

SPICE Newsletter

April 10, 2017

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spice_announce: subscribing and unsubscribing

See https://naif.jpl.nasa.gov/mailman/listinfo/spice_announce for information about signing up to the NAIF announcement system. If you are already signed up but no longer wish to receive SPICE announcements, the same webpage allows you to easily unsubscribe.

NAIF uses spice_announce rather sparingly to announce new Toolkits, major new generic kernels, bugs (we try to have none...), SPICE training opportunities, and a few other sorts of topics that could be of broad interest. We do not share the names or emails with anyone. Some additional announcements are posted to NAIF's "Announcements" webpage: <https://naif.jpl.nasa.gov/naif/announcements.html>

The Broad Outlook for NAIF

While leadership for NASA under the new president is yet to be established, a Feb 1st press release from the U.S. Congress' Science, Space and Technology Committee for the 115th Congress suggests the mission of NASA's Science Mission Directorate will not be diminished. More recently, the President's draft budget appears to strongly support space science. Moreover, as a result of NAIF's NASA Performance Review in early 2016, NAIF has been allocated additional funding to expand the team. In October 2016 Maria Liukis joined NAIF, and in March 2017 Fraser Thomson also joined us. So NAIF foresees continuing to provide strong support to the professional scientists and engineers engaged in space science.

N66 Toolkit Release

NAIF is pleased to announce availability of the suite of version N66 SPICE Toolkits, available in Fortran 77, C, IDL and MATLAB. The primary new component of these Toolkits is the tessellated plate portion of the Digital Shape Kernel (DSK), useful for providing—within the SPICE context—high precision shape models of irregularly shaped bodies such as comet 67P/Churyumov–Gerasimenko and Phobos. (Tessellated plate model data in SPICE are called Type 2 DSKs.)

DSK provides an alternative to the tri-axial ellipse shape models currently available within SPICE, for those instances where a science or engineering team has generated appropriate high fidelity shape data that can be ingested into the DSK format.

As a result of the tessellated plate component of the DSK subsystem becoming available, a number of previously existing high-level geometry computation APIs have been augmented to allow use of a DSK instead of the ellipsoidal or spheroidal data available in a text-style PCK. Some new APIs specific to DSK have also been added. But be aware that, currently, tessellated plate shape models exist for relatively few bodies—examples are comet 67P/C-G, Vesta, Ceres, Steins, Lutetia and Phobos. Some such DSKs are available from the NAIF website, under “generic kernels” and in the PDS SPICE data sets. The DSK subsystem includes a utility for making a Type 2 DSK from any of a variety of popular shape model datasets in use in the space science community.

Much of this capability has long been available in a set of alpha-test DSK Toolkits, where it has been used in support of the Rosetta and Dawn missions as well as other activities. The N66 official release contains additional functionality as well as more thorough testing and more complete documentation. More details about this portion of the DSK subsystem may be found in the DSK Required Reading document provided as part of the Toolkit. Examples of using the various DSK APIs may be found in the source code “headers.”

For compatibility purposes, we have retained in this official release of the DSK subsystem all of the high-level APIs offered in the alpha-test DSK Toolkits.

NAIF has not been able to complete the digital elevation model (DEM) portion of the DSK subsystem in time for the N66 release. When it is finished and released, it will be most suitable for bodies for which digital elevation model (DEM) datasets exist, such as Earth, Mars, Mercury and the moon. (An early draft of partial functionality is in use now on NASA’s Soil Moisture Active and Passive earth science mission.)

Other additions and improvements found in the N66 Toolkits are described in the “whats.new” text file found one click below this page, <https://naif.jpl.nasa.gov/naif/documentation.html>, according to the language of interest to you. Performance (speed) improvement in some situations is amongst these.

As in the past, these Toolkits are fully backwards compatible, so you should feel comfortable in downloading N66 and relinking your applications to the appropriate N66 API library.

These new Toolkits are available at the usual location from the NAIF server:

<https://naif.jpl.nasa.gov/naif/toolkit.html>

Take care in selecting the one that is correct for your computer’s architecture.

Each one of these Toolkits has been individually built and tested in the indicated environment.

JNI Toolkits

In parallel with producing the N66 Toolkits, the capabilities of the alpha-test Java Native Interface (JNI) Toolkits have been beefed up, including addition of the tessellated plate portion of the DSK subsystem. The alpha-test JNI Toolkits have also been in use for quite some time and are considered by NAIF to be quite safe to use. Now they are even better, but the documentation is not yet up to NAIF standards, so this set of Toolkits will retain its “alpha-test” status for a while longer. The alpha-test JNI Toolkits based on N066 are available at <https://naif.jpl.nasa.gov/pub/naif/misc/JNISpice/>

Other Interfaces to SPICE APIs

As reported in our last (April 2016) newsletter, several groups have implemented their own Python bindings to CSPICE Toolkits. Two of these, freely offered to the space science community, are noted below. NAIF has not examined these, but believes there are many happy users.

Andrew Annex: <https://github.com/AndrewAnnex/SpiceyPy>

Mark Showalter/Robert French: <https://github.com/SETI/pds-tools>

We anticipate both of these products will be updated with the new N66 capabilities not long after release of N66 by NAIF.

It is our understanding that neither of these offers a 100% duplication of CSPICE capabilities, but the extent of their functionality should serve most purposes. Anyone contemplating using one of these products should use diligence to ensure you will be getting the capabilities you need. Check with the authors for details.

A Change to the NAIF Server

NASA recently required (on rather short notice) a switch from the http protocol to the https protocol for all publicly accessible servers. NAIF's sys admin made this change on January 27th, which did result in a few problems for ourselves and some of our users. We apologize to those inconvenienced by this abrupt change. If you use the wget or the curl utility to download SPICE kernels, using the latest version should avoid problems. (Use the -L option with curl.)

SPICE-Enhanced Cosmographia Visualization Tool

We have previously reported the availability of this 3D mission (trajectory) visualization program—one that is highly “SPICE aware.” <http://naif.jpl.nasa.gov/naif/cosmographia.html>

An on-line User's Guide is available here: <https://cosmoguide.org/>

Recently we were able to contract with the originator of Cosmographia, Mr. Chris Laurel, to further enhance this tool for SPICE users. We will make announcements when new versions become available, using our “spice_announce” system.

WebGeocalc Tool

This tool, providing a Graphical User Interface to a SPICE geometry engine, remains very popular around the globe. <http://naif.jpl.nasa.gov/naif/webgeocalc.html> We have a long list of enhancements and usability improvements we'd like to add, and are investigating means to accomplish this.

If you are contemplating using WebGeocalc, be sure to read the “About the Data” text available from a link on the WebGeocalc home page.

SPICE 2.0

Our next major endeavor will be to re-implement the SPICE Toolkit using C++. This Toolkit will offer both thread safety and object oriented features. In taking on this effort we'll **not** abandon our current suite of Toolkits (Fortran 77, C, IDL, MATLAB, and JNI).

SPICE Training

We've started contemplating the dates and location for the next domestic SPICE Beginner's training class. It seems likely it will be held in the Fall of 2017, too be confirmed. The location is yet to be determined, but is likely to be in Pittsburgh, Pennsylvania. The class will be announced using the “spice_announce”

system. Meanwhile, self-training materials are available from the NAIF website for those who can't wait for or are not able to attend a class; check here: https://naif.jpl.nasa.gov/naif/self_training.html

SPICE Tutorials

Many of the on-line SPICE tutorials were updated on 1/31/17, but a few still need updates.

NASA Use of SPICE

As best we know all major NASA solar system exploration missions are using or will use SPICE. It is also used on some Heliophysics missions, and on at least two Earth Science missions. It is not yet clear which, if any, of the upcoming CubeSat missions will decide that using SPICE is appropriate; we're hoping to get some clarification in the near future. (If you know of such a mission, we'd be happy to hear about it.)

International Use of SPICE

To the best of our knowledge ESA and JAXA will continue using SPICE on solar system missions. We don't know what are ISRO's (India) or ROSCOSMOS' (Russia) plans for the future. The United Arab Emirates mission to Mars, EMM, with assistance from LASP at U. of Colorado, will be using SPICE, and the upcoming Korean Pathfinder Lunar Orbiter mission (KPLO) is considering if it will use SPICE.

Contact information for some of our international partners:

European Space Agency: <https://www.cosmos.esa.int/web/spice>

Japan Aerospace Exploration Agency: <http://darts.isas.jaxa.jp/planet/spice/>

Your Feedback

We appreciate hearing your suggestions for improving SPICE or NAIF operations. Your criticism is also valuable for us. You can write to the NAIF manager or anyone else on the NAIF Team, or to any of the officials who oversee our efforts:

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