

01 September 2016

Dear SPICE Class participants,

The SPICE training class at the ESAC facility outside of Madrid, offered by ESA's ExoMars 2016 project and the ESA SPICE Service, is rapidly approaching.

<http://www.cosmos.esa.int/web/spice/training-class-september-2016>

There are some important actions for you to take in preparation for this class. These preparations are particularly important given the very large number of students who will attend—it would be difficult to get caught up at the last minute.

A special set of SPICE tutorials has been prepared for this class. As compared to the tutorials offered at the NAIF website we have shortened some of them, moved some to a “Backup – Not presented” category, and changed the order in which they will be presented. It is not necessary for you to have these tutorials on your laptop for use at the class, but should you choose to download them, you'll find them here

ftp://spiftp.esac.esa.int/workshops/2016_09_ESAC_BASIC_TRAINING/

They are provided in PDF format, and are available as individual files and in a zip package.

While the NAIF team had hoped to have a new Toolkit (version N0066) available for this class, it did not work. So the coding lessons you'll do as part of the class should be done using the version N0065 SPICE Toolkit that is appropriate for your laptop.

(<http://naif.jpl.nasa.gov/naif/toolkit.html>) This version has been available since July 2014, so if you've been using SPICE at all lately, it's quite likely you already have N0065 installed. But please check this to be sure. One way to check the version is to open a terminal window on your computer, change directory to the location of the Toolkit executables, and run the program named *version*. You should see something like this on your screen:

```
% cd /<your toolkit location>/<your toolkit language>/exe
% version
N0065
```

If you haven't been using your laptop to write SPICE-based programs (or some other kind of programs), you should also check that you have a working compiler installed (if using either the Fortran or C Toolkit), or a working IDL or MATLAB installation and license. (You do NOT need a C compiler if you are using IDL or MATLAB.) If you will use an institutional IDL or MATLAB license, be sure you'll be able to access your institution's license server remotely from the ESAC classroom.

Also be sure you have installed, tested and are familiar with an appropriate code writing tool or IDE; you don't want to run into problems writing (and compiling and linking) your SPICE programming lessons while there at the class—it's best to work out any such issues well before coming to ESAC.

If you are not already successfully building SPICE-based programs, well before the start of the class you should go to the NAIF website and read these tutorials in order to help install the Toolkit and set up your programming environment:

From the NAIF tutorials webpage: <http://naif.jpl.nasa.gov/naif/tutorials.html>

- All persons read: 07_installing_toolkit
- MATLAB users also read: 10_matlab_interface and 11_preparing_for_programming
- IDL users also read: 09_idl_interface and 11_preparing_for_programming

(These same tutorials, but with different leading numbers, are available in the class tutorials package mentioned earlier in this message.)

The “hands-on” programming lessons that will be provided for your use during the class are still being prepared, so are not yet ready for downloading and installation. Please stay alert for a future announcement about their availability; it will be very important for you to download these lessons and install them INSIDE your SPICE Toolkit according to directions that will be provided.

Should you have a bit of free time before traveling to the class and wish to do a bit of prep work, consider downloading and skimming through some of these class tutorials:

00_SPICE_Class_Agenda
02_spice_overview
04_conventions
07_intro_to_kernels
08_intro_to_toolkit
29_commong_problems
32_summary_of_key_points

You might even consider printing the tutorial named “32_summary of key points” and having that available at your table in the classroom.

As you may see at the bottom of the class agenda, there are 12 tutorials in the “backup” category that will not be presented in the class. (B01 through B12) In some cases these are of limited interest, and in any case, there is simply not enough time to cover all the SPICE tutorials during the class. By the time of the class you should have already dealt with the issues covered in B01 through B04. B05 through B08 could be very helpful at some point: they show the step-by-step construction of a typical SPICE-based geometry program, done in each of the four languages supported by SPICE. B10 is not likely to be of interest. B11 and/or B12 would be very

important if you will be involved in producing any kind of SPK or CK kernels. For flight projects, this sort of production is usually done by the SPICE team at ESAC, but occasionally an instrument team or a scientist needs to make some of her/his own CK kernels.

Here we offer some thoughts about program errors. As you learn to use SPICE you will encounter some errors. The SPICE code is pretty good at detecting invalid or unusable inputs and providing you a SPICE error message about such. Sometimes these SPICE error messages are rather terse, or initially won't make sense, but after a while you'll learn to understand them and take the appropriate action to fix the errors. Along the way you may be tempted to blame any errors you run across on SPICE Toolkit code. While this is indeed possible, it's not likely since the SPICE code has been well tested and has been in use for many years. It is far more likely you have made a coding error, have provided an inappropriate input, are missing a needed kernel, or have assumed a kernel contains data that it does not contain. NAIF offers a number of resources that can help you diagnose these kinds of errors. These include:

- SPICE run-time error messages
- The "common_problems" tutorial
- Examples of common errors found at the rear of several tutorials, such as SPK and CK
- A variety of topics found under the "Getting Help" webpage:
<http://naif.jpl.nasa.gov/naif/gettinghelp.html>

If your program crashes without signaling a SPICE error, the problem exists elsewhere—not where you're calling SPICE code.

One way to limit time spent chasing down errors in a SPICE-based program is to do some systematic checking of your program as you develop it. Sometimes you can output intermediate results and check these with those of some other, trusted program. One such possibility might be to use the "*Webgeocalc*" program—a client-server tool connecting your browser to a SPICE-based "geometry engine" installed at ESAC and NAIF. This program will be discussed and demonstrated during the class. (Take note: the SPICE kernels collections available to the ESAC installation of Webgeocalc is not identical to the SPICE kernels collections available to the NAIF installation.)

Towards the end of the class we'll offer you a chance to give anonymous, written feedback on the class, on the SPICE system, or on the ESAC or NAIF services.

Final note of encouragement. It's likely you will find it takes some effort to learn enough about SPICE to be useful in your job—it won't suddenly happen during this class, or in a week or two after the class. Don't get discouraged! There are many hundreds of scientists and engineers around the world who have successfully learned to use SPICE—you can, too. Take advantage of the many resources available to help you: highly documented source code, usually with working examples included in the code header; the tutorials provided in this class, with often more meaty versions available on-line at the NAIF server; a collection of technical reference documents and other documents contained in your Toolkit, aimed at helping you find the "right" module (API); the coding lessons included in this class (and also available at the NAIF

website); and when all else fails, a bit of help from a colleague, or email consultation from Marc Costa, ESA's SPICE leader.

We will arrange for a no-host (pay for yourself) social dinner on Wednesday night at 20:30h near the Leonardo Madrid hotel we will give you the details next Monday. This will provide a nice chance to interact a bit with some of your European colleagues and with the ESAC and NAIF staff. On Monday we'll ask for a show of hands regarding who plans to attend so we can ensure enough spaces will be available.

Please pay careful attention to the bus schedule. Note that it will depart right at 10:00 am on Monday morning from in front of the Leonardo Madrid City Center Hotel, located at Calle de Alberto Aguilera, 18. The bus ride to ESAC will take approximately 40 minutes.

On Tuesday, Wednesday and Thursday the bus departs from the hotel at 8:30.

Be sure to bring a photo ID or passport with you to gain entry into the ESAC facility.

In the event of any problems, use the following contact information:

Marc Costa cell phone: +34 650 130 121 or email mcosta@sciops.esa.int

Alternatively:

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