





Geomorphology on Titan, processing data and mapping

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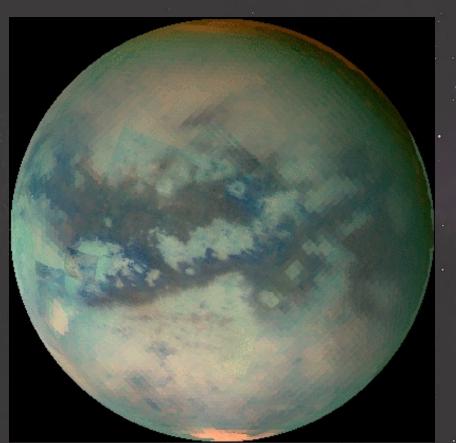
TITAN

-10 times thicker than Earth's atmosphere

 $-N_2$: Major constituent of both Earth's and Titan's atmosphere

(~98.4% N2,~1.6% CH4)





Instrument/Sensor

ISS: Imaging Science Subsystem

Wide Angle Camera: [WAC](20 cm f/3.5 refractor; 380-1100 nm; 18 filters; 3.5ox3.5o)

Narrow Angle Camera: [NAC](2 m f/10.5 reflector; 200-1100 nm; 24 filters; 0.35ox0.35o) Radar: 13.8 GHz Ku-band (or 2.2 cm wavelength) .

Four different acquisition modes of the Synthetic Aperture Radar (SAR) imaging instrument .

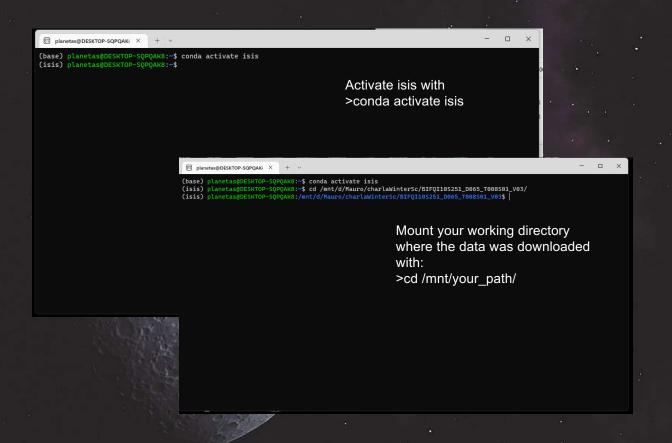
- Altimetry, Scatterometry and Radiometry allow surface imaging, as well as topographic mapping at spacecraft altitudes between 100,000 km and about 1,000 km (resolutions for the modes ranging from 100s of km to a few hundred meters (Elachi et al. 2005).

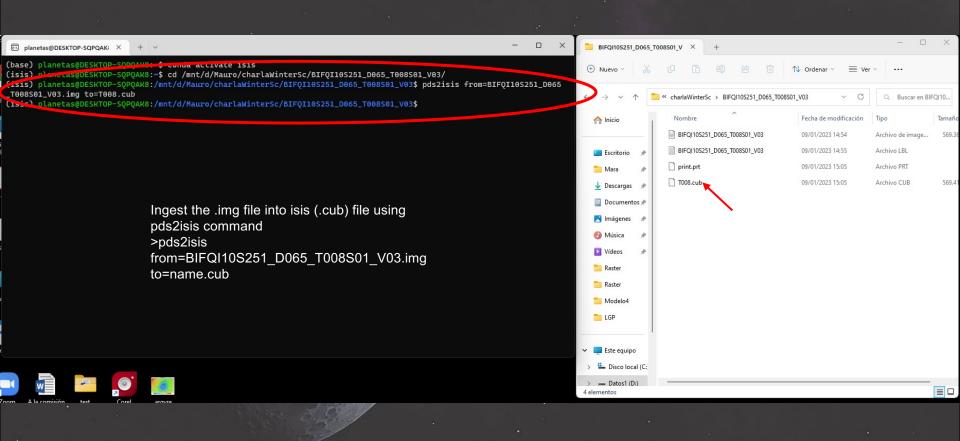
The observations, particularly when performed in the active modes of SAR, altimetry and scatterometry, are largely unaffected by atmospheric contributions.

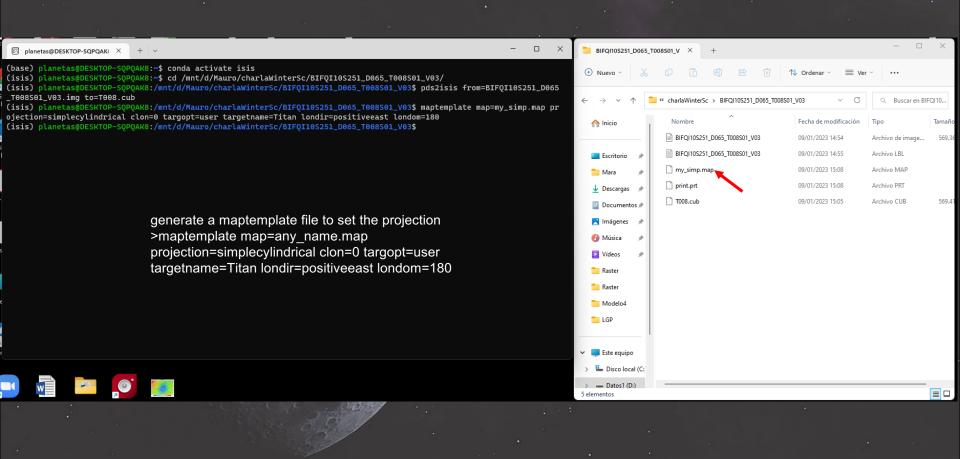


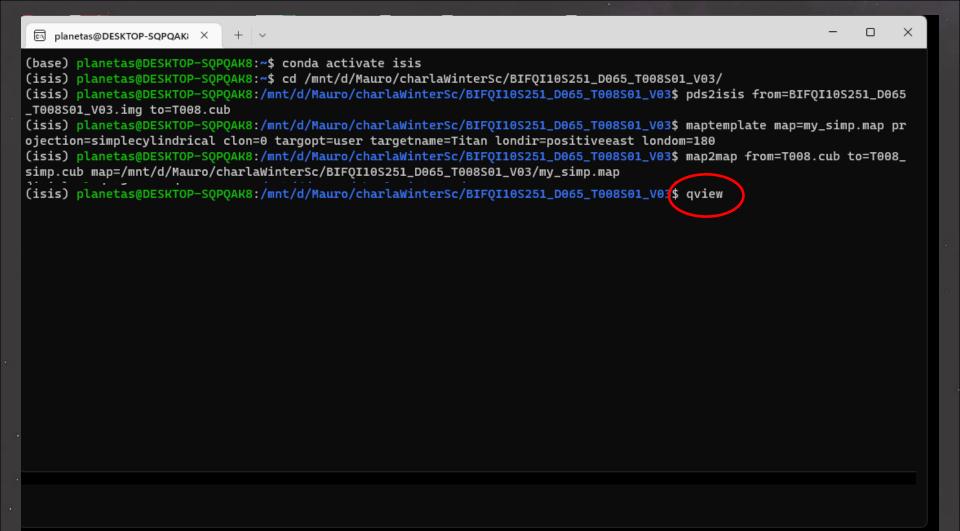
Area of study

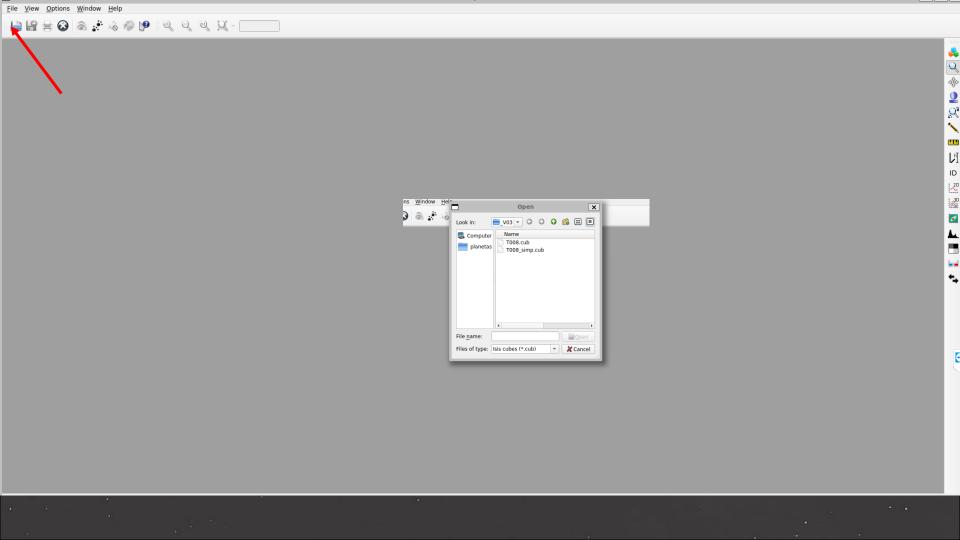


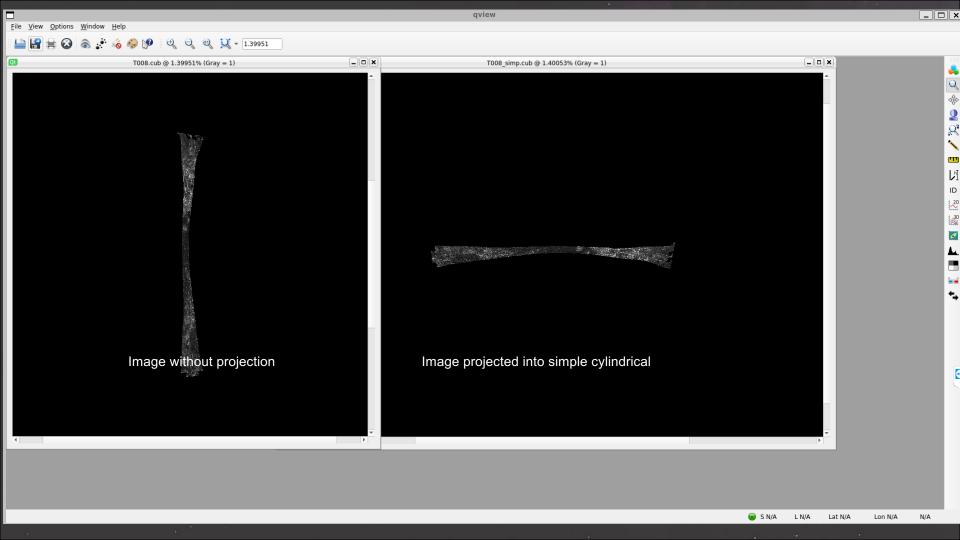


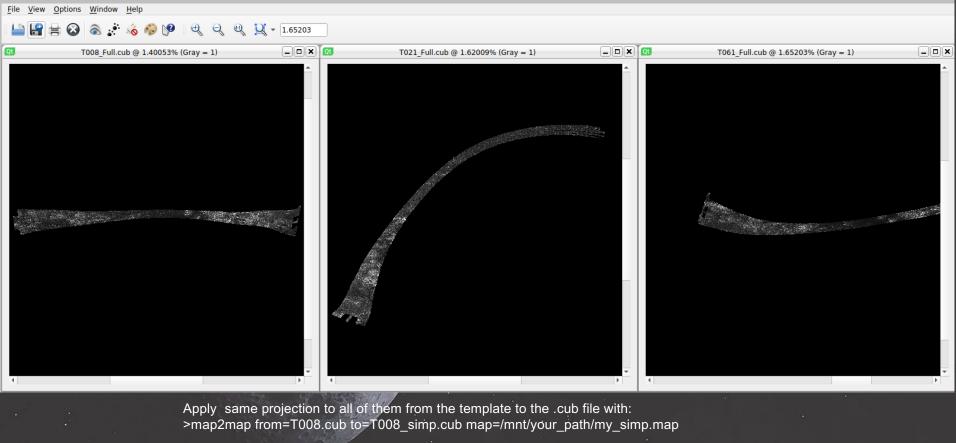








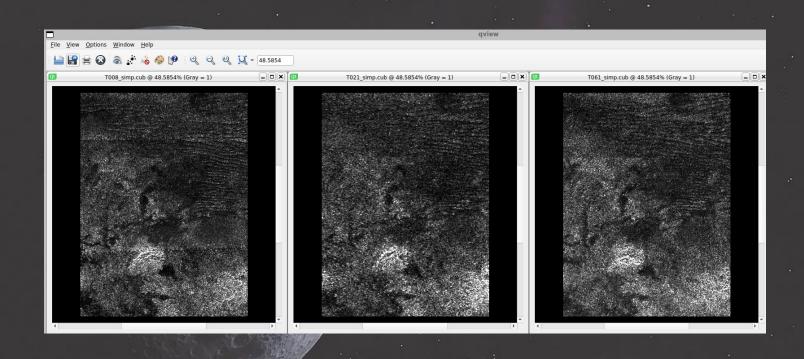




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simp.cub map=/mnt/d/Mauro/charlaWinterSc/BIFQI10S251_D065_T008S01_V03/my_simp.map minlat=-11 maxlat=-7 minlon=67 maxlon=
```

Use map2map to crop to the same area: >map2map from=BIEQI07S128_D277_T121S01_V02.cub to=T121S01_simp.cub map=my_simp.map minlat=-11 maxlat=-7 minlon=67 maxlon=70



09/01/2023 15:03

```
(base) D:\Mauro\charlaWinterSc>dir
El volumen de la unidad D es Datos1
El número de serie del volumen es: F2EC-949B
```

<DIR>

Directorio de D:\Mauro\charlaWinterSc

```
Use gdal to convert between formats with gdal_translate –"Output Format" "Imput file" output file"
```

```
09/01/2023 14:49 <DIR> ...
17/01/2023 15:07 <DIR> BIFQI10S251_D065_T008S01_V03
```

09/01/2023 14:51 210.351.950 BIFQI10S251_D065_T008S01_V03.ZIP 09/01/2023 15:03 1.074 print.prt

2 archivos 210.353.024 bytes 3 dirs 590.878.056.448 bytes libres (in newer versions of gdal –of is not strictly necessary since the format is guess from the extension)

```
(base) D:\Mauro\charlaWinterSc>cd BIFQI10S251_D065_T008S01_V03
```

(base) D:\Mauro\charlaWinterSc\BIFQI10S251_D065_T008S01_V03>gdal_translate -of GTIFF T008_simp.cub T008_simp.tif Input file size is 769, 1025
0...10...20...30...40...50...60...70...80...90...100 - done.

(base) D:\Mauro\charlaWinterSc\BIFQI10S251_D065_T008S01_V03>gdal_translate -of GTIFF T021_simp.cub T021_simp.tif Input file size is 769, 1025
0...10...20...30...40...50...60...70...80...90...100 - done.

(base) D:\Mauro\charlaWinterSc\BIFQI10S251_D065_T008S01_V03>gdal_translate -of GTIFF T061_simp.cub T061_simp.tif Input file size is 769, 1025 0...10...20...30...40...50...60...70...80...90...100 - done.

(base) D:\Mauro\charlaWinterSc\BIFQI10S251_D065_T008S01_V03>

RADAR

Advantages:

- -Nearly all weather capability
- -Day or night capability
- -Penetration through the vegetation canopy
- -Penetration through the soil
- -Minimal atmospheric effects
- -Sensitivity to dielectric properties (liquid vs. frozen water)
- -Sensitivity to structures and roughness

Disadvantages

Information content is different than optical and sometimes difficult to interpret Speckle effects (graininess in the image)
Effects of topography

Radar Backscatter

The radar echo contains information about the surface target, which drives the reflection of the radar signal

This reflection is driven by: The frequency or wavelength: radar parameter

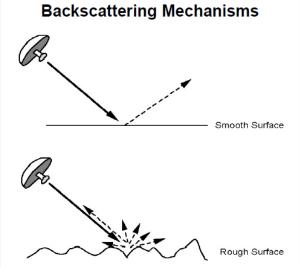
Polarization: radar parameter

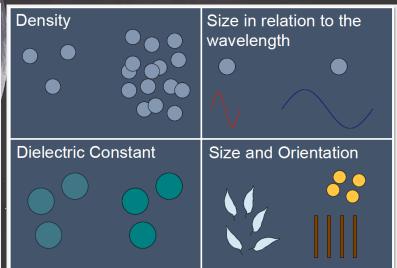
Incidence angle: radar parameter

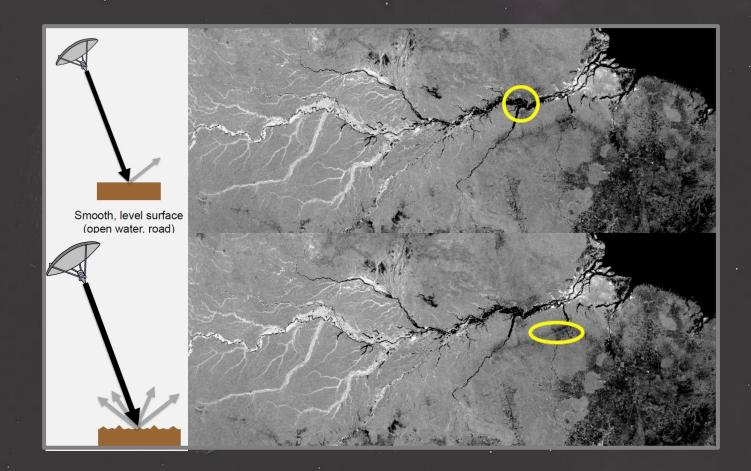
Dielectric constant: surface parameter

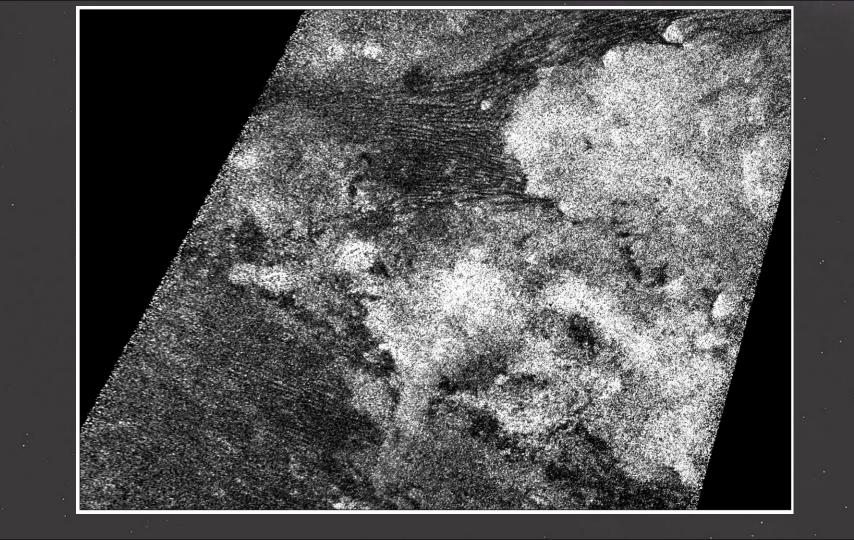
Surface roughness relative to the wavelength, surface parameter

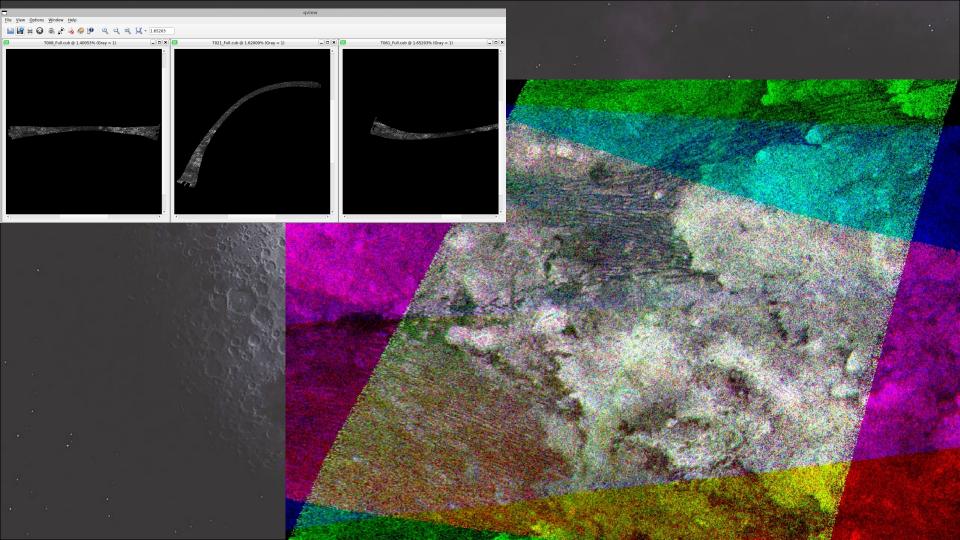
Structure and orientation of objects on the surface: surface parameter

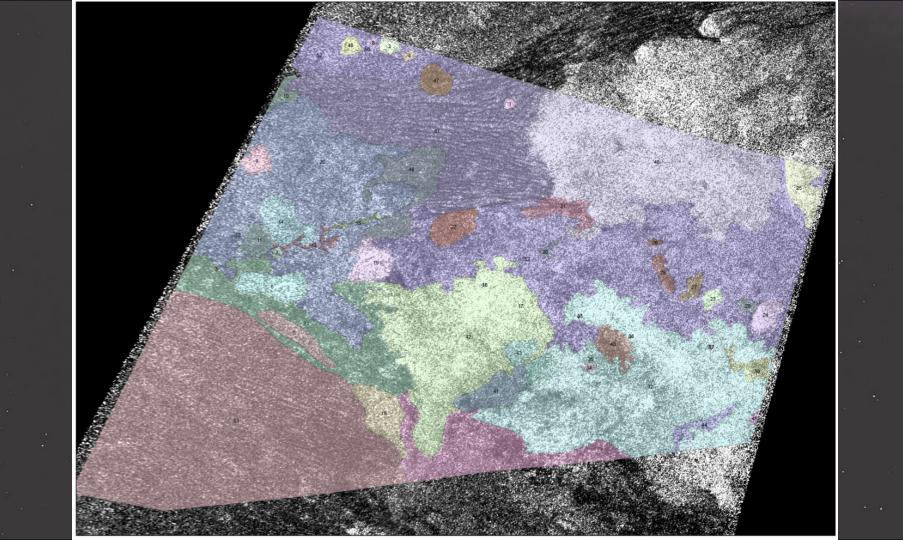












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