

---

Navigation and Ancillary Information Facility

# Demonstration of Two SPICE-based Tools: WebGeocalc Cosmographia

**Charles Acton & Boris Semenov**

Jet Propulsion Laboratory, California Institute of Technology

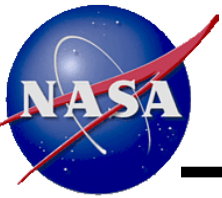
[charles.acton@jpl.nasa.gov](mailto:charles.acton@jpl.nasa.gov)

[boris.semenov@jpl.nasa.gov](mailto:boris.semenov@jpl.nasa.gov)

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

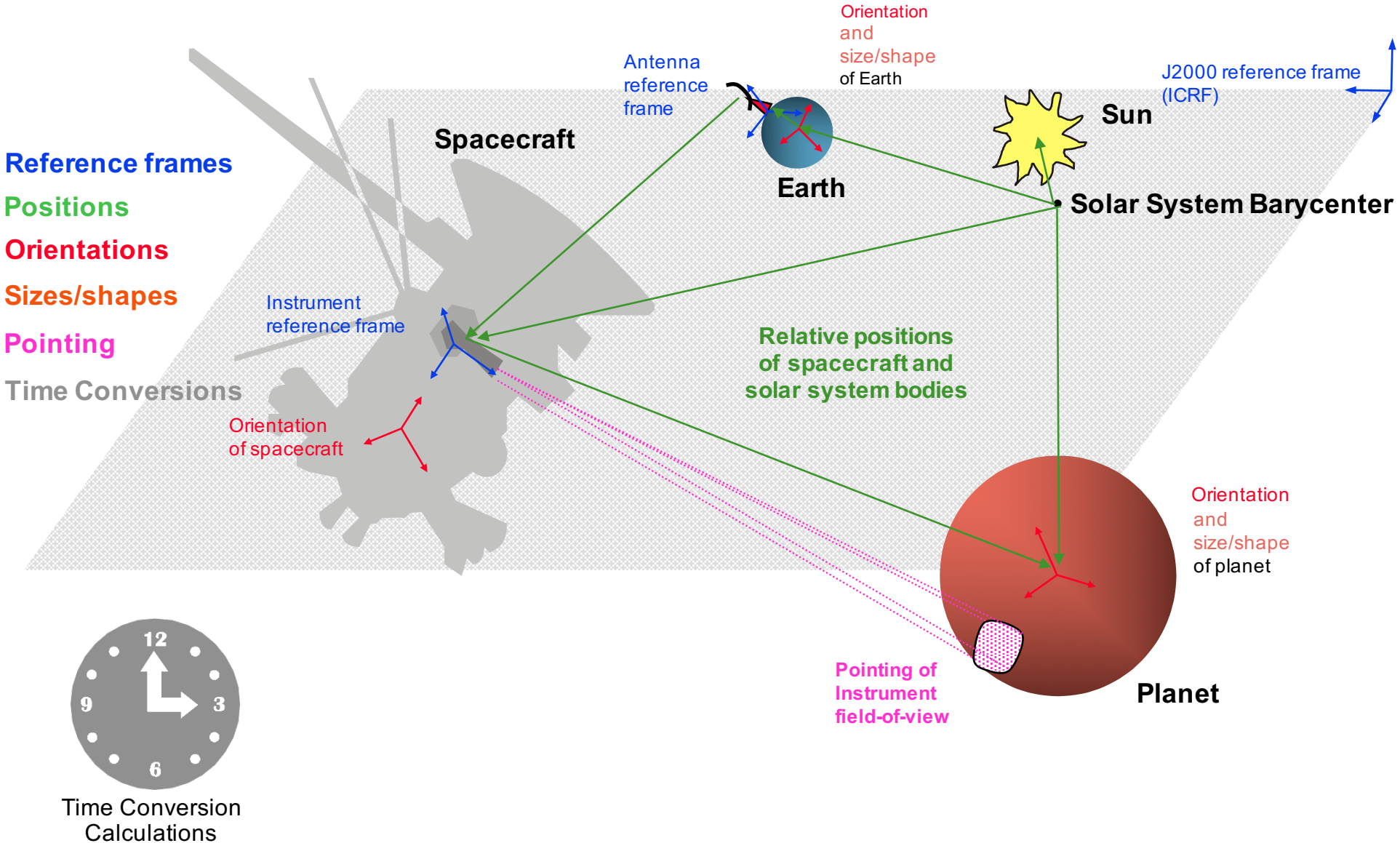
© 2016 California Institute of Technology. Government sponsorship acknowledged

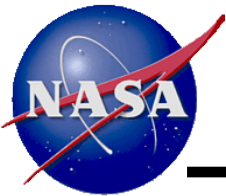
The research described in this publication was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



# SPICE Deals with “Ancillary Data”

## Navigation and Ancillary Information Facility

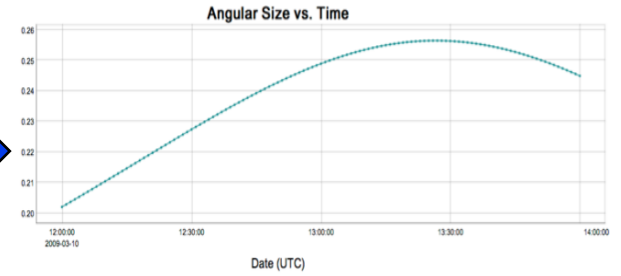




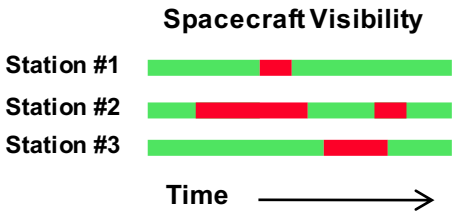
# Purposes for Using SPICE

## Navigation and Ancillary Information Facility

Evaluation of a planned trajectory

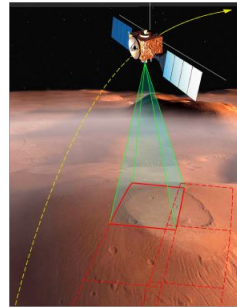


Angular size of Phobos as seen from the Mars rover "SPIRIT"

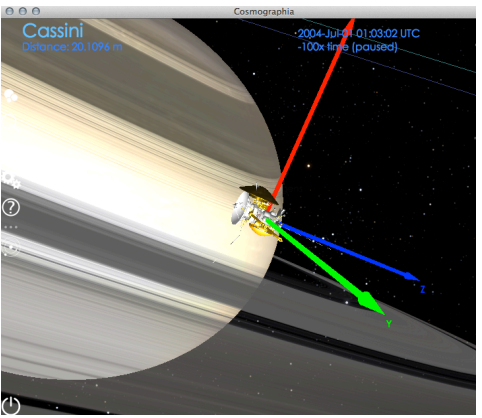


Mission engineering analyses

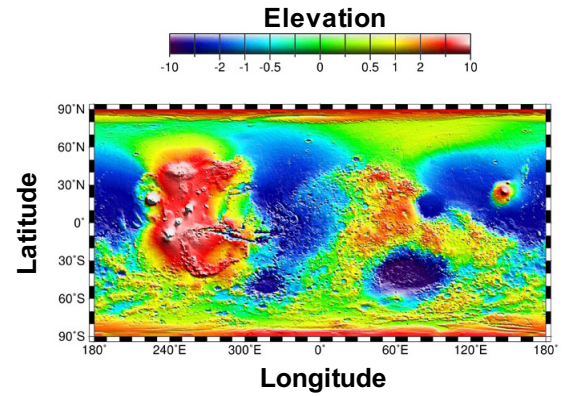
Planning an instrument pointing profile

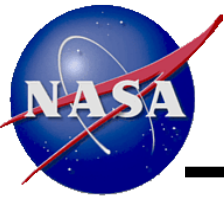


Observation geometry visualization



Science data archiving and analysis



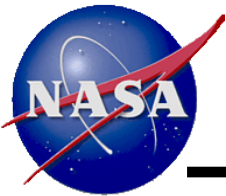


# The Demos

---

Navigation and Ancillary Information Facility

- **Boris Semenov will demonstrate two rather new SPICE-based tools:**
  - **WebGeocalc**: a geometry engine using client-server architecture
  - **SPICE-enhanced Cosmographia**: a mission 3D visualization tool
- **As for all SPICE products, these are free for everyone to use.**

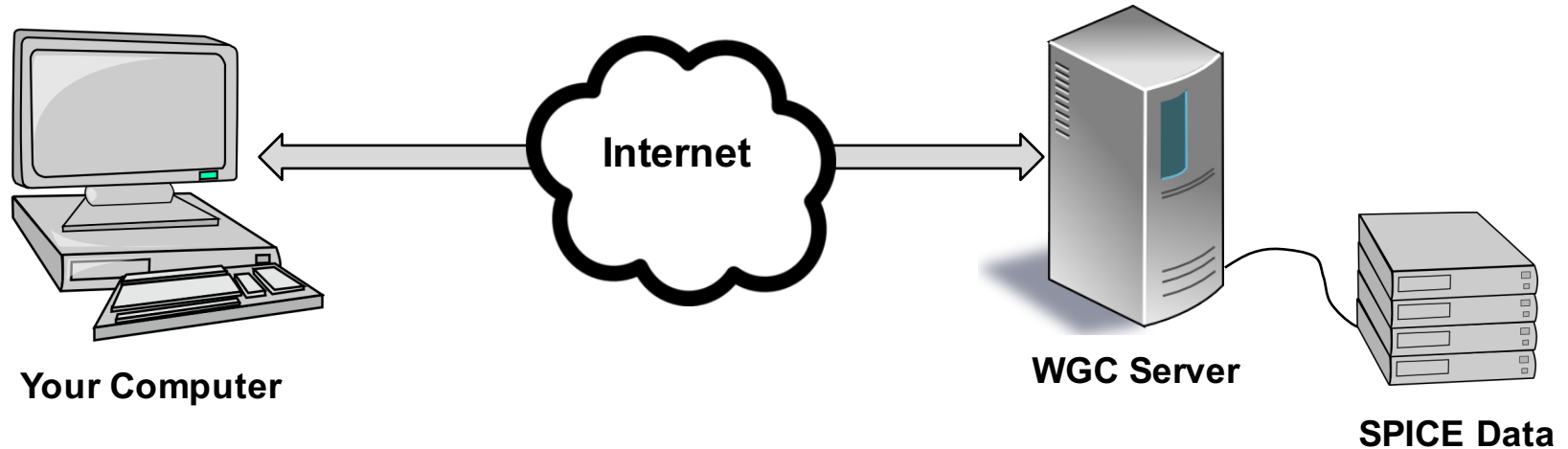


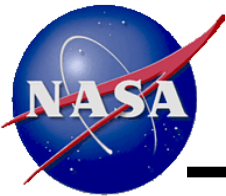
# WebGeocalc (WGC)

Navigation and Ancillary Information Facility

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

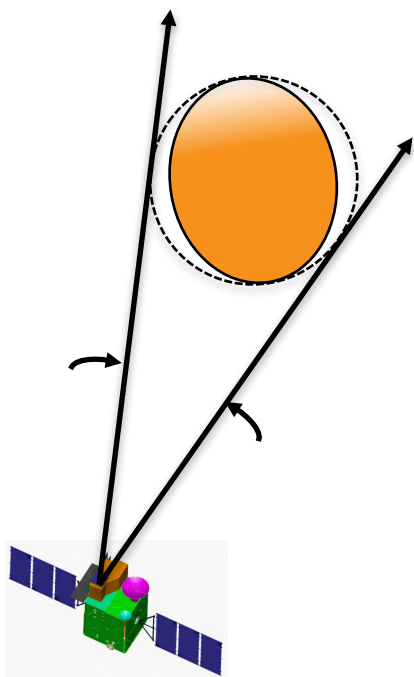
- **WGC provides a Graphical User Interface to a server running a geometry computation engine**
- **WebGeocalc is useful in quickly making space geometry computations using SPICE ancillary data without having to write a program**



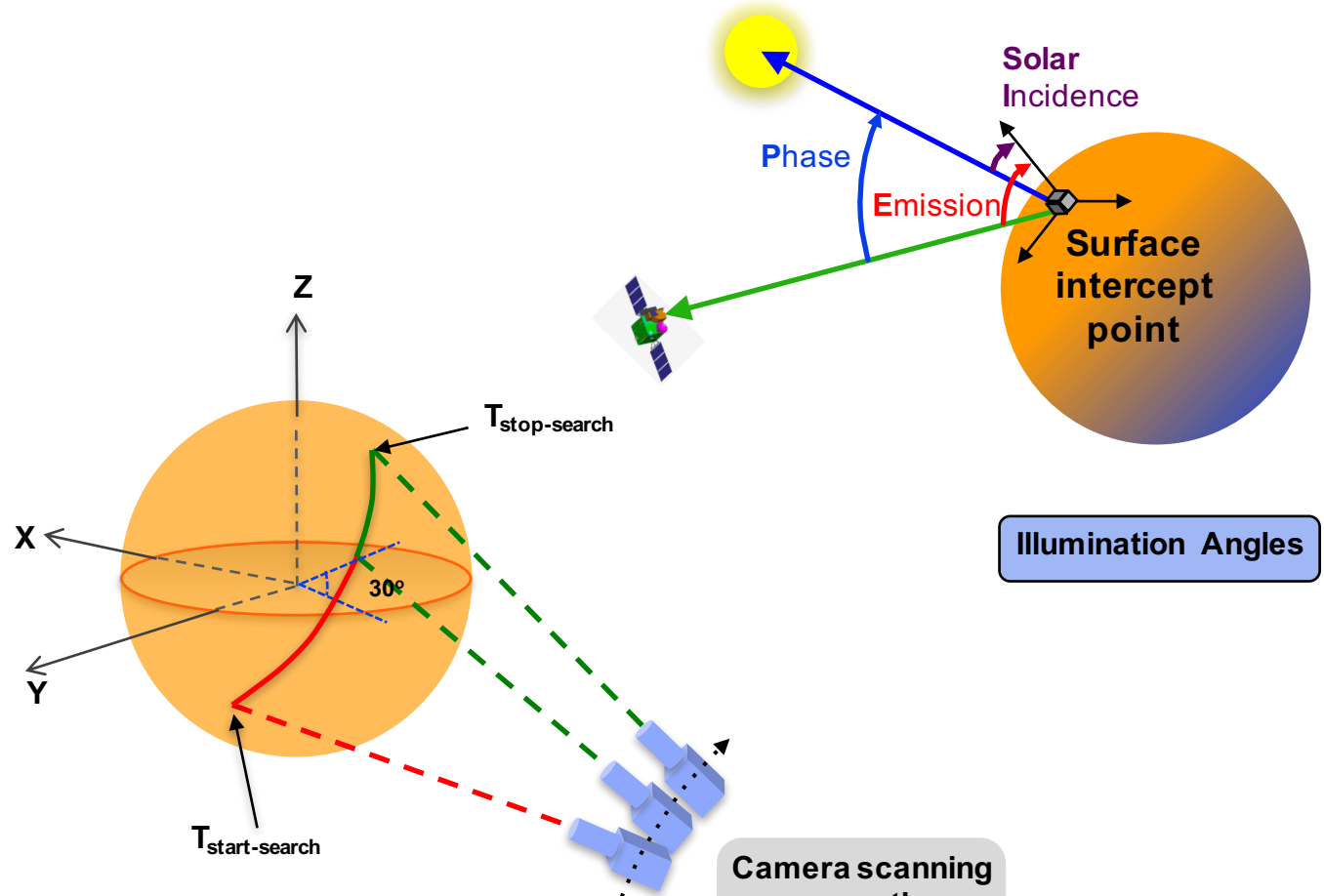


# Illustrations of Three Available WGC Computations

Navigation and Ancillary Information Facility

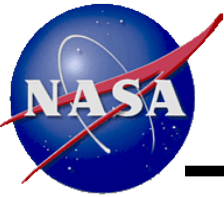


Angular Size



The **GREEN** trace shows when the latitude of the instrument boresight surface intercept is greater than 30 degrees, within the time range  $T_{\text{start-search}}$  to  $T_{\text{stop-search}}$ .

Surface Intercept Event Finder



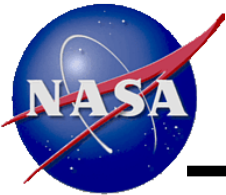
# Cosmographia Visualization Tool

---

Navigation and Ancillary Information Facility

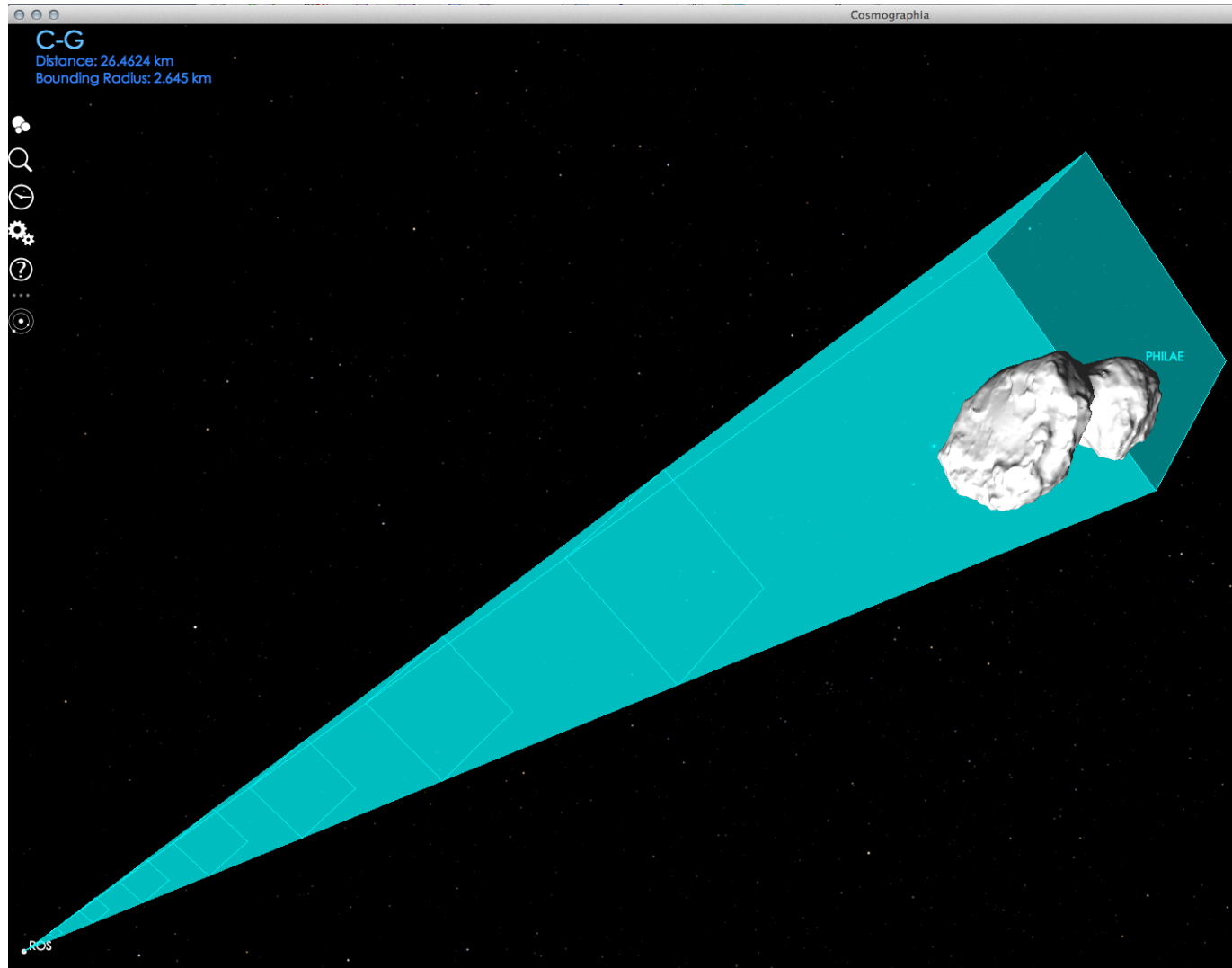
<http://naif.jpl.nasa.gov/naif/cosmographia.html>

- **Cosmographia is a desktop tool used to help visualize and analyze astrodynamics and science aspects of a mission in 3D animations.**
- **The tool uses GUI controls. It also has a Python-based scripting interface (except for the Windows version).**



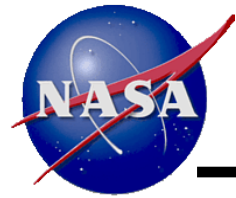
# A Cosmographia Snapshot

## Navigation and Ancillary Information Facility



Rosetta's OSIRIS Camera Imaging Comet C-G and Philae



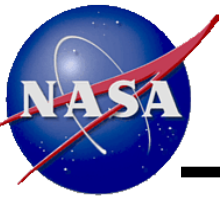


# WebGeocalc Status

---

Navigation and Ancillary Information Facility

- **WGC is running on a NAIF server at JPL**
  - Available for use by anyone
  - Has access to a wide assortment of archived, operational and generic SPICE kernels
- **ESA (ESAC) is in the process of setting up WGC instances for use by several upcoming projects**
- **It's possible NAIF could provide WGC server software to other space agencies**

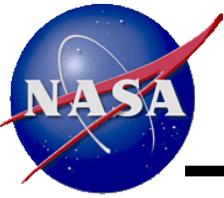


# Cosmographia Status

---

Navigation and Ancillary Information Facility

- **Cosmographia was originally implemented by Chris Laurel of Fifth Star Labs, and it uses the VESTA rendering engine built by Astos Solutions—both represented here at ICATT.**
- **NAIF received permission to add a number of SPICE enhancements and distribute this version.**
- **Executables for OSX, Linux and Windows are available for download by anyone.**
  - **It might be possible for NAIF to provide source code in the near future: stay tuned.**



# Looking Ahead

---

## Navigation and Ancillary Information Facility

- **Both tools are very useful in their current states, but further enhancements are envisaged.**
- **Should you have suggestions for improving either of the tools, please let us know!**