

# ORBITER Credits & Contributions

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## Special thanks:

Doug, Josh, Gary, Orb and the entire Orbiter Forum team for keeping things running smoothly, and in particular Josh for providing and maintaining the server for the forum and Orbiter downloads.

Jarmo for pushing the envelope with the D3D9 client, and helping debug Orbiter and the graphics interface.

All beta testers and bug reporters for their help in getting the new version into shape.

All Orbiter users for their continued support. Keep playing!

## Data sources planetary textures

### Mercury

Mosaics created using MESSENGER orbital images released by [NASA's Planetary Data System \(PDS\)](#) on September 7, 2012.

NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

[http://messenger.jhuapl.edu/the\\_mission/mosaics.html](http://messenger.jhuapl.edu/the_mission/mosaics.html)

### Mercury surface labels

USGS

Astrogeology Research Program

Planetary Geomatics Group

Gazetteer of Planetary Nomenclature

<http://planetarynames.wr.usgs.gov/>

### Venus surface

Composite of Magellan synthetic aperture radar mosaics.

Jet Propulsion Laboratory Multimission Image Processing Laboratory

Solar System Visualization Project and Magellan science team

p45187.tif ( 5120x2560)

### Venus clouds

Björn Jónsson

<http://www.mmedia.is/~bjj>

### Earth land surface

Custom processed from Landsat 7 ETM orthorectified imagery.

### Florida:

Digital Orthoimage Quarter Quads,

Florida Department of Environmental Protection  
Land Boundary Information System ([www.labins.org](http://www.labins.org))  
Download: <ftp://146.201.97.137/DOQQ/2004/RGB/UTM/MrSid>

## Earth water surface

Based on NASA Visible Earth Blue Marble maps  
<http://visibleearth.nasa.gov/>

## Earth night lights

Custom processed, based on NASA Visible Earth Blue Marble maps  
<http://visibleearth.nasa.gov/>

## Earth clouds

NASA Visible Earth Blue Marble maps  
<http://visibleearth.nasa.gov/>

## Earth elevation

SRTM 90m Digital Elevation Data by NASA, released by USGS  
CGIAR-CSI version 4 Processed for void removal by International Centre for Tropical Agriculture (CIAT)

## Moon surface

LRO LROC-WAC Global Mosaic 100m June2013  
Arizona State University  
Astrogeology Science Center

## Moon elevation

LOLA-GDR/Cylindrical  
[http://imbrium.mit.edu/DATA/LOLA\\_GDR/CYLINDRICAL/IMG/](http://imbrium.mit.edu/DATA/LOLA_GDR/CYLINDRICAL/IMG/)

## Mars surface

Custom processed, based on  
NASA MGS/MOC. 256 ppd/230m  
Mars Odyssey THEMIS-IR Day Global Mosaic 100m v12  
[http://astrogeology.usgs.gov/search/map/Mars/Odyssey/THEMIS-IR-Mosaic-ASU/Mars\\_MO\\_THEMIS-IR-Day\\_mosaic\\_global\\_100m\\_v12](http://astrogeology.usgs.gov/search/map/Mars/Odyssey/THEMIS-IR-Mosaic-ASU/Mars_MO_THEMIS-IR-Day_mosaic_global_100m_v12)  
Viking MDIM2.1 Colorized Global Mosaic 232m  
[http://astrogeology.usgs.gov/search/details/Mars/Viking/MDIM21/Mars\\_Viking\\_MDIM21\\_ClrMosaic\\_global\\_232m/cub](http://astrogeology.usgs.gov/search/details/Mars/Viking/MDIM21/Mars_Viking_MDIM21_ClrMosaic_global_232m/cub)

## Mars elevation

MOLA Mars elevation data at 128 pixels per degree  
[http://pds-geosciences.wustl.edu/mgs/mgs-m-mola-5-megdr-l3-v1/mgsl\\_300x/meg128/](http://pds-geosciences.wustl.edu/mgs/mgs-m-mola-5-megdr-l3-v1/mgsl_300x/meg128/)

## Mars surface labels

USGS  
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Planetary Geomatics Group

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<http://planetarynames.wr.usgs.gov/>

## Vesta surface

Dawn FC HAMO Global Mosaic 60mp

[http://astrogeology.usgs.gov/search/details/Vesta/Dawn/DLR/HAMO/Vesta\\_Dawn\\_FC\\_HAMO\\_Mosaic\\_Global\\_74ppd/cub](http://astrogeology.usgs.gov/search/details/Vesta/Dawn/DLR/HAMO/Vesta_Dawn_FC_HAMO_Mosaic_Global_74ppd/cub)

## Vesta elevation

Dawn HAMO DTM Global 93mp

[http://astrogeology.usgs.gov/search/details/Vesta/Dawn/DLR/HAMO/Vesta\\_Dawn\\_HAMO\\_DTM\\_DLR\\_Global\\_48ppd/cub](http://astrogeology.usgs.gov/search/details/Vesta/Dawn/DLR/HAMO/Vesta_Dawn_HAMO_DTM_DLR_Global_48ppd/cub)

## Jupiter

“Cassini's best map of Jupiter”

NASA/JPL/Space Science Institute

Cassini Imaging Central Laboratory for Operations

<http://www.ciclops.org/view/1270/Cassinis-Best-Maps-of-Jupiter>

Rolf Keibel: Jupiter cloud map based on CICLOPS maps

## Io Surface

Based on:

Io Galileo SSI/Voyager Color Merged Global Mosaic 1km

Astrogeology Science Center

USGS

[http://astrogeology.usgs.gov/search/map/lo/Voyager-Galileo/lo\\_GalileoSSI-Voyager\\_Global\\_Mosaic\\_ClrMerge\\_1km](http://astrogeology.usgs.gov/search/map/lo/Voyager-Galileo/lo_GalileoSSI-Voyager_Global_Mosaic_ClrMerge_1km)

## Io Elevation

Based on:

Oliver L. White, Paul M. Schenk, Francis Nimmo, Trudi Hoogenboom,

"A new stereo topographic map of Io: Implications for geology from global to local scales", Journal of Geophysical Research: Planets 119(6), 1276-1301 (2014), doi: 10.1002/2013JE004591

<http://onlinelibrary.wiley.com/doi/10.1002/2013JE004591/abstract>

## Europa:

Based on:

Europa Voyager and Galileo SSI Global Mosaic 500m

Astrogeology Science Center

USGS

[http://astrogeology.usgs.gov/search/map/Europa/Voyager-Galileo/Europa\\_Voyager\\_GalileoSSI\\_global\\_mosaic\\_500m](http://astrogeology.usgs.gov/search/map/Europa/Voyager-Galileo/Europa_Voyager_GalileoSSI_global_mosaic_500m)

## Ganymede

Ganymede Voyager and Galileo Color Global Mosaic 1.4km

Astrogeology Science Center

USGS

[http://astrogeology.usgs.gov/search/map/Ganymede/Voyager-Galileo/Ganymede\\_Voyager\\_GalileoSSI\\_Global\\_ClrMosaic\\_1435m](http://astrogeology.usgs.gov/search/map/Ganymede/Voyager-Galileo/Ganymede_Voyager_GalileoSSI_Global_ClrMosaic_1435m)

## Callisto

Based on:

Callisto Galileo/Voyager Global Mosaic 1km

Astrogeology Science Center

USGS

[http://astrogeology.usgs.gov/search/map/Callisto/Voyager-Galileo/Callisto\\_Voyager\\_GalileoSSI\\_global\\_mosaic\\_1km](http://astrogeology.usgs.gov/search/map/Callisto/Voyager-Galileo/Callisto_Voyager_GalileoSSI_global_mosaic_1km)

## Io, Europa, Ganymede, Callisto surface labels

USGS

Astrogeology Research Program

Planetary Geomatics Group

Gazetteer of Planetary Nomenclature

<http://planetarynames.wr.usgs.gov/>

## Saturn

Björn Jónsson

<http://www.mmedia.is/~bjj>

Rolf Keibel: texture adaptation

## Saturn rings

Björn Jónsson

<http://www.mmedia.is/~bjj>

## Mimas

NASA/JPL-Caltech/SSI/Lunar and Planetary Institute

Cassini Imaging Central Laboratory for Operations

PIA 18437

<http://www.ciclops.org/view/7963/Color-Maps-of-Mimas---November-2014>

## Enceladus

NASA/JPL-Caltech/SSI/Lunar and Planetary Institute

Cassini Imaging Central Laboratory for Operations

PIA 18435

<http://www.ciclops.org/view/7961/Color-Maps-of-Enceladus---November-2014>

## Tethys

NASA/JPL-Caltech/SSI/Lunar and Planetary Institute

Cassini Imaging Central Laboratory for Operations

PIA 18439

<http://www.ciclops.org/view/7965/Color-Maps-of-Tethys---November-2014>

## Dione

NASA/JPL-Caltech/SSI/Lunar and Planetary Institute

Cassini Imaging Central Laboratory for Operations

PIA 18434

<http://www.ciclops.org/view/7960/Color-maps-of-Dione---November-2014>

## Rhea

NASA/JPL-Caltech/Space Science Institute/Lunar and Planetary Institute  
<http://photojournal.jpl.nasa.gov/catalog/PIA18438>

## Titan surface

NASA/JPL/Space Science Institute/Cassini Data Analysis Program/USGS Astrogeology Science Center/Ian Regan

Updated, amended and restored version of USGS photomosaic

[https://astrogeology.usgs.gov/search/map/Titan/Cassini/Global-Mosaic/Titan\\_ISS\\_P19658\\_Mosaic\\_Global\\_4km](https://astrogeology.usgs.gov/search/map/Titan/Cassini/Global-Mosaic/Titan_ISS_P19658_Mosaic_Global_4km)

[https://astrogeology.usgs.gov/search/map/Titan/Cassini/Global-Mosaic/Titan\\_ISS\\_Globe\\_65Sto45N\\_450M\\_AvgMos](https://astrogeology.usgs.gov/search/map/Titan/Cassini/Global-Mosaic/Titan_ISS_Globe_65Sto45N_450M_AvgMos)

<https://www.flickr.com/photos/10795027@N08/43023455582/>

<https://www.insaturnsrings.com/titan-seam-blending>

Map used with permission

## Titan elevation

P. Corlies, A. G. Hayes, S. P. D. Birch, R. Lorenz, B. W. Stiles, R. Kirk, V. Poggiali, H. Zebker, L. Less "Titan's Topography and Shape at the End of the Cassini Mission",  
Geophysical Research Letters 44(23), 11754-11761 (2017)

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL075518>

## Titan surface labels

USGS

Astrogeology Research Program

Planetary Geomatics Group

Gazetteer of Planetary Nomenclature

<http://planetarynames.wr.usgs.gov/>

## Iapetus

NASA/JPL-Caltech/SSI/Lunar and Planetary Institute

Cassini Imaging Central Laboratory for Operations

PIA 18436

<http://www.ciclops.org/view/7962/Color-Maps-of-Iapetus---November-2014>

## Phoebe

NASA/JPL/Space Science Institute

Cassini Imaging Central Laboratory for Operations

PIA 07775

<http://www.ciclops.org/view/1743/Map-of-Phoebe---December-2005>

## Uranus

James Hastings-Trew

<http://apollo.spaceports.com/~jhasting/>

Rolf Keibel: texture adaptation

## Miranda, Ariel, Umbriel, Titania, Oberon

Robert Stettner

Credits: Planetary Satellite Mean Orbital Parameters and Moon Maps

## Neptune

James Hastings-Trew

<http://apollo.spaceports.com/~jhasting/>

## Triton, Proteus, Nereid

Robert Stettner

Credits: Planetary Satellite Mean Orbital Parameters and Moon Maps

Rolf Keibel: Triton texture adaptation from Voyager images

## Celestial sphere background images

DDS2 (visible), Hydrogen alpha, IRAS (far IR), Planck (Microwave, Source: ESA/Planck), Radio, RASS (X-ray), Fermi (Gamma)

Chromoscope <http://www.chromoscope.net/>

Stuart Lowe, Chris North (Cardiff University) and Robert Simpson (Oxford University)

## WMAP Microwave images

WMAP Science Team

WMAP "Science on a sphere" microwave sky images

NASA/LAMBDA

<http://lambda.gsfc.nasa.gov/product/map/current/sos/>

## Spacecraft and structure models and textures

### DeltaGlider and DG-S mesh and virtual cockpit

Roger "Frying Tiger" Long

### Space Shuttle Atlantis

Michael Grosberg: meshes and textures

Don Gallagher: mesh and texture extensions

Robert Conley ("estar"): Module extensions: Movable arm and grapppling, including MMU and Satellite extensions; documentation

David Hopkins: Module code extensions

Damir Gulesich: Space Shuttle External Tank and Solid Rocket Booster mesh and textures.

### LDEF mesh and textures

Don Gallagher

### ISS model "Project Alpha"

Andrew Farnaby

### Mir model

Jason Benson ("agent036")

### Dragonfly model

Roger "Frying Tiger" Long: Mesh improvements and textures

Radu Poenaru: Electrical and environmental simulation, Dragonfly panels

## Shuttle-A model

Roger “Frying Tiger” Long: Shuttle-A mesh  
Radu Poenaru: Virtual cockpit and cargo management

## Hubble Space Telescope (HST) model

David Sundstrom

## KSC VAB mesh

Valerio Oss

## PTV (Personal transport vehicle) mesh

Balázs Patyi  
[patyibalazs@yahoo.com](mailto:patyibalazs@yahoo.com)

## Default exhaust texture, cloud microtextures

“McWgogs”  
<http://mcwgogs.deviantart.com/>

# Code, data and algorithms

## VSOP87

Planetary perturbation terms for Mercury to Neptune  
Bureau des Longitudes, CNRS URA 707  
P. Bretagnon [pierre@bdl.fr](mailto:pierre@bdl.fr)  
G. Francou [francou@bdl.fr](mailto:francou@bdl.fr)

## Lunar Solution ELP 2000-82B

Semi-analytical lunar ephemerides  
Bureau des Longitudes, CNRS URA 707  
75014, Paris, France  
M. Chapront-Touze, J. Chapront  
Astron. Astrophys. 124, 50 (1983)  
Astron. Astrophys. 190, 342 (1988)

## Earth precession parameters

IAU SOFA C Library  
<http://www.iausofa.org/>

## Planetary precession parameters

IAU/IAG Working Group  
Report of the IAU/IAG Working Group on cartographic coordinates and rotational elements  
2006, <http://www.springerlink.com/content/e637756732j60270/>

## Phobos and Deimos ephemeris modules

Carl Romanik (“Chode”)  
Code based on: Sinclair, Astron. Astrophys. 220, 321 (1989)

“Testing against Horizons shows agreement within 20km for Phobos, 50km for Deimos for 2000-2024.”

### Miranda, Ariel, Umbriel, Titania, Oberon ephemeris modules

Carl Romanik (“Chode”)

Code based on: Laskar and Jacobson, Astron. Astrophys. 188, 212 (1987)

“According to the Horizons documentation, this is the same theory they use for Uranus, and the agreement of the DLLs with Horizons looks to be within about 50km.”

### Triton ephemeris module

Carl Romanik (“Chode”)

Code based on: Jacobson et al., Astron. Astrophys. 247, 565 (1991)

“This also appears to be what Horizons use, and the DLL agrees within about 1000km.”

### TransX MFD mode

Duncan Sharpe: TransX MFD mode module

Steve Arch: TransX development <http://orbiter.quorg.org>

### Zlib

Compression/decompression library

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Mark Adler [madler@alumni.caltech.edu](mailto:madler@alumni.caltech.edu)