345D	Deflate
eopc04.11	57 613	14 786	2016-12-15 15:48				-		38BF89D2	Deflate
eopc04.12	57 769	14 726	2016-12-15 15:48				-		BCDA26E5	Deflate
eopc04.13	57 613	15 060	2016-12-15 15:48				-		C1E876D5	Deflate
eopc04.14	57 613	15 197	2016-12-15 15:48				-		62DBAC10	Deflate
eopc04.15	57 613	13 772	2016-12-15 15:48				-		DBCC1B89	Deflate
eopc04.16	50 593	12 195	2016-12-15 15:48				-		B6CB9A0F	Deflate
eopc04_14.17	53 559	11 690	2018-01-08 09:07	2018-01-08 09:07	2018-01-08 09:07	A	-		6238C624	Deflate
eopc04_IAU2000.00	57 740	14 489	2016-12-15 15:48				-		36EAEBA0	Deflate
eopc04_IAU2000.01	57 584	14 656	2016-12-15 15:48				-		135E6EF1	Deflate
eopc04_IAU2000.02	57 584	14 639	2016-12-15 15:48				-		1ECB3688	Deflate
eopc04_IAU2000.03	57 584	14 396	2016-12-15 15:48				-		1703BC33	Deflate
eopc04_IAU2000.04	57 740	14 622	2016-12-15 15:48				-		276E7444	Deflate
eopc04_IAU2000.05	57 584	14 394	2016-12-15 15:48				-		36DD71D9	Deflate
eopc04_IAU2000.06	57 612	14 042	2016-12-15 15:48				-		67072006	Deflate

Frames dependencies

The following diagram explains the links between all considered frames.



Precision vs CPU

In the table below, we can see an example of precision versus CPU time depending on the frames configuration and for a 30 days LEO propagation:

Case	Corrections	Max position error (m)	Max velocity error (m/s)	CPU time (s)
1	All (IERS2010)	-	-	4.24
2	All except EOPs	14.6	1.68E-02	4.02
3	Only Precession-Nutation	14.6	1.68E-02	2.88
4	No corrections	469	5.42E-01	1.97

Here is the example of the "factory" configuration for **IERS 2010**:

Customized frame configuration (GCRF --> CIRF --> TIRF --> ITRF)

Convention: iers2010 ▼

Mode: ☐ custom ☒ factory

Polar Motion (ITRF to TIRF):

Tides Correction: ☒

Option: ☒ interpolated ☐ direct

Libration Correction: ☒

S Prime Correction: ☒

EoPs correction: ☒

Diurnal Rotation (TIRF to CIRF):

Tides Correction: ☒

Option: ☒ interpolated ☐ direct

Libration Correction: ☒

Precession Nutation (CIRF to GCRF):

Precession-nutation Correction: ☒

Constant rotation: ☐

Option: ☒ interpolated ☐ direct

EoPs correction: ☒

EOP history data:

EoPs 2000 History: ☒

Interpolator ☐ HERMITE ☒ LAGRANGE4 ☐ LINEAR

Récupérée de « http://psimu.cnes.fr/index.php?title=Earth_Features&oldid=831 »

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