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.

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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, iau_ATOIQ, iau_APCO, iau_APIO — Application of polar motion calculation made rigorous for canonical consistency.

(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_FW2M
iau_GMST00 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_REFCO
iau_RV2M iau_RXPV
iau_TCGTT iau_TF2A
iau_UT1UTC
iau_XYS00B iau_XYS06A
iau_ZP iau_ZPV

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

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ANSI C Library

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

(2) iauAtioq Application of polar motion calculation made rigorous
    iauAtoiq for canonical consistency.
    iauApco
    iauApio

(3) 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 * PV together with additional note

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

    iauAtciqn iauAticqn
    iauBi00
    iauC2i00a iauC2t00a iauC2t00b iauC2t06a iauC2tpe iauC2txy
    iauEo06a   iauEors
    iauFaom03 iauFk45z   iauFk54z iauFw2m
    iauGmst00 iauGst00a iauGst06 iauGst06a iauGst94
    iauJd2cal iauJdcalf
    iauNum00a
    iauPmat00 iauPn00a iauPn00b iauPn06 iauPnm00a iauPnm00b
               iauPnm80 iauPom00
    iauRefco   iauRv2m   iauRxpv
    iauS00   iauSxpv
    iautcgtt
    iauUt1utc
    iauXys00b iauXys06a
    iauZp   iauZpv

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

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+ 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.
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+ End of updates
+ 2021 January 08
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Updates for SOFA Release 17a : 2021 February

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Summary of Change

The change for this minor release (17a) relates to 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

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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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