

IAU Standards of Fundamental Astronomy (SOFA)

Annual Report 2022

SOFA Board/Working Group Members

John Bangert	US Naval Observatory, retired
Steven Bell	HM Nautical Almanac Office, UKHO (Webmaster)
Nicole Capitaine	Paris Observatory
Maria Davis	US Naval Observatory (IERS)
Mickaël Gastineau	Paris Observatory, IMCCE
Catherine Hohenkerk	HM Nautical Almanac Office, retired (Chair)
Li Jinling	Shanghai Astronomical Observatory
Zinovy Malkin	Pulkovo Observatory, St Petersburg
Jeffrey Percival	University of Wisconsin
Wendy Puatua	US Naval Observatory
Scott Ransom	National Radio Astronomy Observatory
Nicholas Stamatikos	US Naval Observatory
Patrick Wallace	RAL Space, retired
Toni Wilmot	HM Nautical Almanac Office, UKHO

SOFA is a Functional Working Group of Division A. The IAU SOFA service continues its task of establishing and maintaining an accessible and authoritative set of algorithms and procedures that implement standard models used in fundamental astronomy. This is achieved via the expertise of Board members and the SOFA website (www.iausofa.org). The collection, currently, consists of ANSI C and Fortran libraries made up of 192 astronomy routines of which 59 are canonical that realise IAU standards. There are also 55 utility routines dealing with vectors, matrices, and angles, making a total of 247 routines.

SOFA is in a “maintenance” mode. The last release, on 2021 May 12, was the unified eighteenth release, a major release that added three new routines, two in the astrometry category, and an approximate lunar ephemeris routine to the ephemerides category. While there are no plans to add more routines, extensive work is in progress to revise and extend the documentation. Technical queries from users occur occasionally and were answered by Patrick Wallace.

At the end of March 2023, there are 1004 registered users. Full statistics concerning the use of SOFA have been missing in recent years due to system changes at SOFA’s host organisation. However, we do have access to some data. The current libraries have been downloaded 5158 times, split 86% ANSI C and 14% Fortran. This is a migration away from Fortran to ANSI C. It is interesting to note that for the 8th release, made at the end of 2006, the proportions of downloads were 44% Fortran and 56% ANSI C. It is worth noting that it is both individual users and system managers who are installing either or both libraries on their computers. All releases of SOFA are also available for download and various numbers of them are downloaded. It is not clear from the current data available, including that for 2022, how many of these downloads are from bots, but we have made an estimate and excluded them from the downloaded number given above. These figures do not give a measure of those who use the SOFA website to download a particular Cookbook or study an individual routine to better understand the algorithms and processes involved. There are also many users of the SOFA software via other implementations: Java from Jodrell Bank Centre for Astrophysics (<https://github.com/Javastro/jsofa>), C# available from the World Wide Astronomy library (<https://github.com/abrudana/wwa>), and the Essential Routines for Fundamental Astronomy (ERFA) version that is bundled with Astropy in Python (<https://github.com/liberfa/erfa/releases/>). We encourage all our users to acknowledge their use of SOFA.

The SOFA Board also needs a new Chair to take SOFA forward.

Finally, we acknowledge and thank the members of the Board and their institutes. The Board thanks the United Kingdom Hydrographic Office for hosting the SOFA website. We also thank our users; in particular, for reporting issues and making suggestions.

Catherine Hohenkerk
Chair IAU SOFA Board
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