Updates for SOFA Release 17 : 2021 January 25

Summary of Changes

The changes fall into the following categories:

(1) Extra defensive precautions when computing atmospheric refraction at low altitudes.

(2) Application of polar motion handling changed to rigorous. These improvements may result in differences which will be less than 1 mu arcsecond (0.000 001 arc seconds).

(3) Expanded documentation, including a new cookbook for the SOFA Vector Matrix Library.

(4) Typographical and other minor corrections.

(5) Changes to the test program.

FORTRAN 77 Library

(1) iau_ATIOQ Include a limit in altitude (about 3 degrees) below which atmospheric refraction is held constant, for defense and to make it consistent with iau_atoiq.

(2) iau_ATIOQ Application of polar motion calculation made rigorous for canonical consistency.

iau_APCO
iau_APIO

(3) The updates in the following routines were documentation corrections/additions:

iau_EE00B IERS Conventions reference updated to (2003)
iau_GST00B IERS Conventions reference updated to (2003)
iau_PMAT06 IAU reference added
iau_PNM06A Variable renamed to follow SOFA nomenclature
iau_PNM80 Date variables now correctly labelled as TT
iau_TRXPV Action corrected to R^T * PV together with additional note

(4) The updates in the following routines are documentation improvements and typographical corrections:

iau_AF2A
iau_BI00
iau_C2I00A iau_C2T00A iau_C2T00B iau_C2T06A iau_C2TPE iau_C2TXY iau_CAL2JD
iau_EO06A iau_EORS iau_EPB2JD iau_EPJ2JD
iau_FAOM03 iau_FK2M
iau_GMST06 iau_GMST06 iau_GST00A iau_GST06 iau_GST06A iau_GST94
iau_JD2CAL iau_JDCALF
iau_NUM00A
iau_PMAT00 iau_PNM00A iau_PNM00B iau_POM00 iau_PVU
iau_REF00
iau_RV2M iau_RXPV
iau_TCGTT iau_TF2A
iau_UT1UTC
iau_XYS00B iau_XYS06A
iau_ZF iau_ZPV

(5) Test program t_sofa_f.f was updated due to items (1) and (2) above.

ANSI C Library
Include a limit in altitude (about 3 degrees) below which atmospheric refraction is held constant, for defense and to make it consistent with iauAtcign.

Application of polar motion calculation made rigorous for canonical consistency.

The updates in the following functions were documentation corrections:

- iauEe00b: IERS Conventions reference updated to (2003)
- iaugst00b: IERS Conventions reference updated to (2003)
- iauPmat06: IAU reference added
- iauPnm06a: Variable renamed to follow SOFA nomenclature
- iauTrxpv: Action corrected to $R^T \times PV$ together with additional note

The updates in the following functions are documentation improvements and typographical corrections:

- iauAtcign
- iauB100
- iauC2100a
- iauC2t00a
- iauC2t00b
- iauC2t06a
- iauC2tpe
- iauC2txy
- iauE006a
- iauEors
- iauFaom03
- iauFk45z
- iauFk54z
- iauFw2m
- iauGmst00
- iauGst00a
- iauGst00b
- iauGst06
- iauGst06a
- iauGst94
- iauJd2cal
- iauJdcalw
- iauNum00a
- iauPmat00
- iauPn00a
- iauPn00b
- iauPn06
- iauPnm00a
- iauPnm00b
- iauPnm06
- iauPnm06b
- iauRefco
- iauRv2m
- iauRxpv
- iauS00
- iauSxp0v
- iautcgtt
- iauU1utc
- iauXys00b
- iauXys06a
- iauZp
- iauZpv

Test program t_sofa_c.c was updated due to items (1) and (2) above.

SOFA thanks all those who have reported the various issues that go to ensuring the libraries and documentation are kept up-to-date and relevant.

End of updates
2021 January 08

Updates for SOFA Release 17a : 2021 February

For dealing with leap seconds during the period 1960 and 1971.

Between the introduction of UTC at the start of 1960 and the first leap second at the end of 1971 there were a series of small offsets and rate changes with respect to TAI. The SOFA routine D2DTF takes these into account, but a shortcoming in the algorithm meant that under certain conditions a leap second could be flagged even though none had occurred.

Such cases were extremely rare, and moreover depended to some extent on compiler behaviour, affecting rounding.

SOFA is grateful to the Astropy group for reporting an instance of this bug, which has been corrected.

FORTRAN Routine
iau_d2dtf  Format for output a 2-part Julian Date (or in the case of UTC a quasi-JD form that includes special provision for leap seconds).

ANSI C:
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iauD2dtf  Format for output a 2-part Julian Date (or in the case of UTC a quasi-JD form that includes special provision for leap seconds).

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End of Updates
2021 February 14
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