

SPICE Training Class

ExoMarsRSP



Marc Costa Sitja
ESA SPICE Service
by RHEA Group

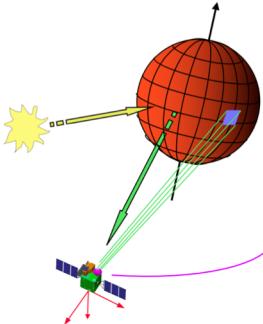


3rd-4th December 2019, ALTEC

SPICE in a nutshell



Compute many kinds of observation geometry parameters at selected times

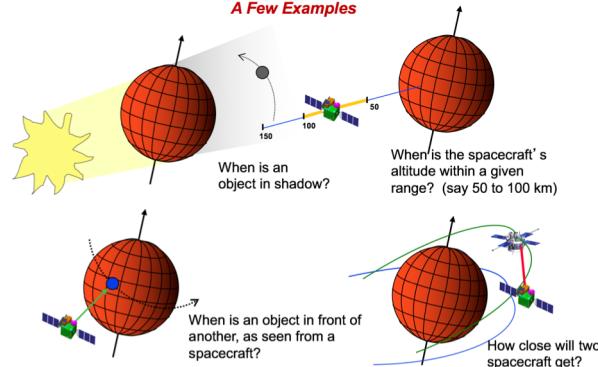


A Few Examples

- Positions and velocities of planets, satellites, comets, asteroids and spacecraft
- Size, shape and orientation of planets, satellites, comets and asteroids
- Orientation of a spacecraft and its various moving structures
- Instrument field-of-view location on a planet's surface or atmosphere

Find times when a specified “geometric event” occurs, or when a specified “geometric condition” exists

A Few Examples



Time conversions

UTC to ET mapping (“generic” LSK file)

Universal Time Coordinated (UTC)

Orbiter on-board clock (SCLK)

Time conversions

ET to orbiter on-board clock mapping (“orbiter” SCLK file)

Position Vectors

Earth position relative to Solar System barycenter (“planet ephemeris” SPK file)

Ephemeris Time (ET)

Z_E

X_E

Y_E

Z_{J2000}

X_{J2000}

Y_{J2000}

Z_R

X_R

Y_R

Z_L

X_L

Y_L

Frame Orientations

Orbiter frame orientation relative to J2000 frame (“orbiter” CK file)

Rover frame orientation relative to local level frame (“rover” CK file)

Local level frame orientation relative to planet body-fixed frame (“mission” FK file)

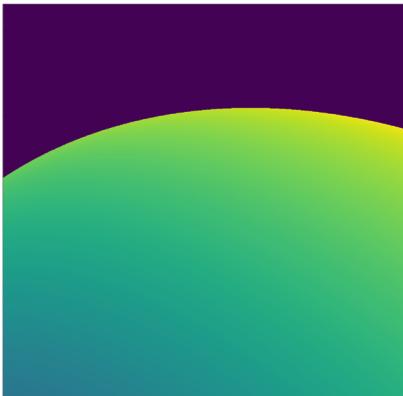
Planet body-fixed frame orientation relative to J2000 frame (“generic” PCK file)

Using SPICE

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loop per pixel  
spice.getfov  
spice.sincpt  
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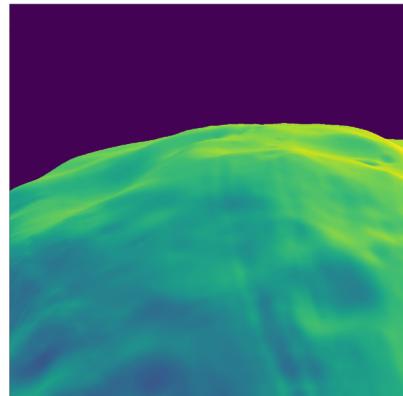
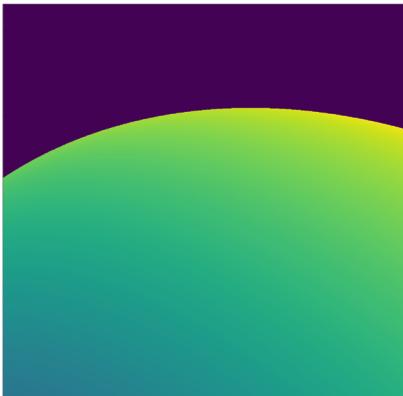
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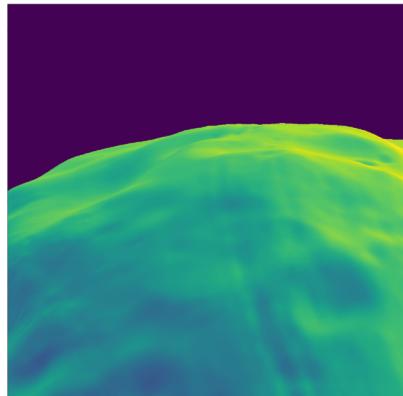
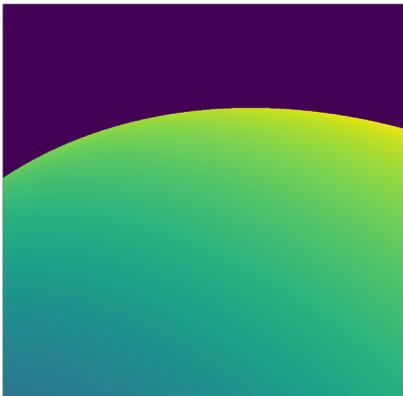


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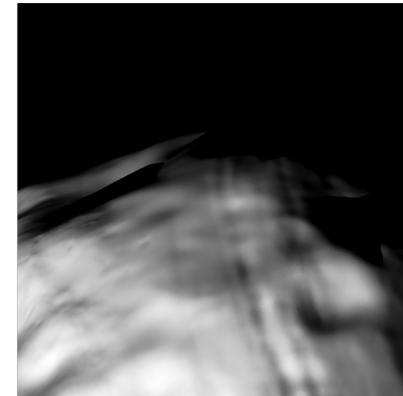
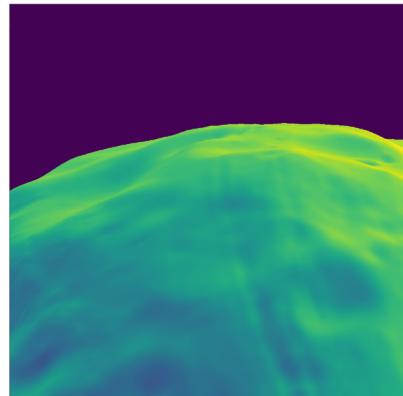
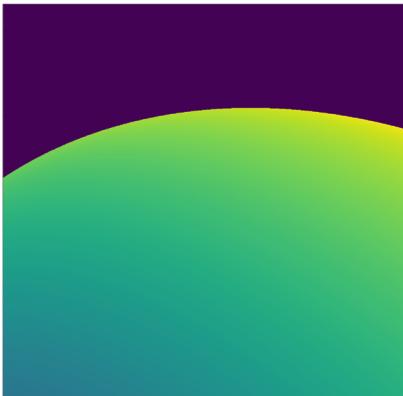


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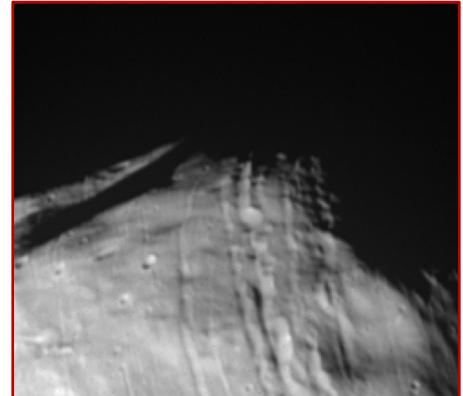
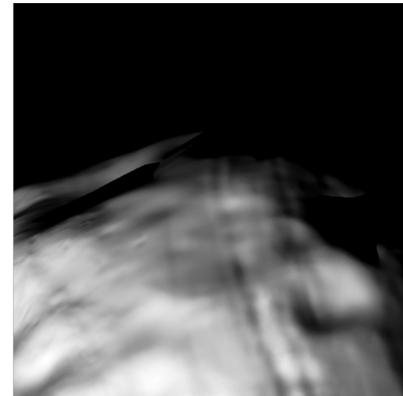
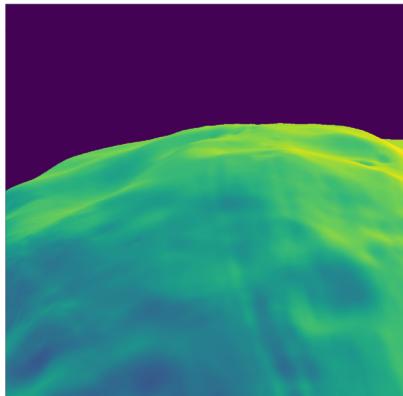
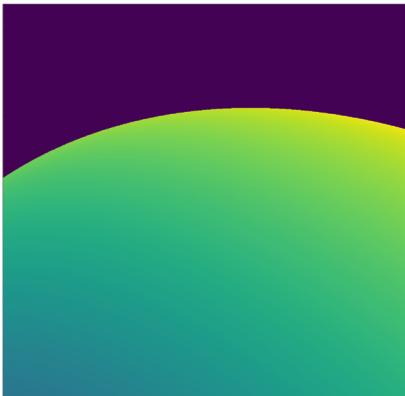


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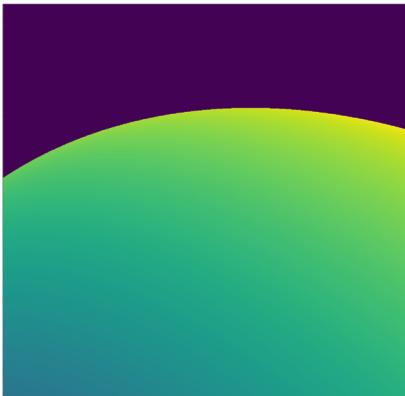
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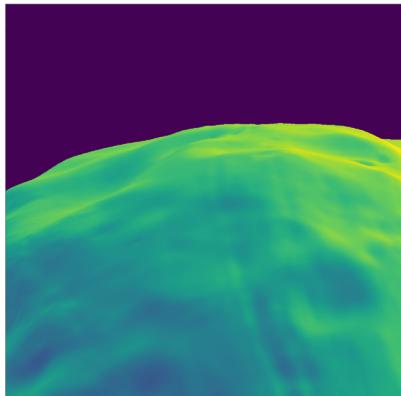
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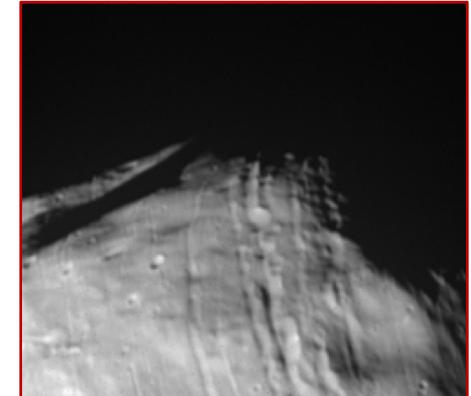
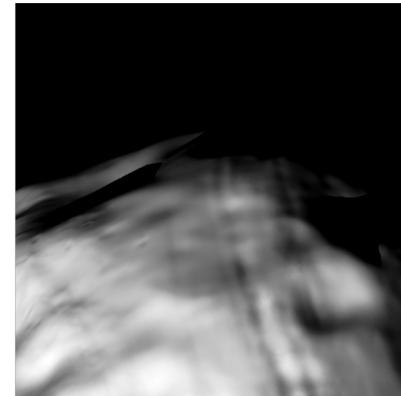
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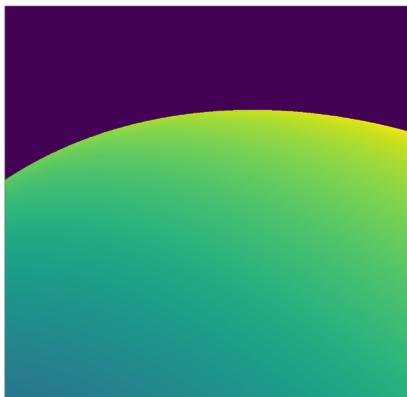
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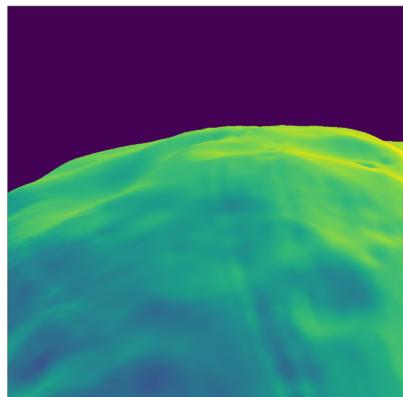
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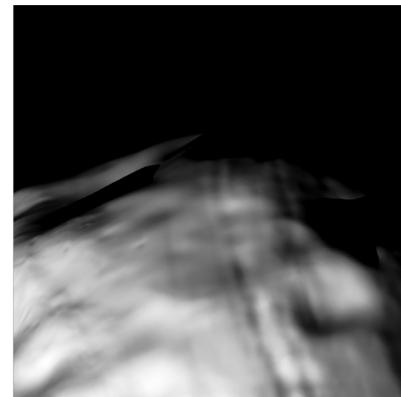
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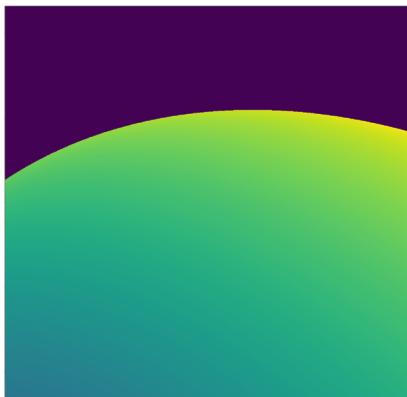
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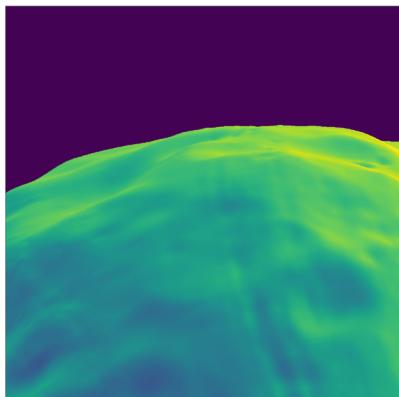
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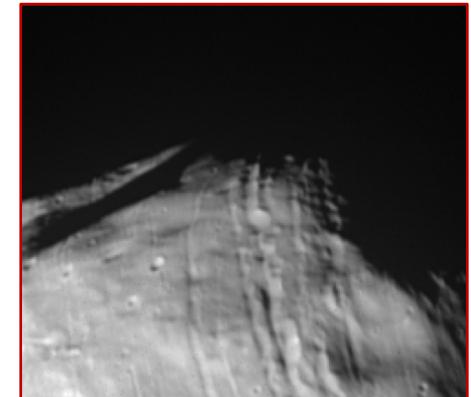
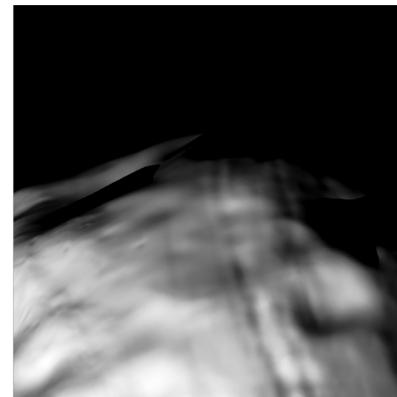
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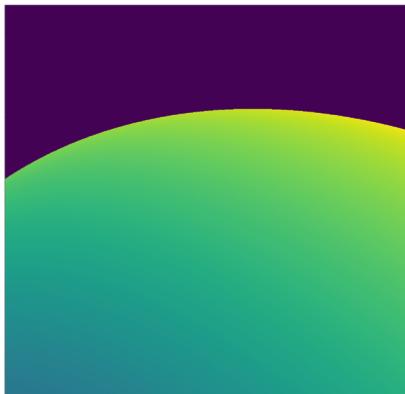
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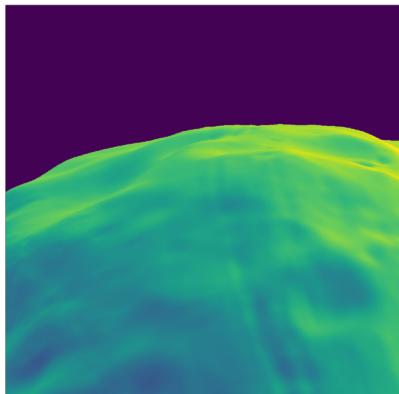
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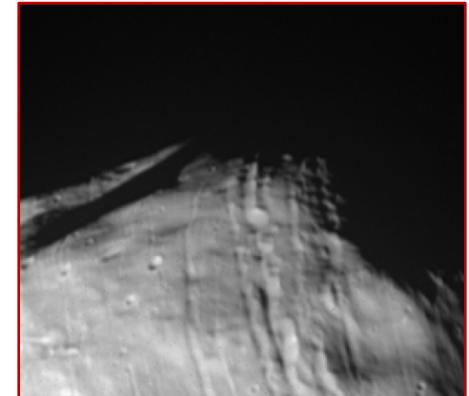
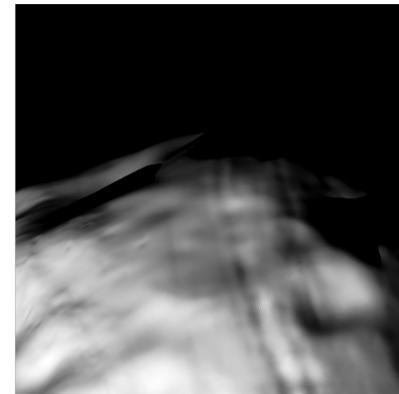
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Lines of code? 75



ftp://spiftp.esac.esa.int/temp/acardesin/spirec_sketch-hrsc_head-phobos.html