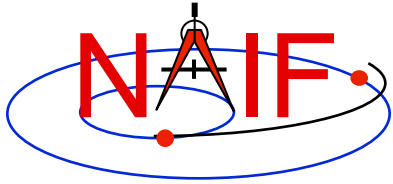


Navigation and Ancillary Information Facility

# **Obtaining SPICE Components Offered by NAIF**

## **Emphasis on Kernels**

**March 2010**

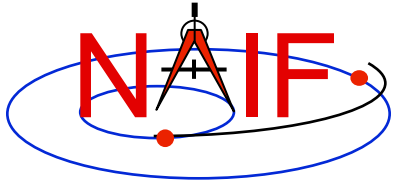


# Overview

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Navigation and Ancillary Information Facility

- **Many SPICE products are available from the NAIF server**
  - These are mostly products produced at JPL by NAIF
  - Access is available using the http or ftp protocol
    - » Note: starting with “http” leads to “ftp”
  - See the next page for URLs
- **SPICE products made by other organizations are controlled by those organizations**
  - Some may be available from the NAIF server
  - Some may be available at other public servers, or on restricted servers, or not at all
  - As a general rule, NAIF has no cognizance of these products



# NAIF Server HTTP URLs

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Navigation and Ancillary Information Facility

- **NAIF home page**

<http://naif.jpl.nasa.gov>

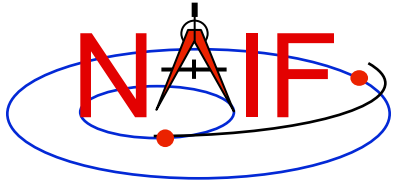
- Here you may access all official SPICE products produced by NAIF
  - kernels (generic, mission ops, PDS archived)
  - software (Toolkits and individual application programs)
  - documents
  - tutorials
  - programming lessons
  - problem solving tips
  - rules about using SPICE
  - links to useful resources

- **SPICE announcements (by NAIF)**

[http://naif.jpl.nasa.gov/mailman/listinfo/spice\\_announce](http://naif.jpl.nasa.gov/mailman/listinfo/spice_announce)

- **SPICE discussion (by anyone)**

[http://naif.jpl.nasa.gov/mailman/listinfo/spice\\_discussion](http://naif.jpl.nasa.gov/mailman/listinfo/spice_discussion)

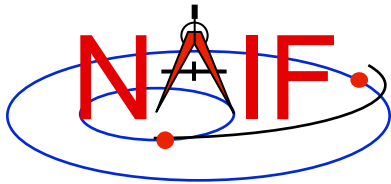


# Getting SPICE Kernels

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Navigation and Ancillary Information Facility

- The remaining charts discuss where to find the various categories of **SPICE** kernel files
  - **Operational flight project kernels**, for (mostly JPL) active flight projects
  - **PDS archived kernels**, those formally delivered to and accepted by NASA's Planetary Data System
  - **Generic kernels**, used by many flight projects and other endeavors



# Obtaining Operational Flight Project Kernels - 1

## Navigation and Ancillary Information Facility

**Operational Flight Project Kernels**

SPICE kernels for currently active missions where NAIF produces the kernels or otherwise has access to them may be obtained directly from the NAIF server using the links below. Included under this category are kernels from past missions that have not yet been archived in the PDS.

- o [Mars Missions](#)
- o [Outer Planet Missions](#)
- o [Comet and Asteroid Missions](#)
- o [Venus Missions](#)
- o [Lunar Missions](#)
- o [Mercury Missions](#)
- o [Earth-Sun Connection Mission](#)
- o [Astrophysics Missions](#)

Please note that kernels produced by agencies other than JPL are usually available only at those agencies, and may not be available to other than the flight project's team members. (Kernels for a few ESA-sponsored missions are mirrored at NAIF by agreement between ESA and NASA, for the convenience of U.S. participating scientists.)

1 - Select the mission class of interest

2a - Select the project name to get access to all products available for that project (see next page)

**Data**

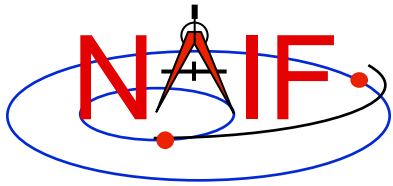
The number of files for each SPICE kernel type is shown in the table below for the missions specified. An asterisk (\*) indicates that one or more non-kernel files are also present; usually this is an 'aareadme' file that explains the kernel file naming convention. The count of the number of kernels is made ONLY in the primary directory; in some cases there are additional kernels in a subdirectory (for instance, older versions of kernels that have been replaced with newer versions).

**Outer Planet Missions**

Mission	ck	ek	fk	ik	lsk	mk	pck	sclk	spk
VOYAGER*	0		2	4	1		0	6	4
CASSINI*	3479*	306*	23*	13*	3*		222*	92*	2404*
GALILEO*	0	0		0	2		3	1	6
PIONEER 10*									1
PIONEER 11*									1

2b - Select the kernel type to get access to all kernels of that type for that project. The number tells how many kernels of that type are available. (see next page)

- or -

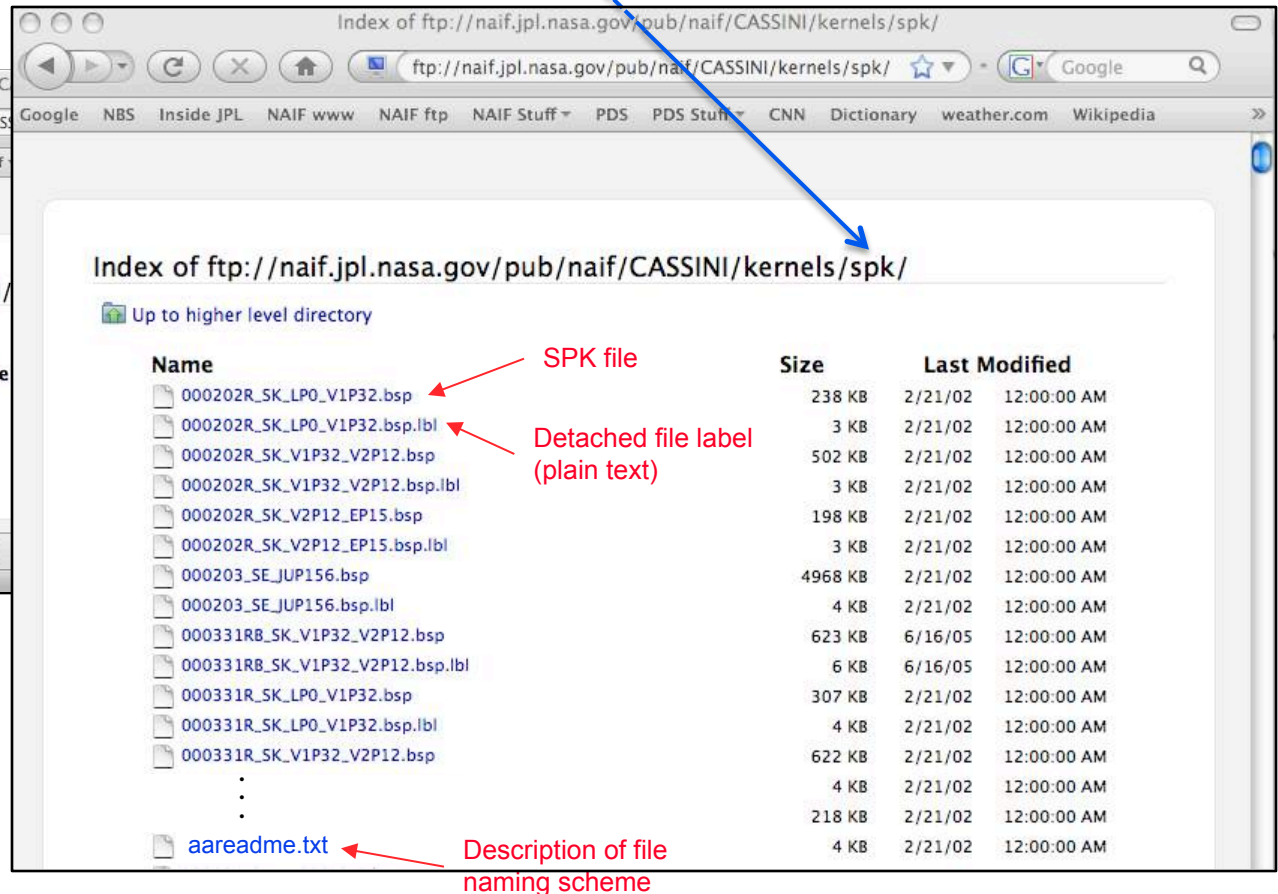
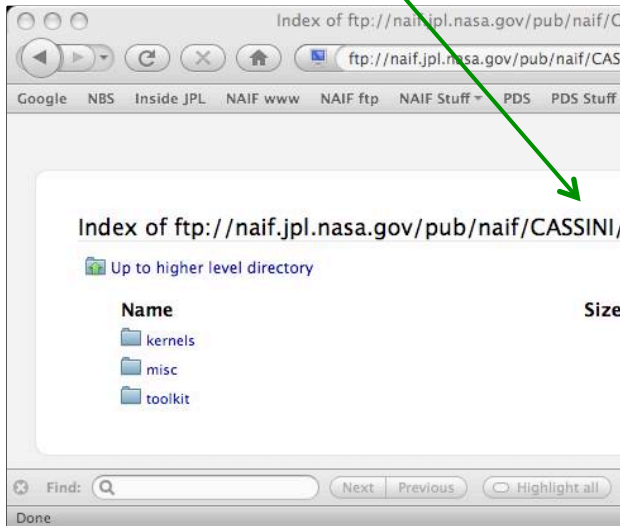


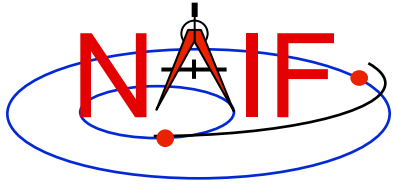
# Obtaining Operational Flight Project Kernels - 2

## Navigation and Ancillary Information Facility

Access to kernels and other products available for the named project

Access to kernels of the selected type for the named project



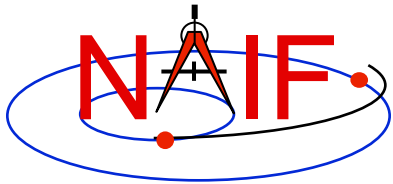


# Overview: Obtaining PDS Archived Kernels

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Navigation and Ancillary Information Facility

- **Two methods are available for obtaining PDS archived kernels.**
  - **Directly from the NAIF server, using your browser: recommended!**
    - » **Unless you have reason to do otherwise, download the entire archival data set using the ftp URL**
      - That way you'll get all the latest data, the associated “furnsh kernels”, and the best documentation.
    - » **If the data set is large and you need only a portion of it (based on start/stop time), use the “Subsetter” link to obtain the smaller amount of data needed.**
  - **Using a web browser to access the PDS central catalog interface, typing “SPICE” and the mission name or acronym in the text search box**
    - » **NAIF suggests you use this method only if you wish to obtain one or a few kernels that fit specific search criteria**
- **Pictorial examples are shown on the next several pages**



# Obtaining Archived Kernels from the NAIF Server - 1

## Navigation and Ancillary Information Facility

Mission Name	Archive Overview	Volume FTP Link	Data Size (gbytes)	Start Time	Stop Time	Data Set Subsetter Link
Cassini Orbiter	<a href="#">aareadme.htm</a>	<a href="#">cosp_1000</a>	18.6	1996-11-06	2008-12-31	<a href="#">subset</a>
Clementine	<a href="#">aareadme.htm</a>	<a href="#">clsp_1000</a>	0.8	1994-01-26	1994-05-07	<a href="#">subset</a>
Deep Impact	<a href="#">aareadme.htm</a>	<a href="#">disp_1000</a>	0.5	2005-01-12	2009-01-15	<a href="#">subset</a>
Deep Space 1	<a href="#">aareadme.htm</a>	<a href="#">ds1sp_1000</a>	0.9	1998-10-24	2003-12-31	<a href="#">subset</a>
MER 1 (Opportunity)	<a href="#">aareadme.htm</a>	<a href="#">mer1sp_1000</a>	1.8	2003-07-07	2009-05-19	<a href="#">subset</a>
MER 2 (Spirit)	<a href="#">aareadme.htm</a>	<a href="#">mer2sp_1000</a>	1.5	2003-06-10	2009-04-28	<a href="#">subset</a>
MESSENGER	<a href="#">aareadme.htm</a>	<a href="#">messsp_1000</a>	12.7	2004-08-03	2008-10-20	<a href="#">subset</a>
Mars Express	<a href="#">AAREADME.TXT</a>	<a href="#">mexsp_1000</a>	0.9	2003-06-02	2008-07-31	<a href="#">subset</a>
Mars Global Surveyor	<a href="#">aareadme.htm</a>	<a href="#">mgsp_1000</a>	15.4	1996-11-06	2006-11-02	<a href="#">subset</a>
Mars Odyssey	<a href="#">aareadme.htm</a>	<a href="#">odsp_1000</a>	9.0	2001-04-07	2009-03-31	<a href="#">subset</a>

Index of [ftp://naif.jpl.nasa.gov/pub/naif/pds/data/co-s\\_j\\_e\\_v-spice-6-v1.0/cosp\\_1000/](ftp://naif.jpl.nasa.gov/pub/naif/pds/data/co-s_j_e_v-spice-6-v1.0/cosp_1000/)

[Up to higher level directory](#)

**Name**

- [aareadme.htm](#)
- [aareadme.lbl](#)
- [aareadme.txt](#)
- [catalog](#)
- [data](#)
- [document](#)
- [errata.txt](#)
- [extras](#)
- [index](#)
- [software](#)
- [voldesc.cat](#)

[Up to higher level directory](#)

**Name**

- [ck](#)
- [ek](#)
- [fk](#)
- [ik](#)
- [lsk](#)
- [pck](#)
- [sclk](#)
- [spk](#)

[Up to higher level directory](#)

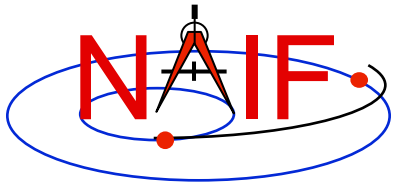
**Name**

- [ckextra](#)
- [extrinfo.txt](#)
- [mk](#)
- [orbnum](#)

If you select “PDS Archive Area” on the NAIF web page you can follow a path like this one.

- You can use the ftp URL along with Unix “wget” or the FileZilla tool, or some other equivalent, to download the entire data set—**recommended, if not too large! Otherwise see the next page.**
- Or you can select specific kernels from the kernel folders, and/or “furnsh” meta- kernels and other items from the extras folder





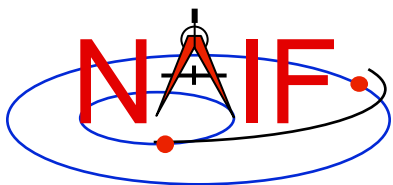
# Obtaining Archived Kernels from the NAIF Server - 2

## Navigation and Ancillary Information Facility

Mission Name	Archive Overview	Volume FTP Link	Data Size (gbytes)	Start Time	Stop Time	Data Set Subsetter Link
Cassini Orbiter	<a href="#">aareadme.htm</a>	<a href="#">cosp_1000</a>	18.6	1996-11-06	2008-12-31	<a href="#">subset</a>
Clementine	<a href="#">aareadme.htm</a>	<a href="#">clsp_1000</a>	0.8	1994-01-26	1994-05-07	<a href="#">subset</a>
Deep Impact	<a href="#">aareadme.htm</a>	<a href="#">disp_1000</a>	0.5	2005-01-12	2009-01-15	<a href="#">subset</a>
Deep Space 1	<a href="#">aareadme.htm</a>	<a href="#">ds1sp_1000</a>	0.9	1998-10-24	2003-12-31	<a href="#">subset</a>
MER 1 (Opportunity)	<a href="#">aareadme.htm</a>	<a href="#">mer1sp_1000</a>	1.8	2003-07-07	2009-05-19	<a href="#">subset</a>
MER 2 (Spirit)	<a href="#">aareadme.htm</a>	<a href="#">mer2sp_1000</a>	1.5	2003-06-10	2009-04-28	<a href="#">subset</a>
MESSENGER	<a href="#">aareadme.htm</a>	<a href="#">messsp_1000</a>	12.7	2004-08-03	2008-10-20	<a href="#">subset</a>
Mars Express	<a href="#">AAREADME.TXT</a>	<a href="#">mexsp_1000</a>	0.9	2003-06-02	2008-07-31	<a href="#">subset</a>
Mars Global Surveyor	<a href="#">aareadme.htm</a>	<a href="#">mgsp_1000</a>	15.4	1996-11-06	2006-11-02	<a href="#">subset</a>
Mars Odyssey	<a href="#">aareadme.htm</a>	<a href="#">odsp_1000</a>	9.0	2001-04-07	2009-03-31	<a href="#">subset</a>

For “large” data sets that might take a long time to download, if you really need just a subset of the data covering a limited amount of time you should use the “Subsetter Link” for the data set of interest.

This process will automatically select just the kernels that fall within or overlap the time bounds you specify, construct a new “FURNISH” kernel(s) containing the names of this subset of kernels (thus making it easy for you to load the subset into your program), and create a custom wget script you may use to download these files to your computer.



# Obtaining Archived Kernels from the PDS Central Catalog - 1

## Navigation and Ancillary Information Facility

**1 - Enter "spice" and the project name or acronym in the data search box**

**2 - Click on the SPICE kernels data set returned by the search**

**Refine Your Search**

<b>Target</b>	Planet (10)
	Satellite (3)
<b>Mission</b>	Mars Global Surveyor (6)
	2001 Mars Odyssey (2)
	Deep Space Program Science Experiment (1)
	Mars Exploration Rover (1)
	Viking (1)
<b>Instrument</b>	Magnetometer (4)
	Other (4)
	Accelerometer (2)
	Spectrometer (1)

**Search Results**

spice mgs Search New

1-11 of 11 results (0.001 seconds)

**Data Sets and Information**

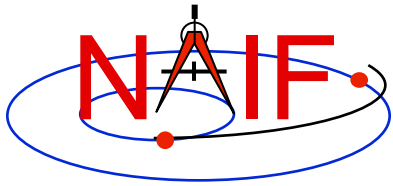
**Data Set: MGS MARS SPICE KERNELS V1.0**  
Navigation and ancillary data in the form of SPICE System kernel files for the Mars Global Surveyor.  
MARS\_GLOBAL\_SURVEYOR - MGS-M-SPICE-6-V1.0 - starting 1996-11-06T08:00:00Z

**Data Set: MGS MARS MAG MAPPING DETAIL WORD RESOLUTION V1.0**  
Calibrated time-ordered data tables from the Magnetometer instrument collected during the mapping phase and extended mission and expressed in payload coordinates and Sun-State coordinates. These are high time resolution (detail) data.  
MARS\_GLOBAL\_SURVEYOR - MGS-M-MAG-1-MAP/HIGHRES-FLUX-V1.0 - starting 1999-03-08T00:00:00Z

**Data Set: MGS MARS MAG PRE-MAP DETAIL WORD RESOLUTION V1.0**  
Calibrated time-ordered data tables from the Magnetometer instrument collected during the premapping phase of the mission and expressed in payload coordinates and Sun-State coordinates. These are high time resolution (detail) data.  
MARS\_GLOBAL\_SURVEYOR - MGS-M-MAG-1-PREMAP/HIGHRES-FLUX-V1.0 - starting 1997-09-12T00:00:00Z

**Data Set: ODY MARS SPICE KERNELS V1.0**  
2006-03-07 NAIF:Semenov removed second ; Navigation and ancillary data in the form of SPICE System kernel files for the Odyssey spacecraft.  
2001\_MARS\_ODYSSEY - ODY-M-SPICE-6-V1.0 - starting 2001-04-07T00:00:00Z

continues on next page



# Obtaining Archived Kernels from the PDS Central Catalog - 2

## Navigation and Ancillary Information Facility

continued from previous page

Use the PDS browser if you wish to query for kernels meeting specific criteria.

Recommended

Click on the data set ID to see a summary of the entire data set

Click on "NAIF Online Archives" to get to the data set. From there you can download the complete data set (recommended!) or individual components.

PDS Data Set Profile

http://starbrite.jpl.nasa.gov/pds/viewDataset.jsp?d

NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Planetary Data System

Home Data Services Tools Documents Related Sites About PDS Sitemap

Navigation and ancillary data in the form of SPICE System kernel files for the Mars Global Surveyor.

Citation: Semenov, B.V., L.S. Elson, and C.H. Acton, MARS GLOBAL SURVEYOR SPICE KERNELS V1.0, MGS-M-SPICE-6-V1.0, NASA Planetary Data System, 1998.

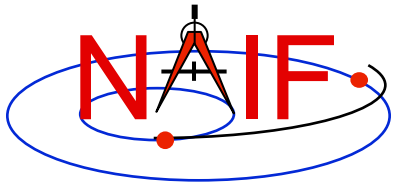
Access/Download Data Set: [Search for Products with the Basic Browser](#)

Data set abstract: This data set includes the complete set of Mars Global Surveyor SPICE data files ("kernel files"), which can be accessed using SPICE software. The SPICE data contains geometric and other ancillary information needed to recover the full value of science instrument data. In particular SPICE kernels provide spacecraft and planetary ephemerides, instrument mounting alignments, spacecraft orientation, spacecraft sequences of events, and data needed for relevant time conversions.

Additional Information

Mission Information	MARS GLOBAL SURVEYOR
Dataset Information	<a href="#">MGS-M-SPICE-6-V1.0</a>
Instrument Host Information	MGS
Instrument Information	SPICE
Target Information	MARS
Other Resources	<a href="#">NAIF Online Archives</a> <a href="#">MGS Home Page</a>

continues on next page



# Obtaining Archived Kernels from the PDS Central Catalog - 3

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Navigation and Ancillary Information Facility

- **Unless you have a specific reason to do otherwise you should download the complete archived SPICE data set for the mission of interest**
- **Complete SPICE data sets exist on the NAIF server fully expanded—not bundled in a Zip or tar file**
- **Use GNU wget or FileZilla or a similar utility to download the complete SPICE data set**
  - **Possible wget usage, and an example using Deep Impact**
    - » `wget -m -nH --cut-dirs=5 -nv (insert the URL of the "Volume FTP Link" for the SPICE data set here)`
    - » `wget -m -nH --cut-dirs=5 -nv ftp://naif.jpl.nasa.gov/pub/naif/pds/data/di-c-spice-6-v1.0/disp_1000/`
  - **FileZilla info**
    - » `http://filezilla-project.org/client_features.php`