Data analysis FAQ

General Data Analysis

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Space Plasmas Analysis

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General Data Analysis

Which library should I use to handle data series?

You will want to use the python Pandas (check here for Pandas tips) for analyzing your data. It is in particular very well suited for time series analysis and enable you to very easily manipulate dates, missing data, etc.

Is there a library for plotting statistical data?

Seaborn is a Python visualization library based on matplotlib. It provides a high-level interface for drawing attractive statistical graphics. Check here for seaborn tips

Where can I learn machine learning?

Check out this page to find many links on machine learning.

Space Plasmas Data Analysis

How can I open a CDF file?

You should install Spacepy on your machine. Then import the module spacepy.pycdf to load CDF files. Documentation for PYCDF is here

How can I change coordinates systems in planetary systems other than Earth?

We will need to download and load some **SPICE** kernels (that indicate the position of the satellite, its orientation ...etc) from the NAIF servers.

The SPICE kernels file contents are summarized below:

S- Spacecraft ephemeris, given as a function of time. (SPK)
P- Planet, satellite, comet, or asteroid ephemerides, or more generally, location of any target body, given as a function of time. (also SPK)
The P kernel also logically includes certain physical, dynamical and cartographic constants for target bodies, such as size and shape specifications, and orientation of the spin axis and prime meridian. (PCK)
I- Instrument description kernel, containing descriptive data peculiar to a particular scientific instrument, such as field-of-view size, shape and orientation parameters. (IK)
C- Pointing kernel, containing a transformation, traditionally called the "C-matrix," which provides time-tagged pointing (orientation) angles for a spacecraft bus or a spacecraft structure upon which science instruments are mounted. A C-kernel may also include angular rate data for that structure. (CK)
E- Events kernel, summarizing mission activities - both planned and unanticipated. Events data are contained in the SPICE EK file set, which consists of three components: Science Plans, Sequences, and Notes. (EK)

Some additional data products are also important components of the SPICE system, even if not contained in the "SPICE" acronym.

A "frames kernel" **(FK)** contains specifications for the assortment of reference frames that are typically used by flight projects. This file also includes mounting alignment information for instruments, antennas and perhaps other structures of interest.

Spacecraft clock **(SCLK)** and leap seconds **(LSK)** kernels are also part of SPICE; these are used in converting time tags between various time measurement systems.

Under development is a digital shape model kernel (DSK) for both small, irregularly shaped bodies such as asteroids and comet nuclei, and for large, more uniformly shaped bodies such as the moon, earth and Mars. Other kernel types can be added as requirements arise and time permits.

For more information, please consult the NAIF Homepage

What languages support the SPICE kernels toolkit?

C, FORTRAN, IDL, MATLAB

and

Spiceypy for PYTHON

How can I get the CASSINI spacecraft axes in the SSE (same as KSO) coordinate systems?

We should visit the CASSINI Spacecraft Attitude tool.
We choose the "Time Range", "Time Interval", and **SSE Spacecraft Axes (SSE)** for the "Attitude Type".