

Examples of Tools Using and/or Producing SPICE Kernels⁺

(Tools not included in the SPICE Toolkit)

Tool Name	Acronym	Brief Abstract	Type	Developer	References	Restrictions*	Contact
Spacecraft Trajectory Design							
Copernicus		Spacecraft trajectory design	Program	NASA/JSC	http://www.nasa.gov/centers/johnson/copernicus/index.html		Gerald Condon gerald.l.condon@nasa.gov
General Mission Analysis Tool	GMAT	Spacecraft trajectory design	Program	NASA/GSFC	http://gmat.gsfc.nasa.gov/		gmat@gsfc.nasa.gov
Optimal Trajectories by Implicit Simulation	OTIS	Spacecraft trajectory and vehicle design	Program	NASA/GRC	http://otis.grc.nasa.gov/index.html	Domestic use	robert.falck@nasa.gov
Mission Analysis and Simulation Tool in Fortran	MASTIF	6-DOF Simulation	Program	NASA/GRC		Restricted use	waldy.k.sjauw@nasa.gov
Spacecraft N-Body Analysis Program	SNAP	3-DOF trajectory propagator	Program	NASA/GRC		Restricted use	michael.c.martini@nasa.gov
Fast Spiral Trajectory Optimization Program	FastSTOP	Low thrust spiral trajectory design	Program	NASA/GRC		Under Development	robert.falck@nasa.gov
Hybrid Trajectory Optimization Program	HYTOP	Low-thrust orbit transfer optimization	Program	Aerospace Corp.	none	Restricted use	David Garza david.garza@aero.org
Indirect Trajectory Optimization Program	ITOP	Low-thrust orbit transfer optimization	Program	Aerospace Corp.	none	Restricted use	David Garza david.garza@aero.org
Trajectory Optimization Program	TOP	Launch, reentry, and space vehicle trajectory optimization	Program	Aerospace Corp.	none	Restricted use	Gregory Fruth gregory.fruth@aero.org
Natural Body Ephemeris Access							
CALCEPH	CALCEPH	Access SPICE planetary ephemeris (SPK), binary PCK and allied frames, plus other ephemeris formats	Library	CNRS/IMCCE	http://www.imcce.fr/inpop/calceph/	See reference website	inpop@imcce.fr
Ephemerides of Planets and Moon	EPM	Access SPICE planetary ephemeris (SPK), binary PCK and allied frames, plus other ephemeris formats	Library	Institute of Applied Astronomy (IAA)		Under development Not distributed	Dmitry Pavlov dpavlov@ipa.nw.ru
Spacecraft Operations							
Activity Plan Generator	APGEN	Enables mission and science planners to perform resource-driven planning that spans the range of high-level mission scenarios to detailed science activity plans	Program	NASA/JPL	http://www.researchgate.net/publication/3816487_JIT_planning_an_approach_to_autonomous_scheduling_for_spacemissions		Pierre Maldague pierre.f.maldague@jpl.nasa.gov
Automated Scheduling and Planning Environment	ASPEN	A modular, reconfigurable application framework which is capable of supporting a wide variety of planning and scheduling applications	Program set	NASA/AMMOS	http://aspden.jpl.nasa.gov/	Domestic licensing	Steve Chien steve.chien@jpl.nasa.gov
Science interface for robots	Maestro	A science-operations interface for robotic spacecraft and systems	Program	NASA/JPL	http://www-robotics.jpl.nasa.gov/facilities/facility.cfm?Facility=9		Jeff Norris jeffrey.s.norris@jpl.nasa.gov
Sequence and Command Generation	SEQGEN	Expand a series of science and engineering activities into their resultant spacecraft commands; model changes in spacecraft state based on commands in order to produce event predictions; model sequences expanded onboard the spacecraft and those expanded on the ground, and indicate conflicts in the modeling of commands and violations of flight rules.	Program	NASA/AMMOS	http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=18&ved=0CFIQFjAHOAo&url=http%3A%2F%2Farc.aiaa.org%2Fdoi%2Fpdfplus%2F10.2514%2F6.2008-3481&ei=BnYBUvasl6S-igLg0YCoDQ&usg=AFQjCNH9nqqCR1A0NIhYiLpBK Cgc7cmdvw		Benjamin Smith benjamin.d.smith@jpl.nasa.gov
Multi-mission Payload Programming System	MMPPS	Optimally schedules payload operations on all Indian Remote Sensing (IRS) satellites	Program	Indian Space Research Organization (ISRO)		Not distributed	Daniel Deva Arul
Saturn Particle Impact Risk Estimator	SPIRE	Dust hazard analysis tool	Program	NASA/JPL		Not distributed	David Seal seal@jpl.nasa.gov

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Mars Science Laboratory Interface	MSLICE	Software ensures that mission scientists can work closely with both rover and instrument engineers to create a plan that will maximize scientific data and be safe for the rover to perform	Web-based tool	NASA/JPL and NASA/Ames	http://www.nasa.gov/centers/ames/research/msl_operations.html	Commercial licensing	http://www.techbriefs.com/component/content/article/5707
Spacecraft Attitude Visualization	TBALL	Spacecraft Attitude Visualization	Program	NASA/JPL	none	Not distributed	Steve Collins steven.m.collins@jpl.nasa.gov
Spacecraft Attitude Simulation	Slewtooth	Spacecraft Attitude Simulation	Program	NASA/JPL	none	Not distributed	Tony Vanelli vanelli@jpl.nasa.gov
Multi-mission Power Analysis Tool	MMPAT	Spacecraft power analysis system	Program	NASA/JPL	http://www.embeddedtechmag.com/component/content/article/9446		Eric Wood eric.g.wood@jpl.nasa.gov
Telecom Forecaster & Predictor	TFP	Spacecraft telecommunications prediction and analysis	Program set	NASA/JPL	http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=878247&userType=inst		Kar-Ming Cheung kar-ming.cheung@jpl.nasa.gov
Telecom Orbital Analysis and Simulation Tool	TOAST	Telecom analysis and simulation	Program	NASA/JPL		Not distributed	
Orbital Trajectory Inference Engine	OTIE	Automated generation of spacecraft trajectory and/or visibility files	Program	NASA/JPL		Not distributed	
DSN Service Preparation Subsystem	SPS	Deep Space Network scheduling and operational metric predicts generation	Program set	NASA/JPL	http://spsweb.fltops.jpl.nasa.gov/portalappsops/Main.do		Mark Johnston mark.d.johnston@jpl.nasa.gov
DSN Delta-DOR Service	DOR	Plan and correlate Delta Differential One-way Range measurements used in spacecraft navigation	Program set	NASA/JPL	http://ipnpr.jpl.nasa.gov/progress_report/42-193/193D.pdf	Not distributed	James Border james.s.border@jpl.nasa.gov
Global Ionospheric Model Calibration Software	GIMCAL	Spacecraft line-of-sight ionosphere calibration	Program set	NASA/JPL			Thomas Runge Thomas.Runge@jpl.nasa.gov
DARTS Shell	DARTS/Dshell	Spacecraft dynamics simulator	Program set	NASA/JPL	http://dshell.jpl.nasa.gov/	Discuss with management	Abhi Jain (jain@jpl.nasa.gov)
Science Observation Planning							
C-kernel Viewer	CKVIEW	Instrument Pointing Profile Visualizer	Program	DLR/IPE	none	Limited to certain flight teams	Thomas Roatsch thomas.roatsch@dlr.de
Mars Express HRSC Science Opportunity Analyzer	MEXSOA	Planning for MEX HRSC observations	Program	DLR/IPE	none	Not distributed	
Java Mission Planning and Analysis for Remote Sensing	JMARS, MTT, J-Moon, J-Vesta, J-Asteroid	Science observation planning and data analysis	Program set	Mars Space Flight Facility, Arizona State University	http://jmars.asu.edu/		Saadat Anwar saadat@mars.asu.edu
SciBox	SciBox	A scientific planning software package for images and spectral observations		Applied Physics Lab	http://www.spacedaily.com/reports/Software_Enables_Efficient_Planning_of_MESSENGER_Observations_999.html		Teck Choo teck.choo@jhuapl.edu
Science Opportunity Analyzer	SOA	Science observation design tool	Program	NASA/JPL	http://descanso.jpl.nasa.gov/RCSGSO/Paper/A0063Paper.pdf		Barbara Streiffert barbara.a.streiffert@jpl.nasa.gov
Dave's Event Program	DEP	Mission event calculator	Program			Not distributed	David Seal seal@jpl.nasa.gov
Solar System Science Operations Laboratory	SOLAB	Software for computation, visualization and analysis of scientific observation opportunities, focusing on the geometrical requirements	Program	ESA/ESAC	http://www.academia.edu/2500875/The_Solar_System_Science_Operations_Laboratory_A_scientific_opportunity_analysis_tool_for_MarcoPolo-R	Under development	Marc Costa marc.costa@sciops.esa.int
Rosetta Science Planning and Scheduling Subsystem	RSGS	Integrated suite of tools focused on science observation planning	Program set	ESA/ESAC	none	Under development Not distributed	
Committee on Earth Observation Satellites Visualization Environment	COVE	Acquisition planning, coverage assessment, coincidence scene observation, and archive data search tool for earth observing satellites from around the world	Web-based tool	Analytical Mechanics/CEOS SEO/NASA/LARC	http://www.ceos-cove.org		Brian Killough brian.d.killough@nasa.gov

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Science Data Analysis							
Analysts' Notebook		Notebook combines sequence information, engineering and science data, and documentation into standard web-accessible pages to provide mission "replay".	Web-based tool	NASA/PDS/Geosciences Node (Wash. U.)	http://an.rsl.wustl.edu/	Not distributed	Tom Stein stein@wunder.wustl.edu
Orbital Data Explorer	ODE	Data search, display and download	Web-based tool	NASA/PDS/Geosciences Node (Washington U.)	http://ode.rsl.wustl.edu/mars/		odewebmaster@wunder.wustl.edu
Integrated Software for Imagers and Spectrometers	ISIS	Suite of tools for the orthorectification and cartographic and scientific analysis of images from over 50 NASA and international instruments.	Program set	USGS/Astrogeology Science Center	http://isis.astrogeology.usgs.gov/		Stuart Sides ssides@usgs.gov
Unified Planetary Coordinate	UPC	Database of SPICE-corrected positional information about planetary image data computed using a uniform coordinate system and projection onto a common planetary surface shape.	Database	USGS/Astrogeology Science Center	http://www.lpi.usra.edu/meetings/lpsc2009/pdf/2002.pdf		Lisa Gaddis lgaddis@usgs.gov
Planetary Image Locator Tool	PILOT	SPICE-corrected UPC-derived image locations and search capabilities using a navigable map, user selectable image constraints (e.g., incidence angle, solar longitude, pixel resolution and phase angle), and facilitates bulk downloads and/or image processing using POW	Web-based tool	USGS/Astrogeology Science Center	http://www.lpi.usra.edu/meetings/lpsc2013/pdf/2246.pdf		Mark Bailen mbailen@usgs.gov
Map Projection on the Web	POW	Creates science-ready map projected images from raw Planetary Data System images.	Web-based tool	USGS/Astrogeology Science Center	http://www.lpi.usra.edu/meetings/lpsc2013/pdf/2068.pdf		Trent Hare thare@usgs.gov
3D View		3D visualization of position and orientation of spacecrafts, planetary ephemerides, as well as scientific data representation. (Emphasis on space physics.)	Java applet	Centre de Données de Physique des Plasmas (CDPP)	http://3dview.cesr.fr/		vincent.genot@irap.omp.eu
Automated Multi-Dataset Analysis	AMDA	Visualisation and analysis of space physics data, from observational or model origins	Web-based tool	Centre de Données de Physique des Plasmas (CDPP)	http://cdpp.eu/AMDA	Registration required	vincent.genot@irap.omp.eu
Planet Viewers		Tool to generate a diagram showing the appearance of a planetary system at a specified time. Bodies and rings are rendered with terminators and shadows as appropriate.	Web-based tool	NASA/PDS/Rings Node (SETI Institute)	http://pds-rings.seti.org/tools/	Not distributed	Mark Showalter mshowalter@seti.org
Moon Trackers		Generate a diagram showing the apparent east-west motion of one or moons relative to the disk of a planet	Web-based tool	NASA/PDS/Rings Node (SETI Institute)	http://pds-rings.seti.org/tools/	Not distributed	Mark Showalter mshowalter@seti.org
Ephemeris Generators		Generate a table listing useful information about the viewing geometry for a planet and/or any of its moons as a function of time	Web-based tool	NASA/PDS/Rings Node (SETI Institute)	http://pds-rings.seti.org/tools/	Not distributed	Mark Showalter mshowalter@seti.org
WWW Information Processing Environment	WIPE	A network-centric geospatial data processing, management and analysis server		Applied Coherent Technology Corp.	http://www.actgate.com/home/wipe.htm	Commercial product	Erick Malaret malaret@actgate.com
Small Bodies Image Browser		Graphically search through a large number of images quickly (currently just DAWN/Vesta)	Web-based tool	NASA/PDS/Small Bodies Node	http://sbib.psi.edu/		Eric Palmer epalmer@psi.edu
STEER Coefficient Maker	SCM	Calculates tuning adjustment required to move a radio science open loop receiver signal to the center of its frequency window. Requires customized SPK reader for maximum precision.	Program	Stanford U.	none	Not Distributed	Dick Simpson rsimpson@stanford.edu
Radio Science Geometry Calculation	BSRGEOM	Calculates geometry for radio science observation(s). Can be used for planning or analysis.	Program set	Stanford U.	none	Not Distributed	Dick Simpson rsimpson@stanford.edu
Radio Science Simulator	RSS	Orbit simulator about planetary bodies	software package	UniBw Munich	none	not distributed	Tom Andert tom.andert@unibw-muenchen.de

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Frequency Predictor		Prediction of received carrier frequency of interplanetary spacecraft	software package	UniBw Munich	none	not distributed	Tom Andert tom.andert@unibw-muenchen.de
Radio Science Data Analysis		Level-2: calibrated received carrier frequency, frequency residuals & differential Doppler -- public archive product! Level-3: occultation plane, bending angle, refractivity of planetary atmospheres	software package	RIU-PF, Cologne University	none	Not distributed	Martin Pätzold martin.paetzold@uni-koeln.de
Misc. for daily routine use		MEX, VEX occultation predictor; Rosetta BSR and gravity investigation planner; geometry calculator: solar zenith angle, surface coordinates of occultation point; spacecraft antenna mispointing; radio signal defocussing loss etc....	software	RIU-PF, Cologne University	none	Not distributed	Martin Pätzold martin.paetzold@uni-koeln.de
Geometry Visualization							
Celestia	Celestia	Space simulation software	Program	Open Source	http://www.shatters.net/celestia/		
Eyes on the Solar System		Space simulation software	Web-based tool	NASA/JPL	http://eyes.nasa.gov/		Kevin Hussey kevin.j.hussey@jpl.nasa.gov
Rosetta Visualization Subsystem	ROVIZ	Rosetta orbit visualization (and more)	Program set	ESA/ESAC	http://comsim.esac.esa.int/rossim/bgrieger/CDR/slides.pdf	Under development Not distributed	Bjoern Grieger bgrieger@sciops.esa.int
Solar System Visualization Project		Space simulation software		NASA/JPL			Eric De Jong eric.m.dejong@jpl.nasa.gov
Solar System Simulator		Space simulation software	Web-based tool	NASA/JPL	http://space.jpl.nasa.gov/		David Seal seal@jpl.nasa.gov
Dave's Interactive Geometry & Information Tool	DIGIT	Space simulation software	Program	NASA/JPL		Not distributed	David Seal seal@jpl.nasa.gov
Field of View Visualizer	FLOW	Instrument FOV visualizer	Program	JAXA	http://darts.jaxa.jp/planet/tools/flow/		Yukio Yamamoto yukio@planeta.sci.isas.jaxa.jp
Luna-Glob Orbit Visualization	LGOV	Spacecraft orbit visualization	Program	Russian Academy of Sciences/Space Research Institute	http://193.232.10.221/lgov/		aabbakumov@romance.iki.rssi.ru
Fast 3D Scenario Maker		Creates the necessary files and the kernel for Celestia to quickly get 3d animation for presentations	Program	Dauria Aerospace		Under development	Alexander Yanin yanin@dauria.ru

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Multi- or Special Function							
Ephemeris generator for natural bodies	Horizons	Ephemeris generation and allied geometry computations	Internet-based tool	NASA/JPL	http://ssd.jpl.nasa.gov/?horizons		Jon Giorgini Jon.D.Giorgini@jpl.nasa.gov
WebGeocalc	WebGeocalc	GUI interface to many SPICE computations	Web-based tool	NASA/JPL (NAIF) and NASA/AMES	TBD	Under development	Charles Acton charles.h.acton@jpl.nasa.gov
Satellite Orbit Analysis Program	SOAP	Trajectory design and analysis		Aerospace Corp.	http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=00468892	Restricted use	David Stodden David.Y.Stodden@aero.org
System Tool Kit (formerly Satellite Tool Kit)	STK	Large suite of mission design and analysis tools	Program set	Analytical Graphics Inc.	https://www.agi.com/products/by-product-type/applications/stk/Default.aspx	Commercial product	Vince Coppola vcoppola@agi.com
Spacecraft Control Toolbox		Over two thousand functions are provided for attitude and orbit dynamics, simulation, analysis and design.	MATLAB Library	Princeton Satellite Systems, Inc.	http://www.psatellite.com/sct/index.php	Commercial product	info@psatellite.com
Spacecraft Package for DSim		This simulation package for VisualCommander enables you to simulate spacecraft control systems including sensors and actuators, attitude and orbit dynamics, and provides a library for control and estimation software.	C++ library	Princeton Satellite Systems, Inc.	http://www.psatellite.com/ControlSystems/spacecraftpkg.php	Commercial product	info@psatellite.com
Free Flyer	Free Flyer	Mission planning and analysis	Program	A. I. Solutions	http://www.ai-solutions.com/ProductsServices/FreeFlyer/Overview.aspx	Commercial product	http://www.ai-solutions.com/ContactUs.aspx
Geometry Library for PSA Archives	GEOLIB	Generates a variety of observation geometry parameters recommended for inclusion in ESA/PSA science instrument archives	Library	ESA/ESAC	ftp://ssols01.esac.esa.int/pub/software/GEOLIB/		Jose Luis Vazquez-Garcia jlvazquez@sciops.esa.int
Lunar Mapping and Modeling Portal	LMMP	Lunar mission tools	Web-based tool	NASA, U.S. Army, U.S.G.S.	http://pub.lmmp.nasa.gov		Shan Malhotra shantanu.malhotra@jpl.nasa.gov
Flight Algorithm Simulation for Human Exploration	Flashe	Orion GN&C Flight algorithm simulator	Program	NASA/JSC, NASA/GRC		Not distributed	erin.eldridge@jacobs.com, zoran.milenkovic-1@nasa.gov
HWCNTRL	HWCNTRL	Control a spacecraft ground system	Program	DeWitt & Associates LLC w/ NASA/Wallops	http://www.dewitt-assoc.com/spacecraft.html	Restricted use	Henry DeWitt hdewitt@dewitt-a
Radio Science Tools							
events		calculates DSN view periods and spacecraft occultation times	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
lmbtrk		calculates bending angles for radio science occultation observations	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
postlb		creates Doppler files for radio science observations	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
bistat		calculates Doppler files for radio science bistatic scattering experiments	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
predicts		calculates Doppler frequency predictions for radio science experiments	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
LGA2		Calculates spacecraft low-gain antenna pointing angles for planning radio science experiments	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov
px6point		Calculates pointing angles for Advanced Water Vapor Radiometer	Program	NASA/JPL	none	Restricted use	Asmar, Sami sami.w.asmar@jpl.nasa.gov

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<i>A few of the many other instrument tools</i>							
assorted tools		planning, commanding and data processing	Program set	MARSIS Ops Center, ASI/INAF	none	Not distributed	
assorted tools		planning, commanding and data processing	Program set	SHARAD Ops Center, ASI/INAF	none	Not distributed	Fabrizio Bernardini fabrizio.bernardini@iaps.inaf.it
assorted tools		planning, commanding and data processing	Program set	Co-Sharps SHARAD Processing System, SWRI	none	Not distributed	Fabrizio Bernardini fabrizio@boulder.swri.edu

*The Usage Restrictions may not be accurate; check with the tool provider. ITAR restrictions may also apply for some U.S. tools.

†NAIF has not tested and does not endorse any of the tools in this listing other than those marked as developed by NAIF.