

IVOA – SSIG

Solar System Reference Frames

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Issue

- Currently the IVOA data model only includes a small set of reference frames that are used in astronomy
- This list does not include the most commonly used planetary and heliophysics reference frames
- SSIG has recently taken on the task of trying to address this issue in order to facilitate access to solar system data sets using IVOA tools

Work Plan

- Our first step is to go through the literature and existing planetary/heliophysics data systems and collect a list of frames that are currently in use
- We will organize this list and make sure that each named system has a well-defined quantitative definition
- Many of the systems in use are identical (same exact mathematical description but different name) or nearly identical (different reference epoch, etc.)
 - We will use this list to define a frame alias list
 - We will try to define a convention for reference frame naming

☞ List of Data Sources

- [NAIF/SPICE Repository \(check all kernels\)](#)
- [Europlanet/VESPA Planetary Coord Systems](#)
- [IVOA Space Time Coordinate Mode: Standard Reference Frames List](#)
- [SPASE Data Model: CoordinateSystemName](#)
- [M.A.Hapgood, Space physics coordinate transformations: A user guide, PSS, 40-5, 1992, 711-717](#)
- [Fränz & Harper, Heliospheric Coordinate Systems](#)
- [CDPP/TREPS tool](#)
- [HELIO-FP7 Coordinate Systems](#)
- [Juno Coord System Document](#)
- [OMNIWeb Geomagnetic Frames](#)
- [Geophysical Coordinate Transformations, C. Russel, IGPP, UCLA](#)
- [MSSL UCL Ref list](#)
- [Coordinate systems for solar image data, W. T. Thompson, A&A 449, 791-803 \(2006\)](#)
- [Coordinate Systems for ACE](#)
- [SPENVIS Coordinate Systems](#)
- [STEREO Science Center Coordinate Systems](#)
- [IAU code - Data get from IAU report and source code to convert to WKT-crs](#)

Team Working the Issue

- Steven Joy (UCLA/IGPP, PDS/PPI, IVOA/SSIG, IPDA)
- Baptiste Cecconi (Observatoire de Paris, EPN/VESPA, IVOA/SSIG, IPDA)
- Stéphane Erard (Observatoire de Paris, EPN/VESPA, IVOA/SSIG, IPDA)
- Marc Costa (ESA/ESAC, SPICE expert)
- Jean-Christophe Malapert (CNES, OGC Expert)

- Others are encouraged to join us in this effort

Where we are...

- This effort is just getting started
- We are in the process of going through our reference list and consolidating the information into table of frames that includes frame name, type (inertial, body-fixed, plasma, etc.), representation (Cartesian, spherical, etc.), center, definition, and definition source
 - The list will be validated to make sure that no definition errors have been introduced in the process.
- The list will be sorted/grouped in a variety of ways initially
 - Sort on name – look for names that are the same but definitions are different
 - Sort on center – look for names that are different but definitions are the same
 - Look for definitions that are similar but not exactly the same
- The current state of the effort will be presented at the AGU in December in poster **IN11D-0660** VESPA-Europlanet Planetary Coordinate Systems Update on Monday morning

Where we're going

- Current the IVOA data model has a hard-coded list of reference frame names that can be used to search the data
- Eventually, we would like to propose a reference frame naming system to the Semantics WG for consideration.
- When and if the SWG agrees to adopt some version of our proposed naming system, then we would go the Data Modeling WG