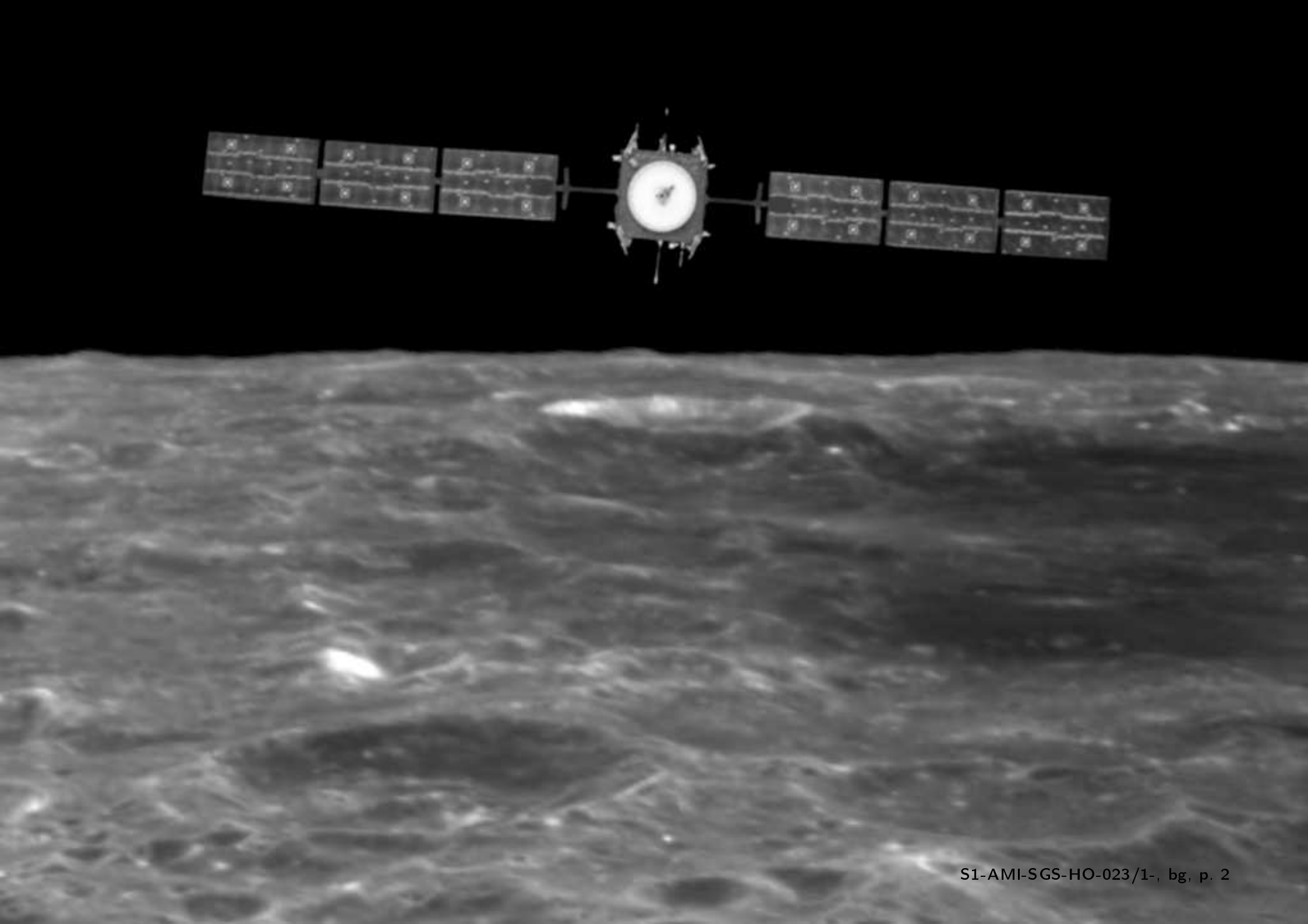
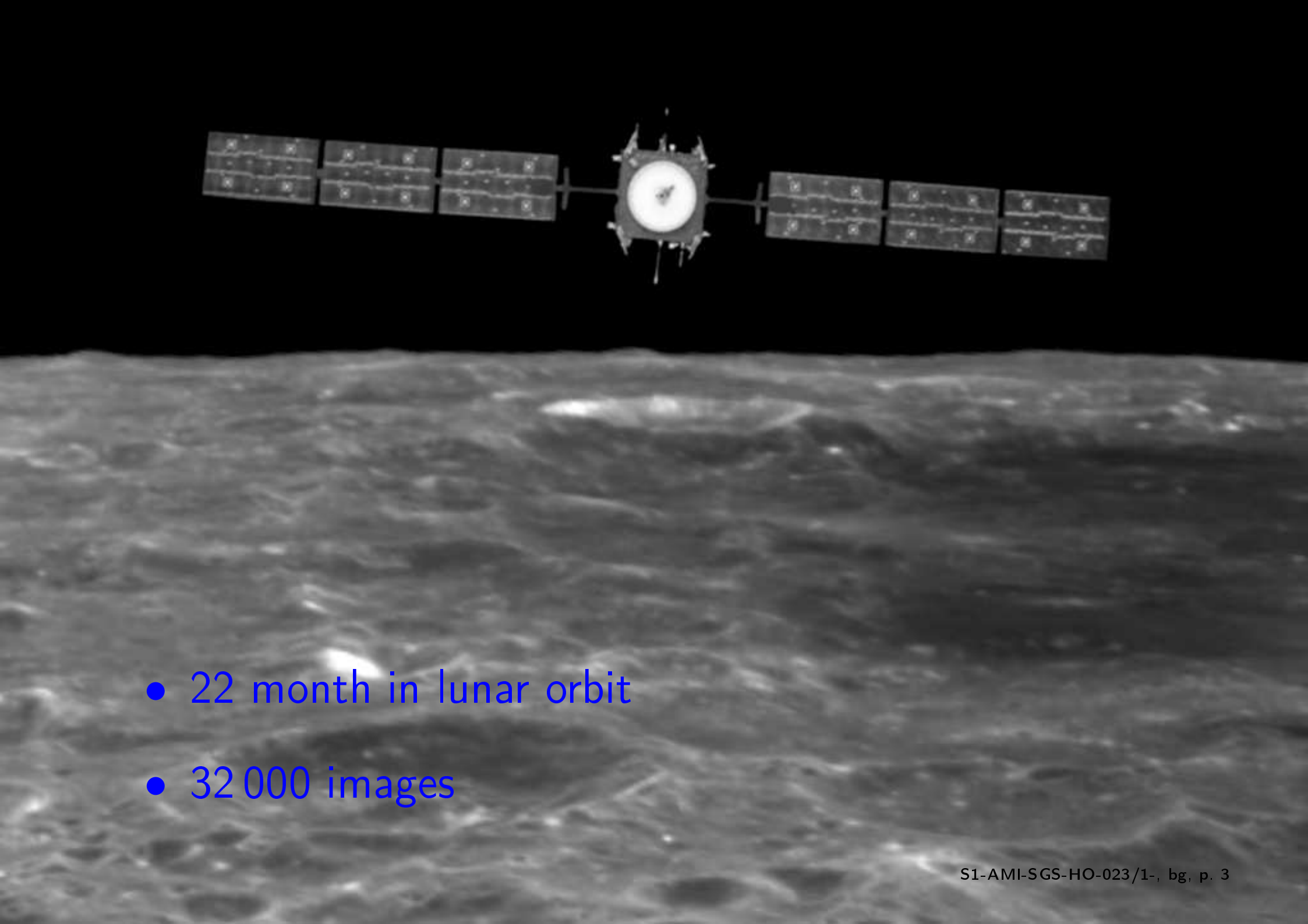
Estimating a digital terrain model for a peak of (almost) eternal light close to the lunar south pole from SMART-1/AMIE images

Björn Grieger
ESA/ESAC, Madrid

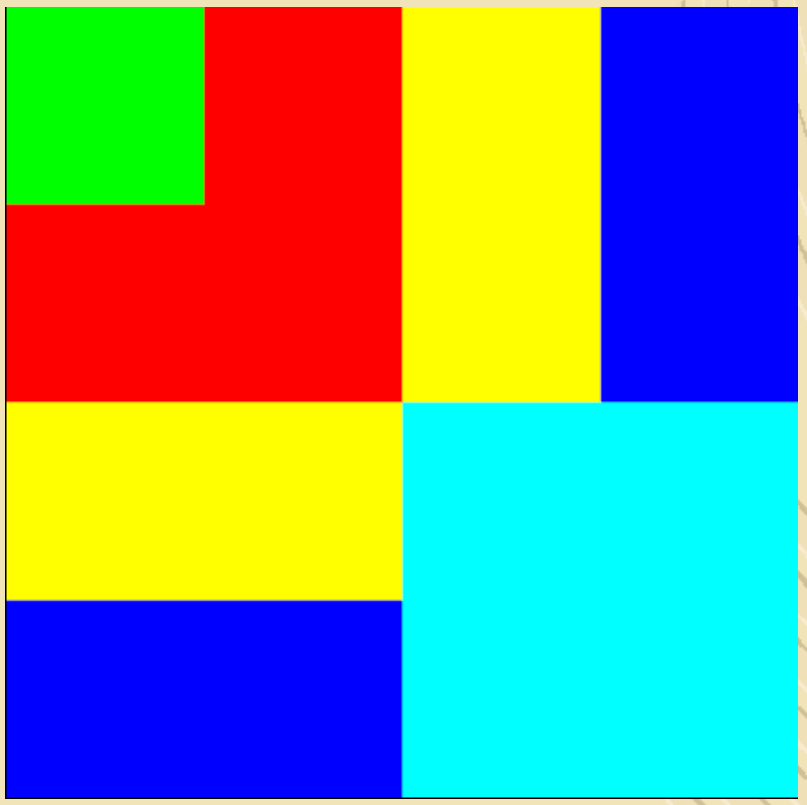
Detlef Koschny
ESA/ESTEC, Noordwijk





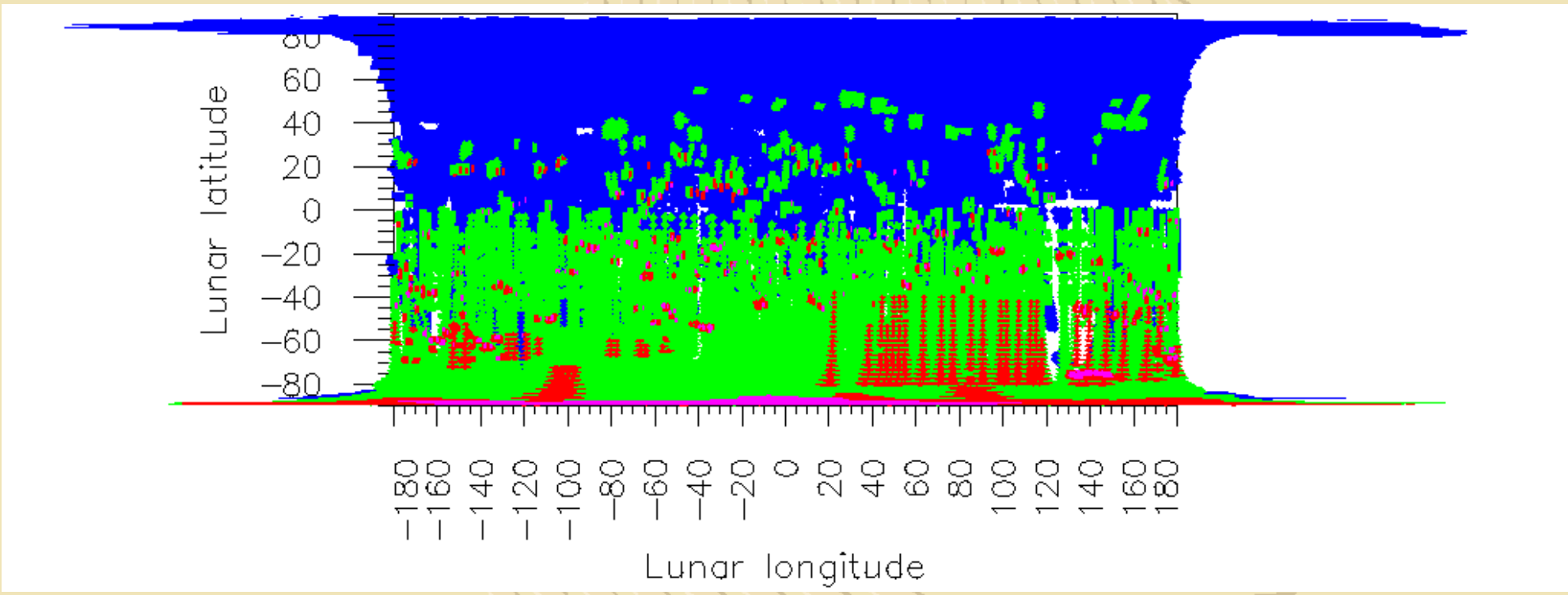
- 22 month in lunar orbit
- 32 000 images

AMIE filters



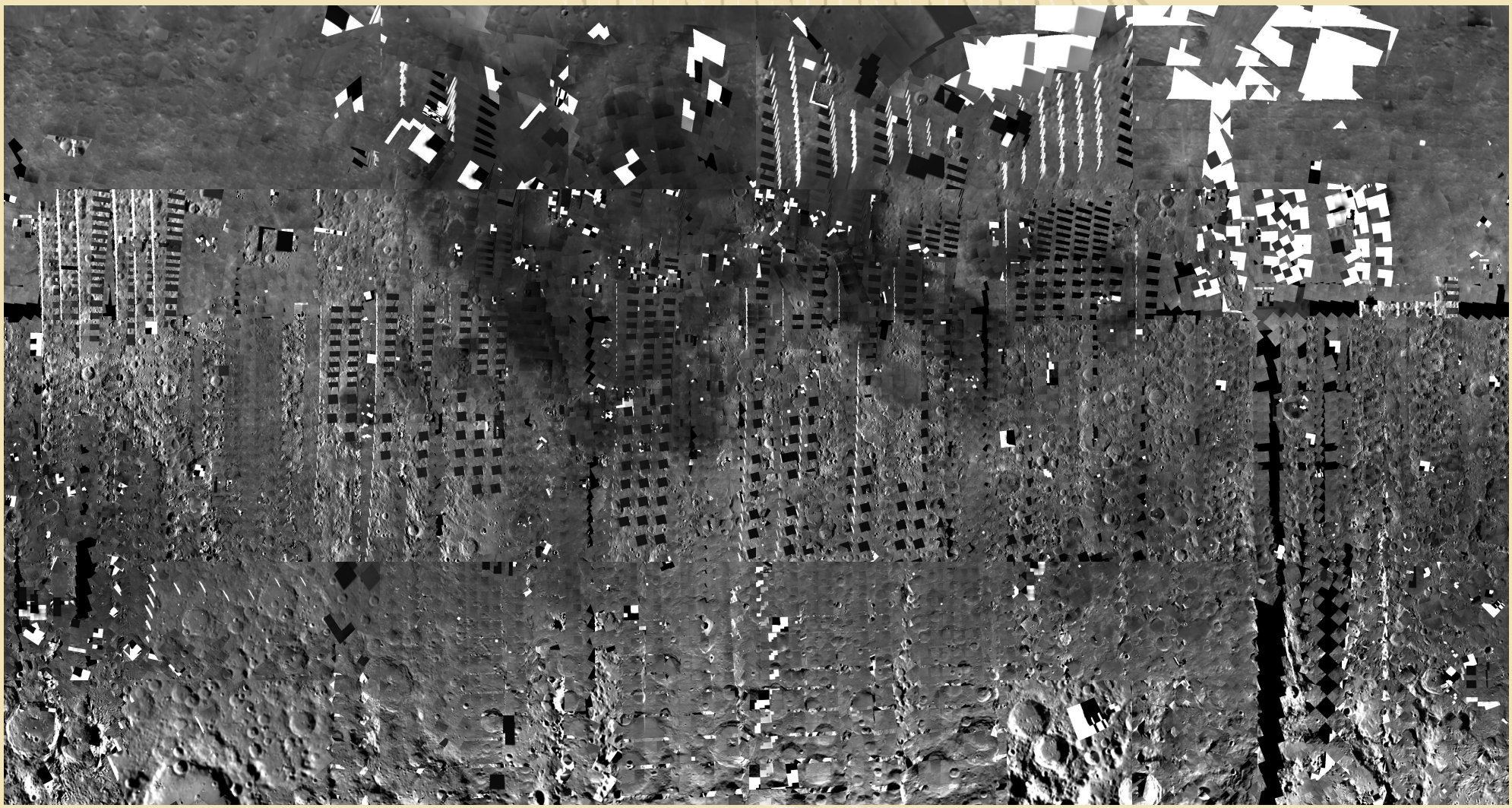
Filter name	Center wavelength	Bandwidth
NONE	800 nm	700 nm
VIS	750 nm	10 nm
FeL	915 nm	30 nm
FeH	960 nm	70 nm
LASER	847 nm	10 nm

Global coverage and resolution

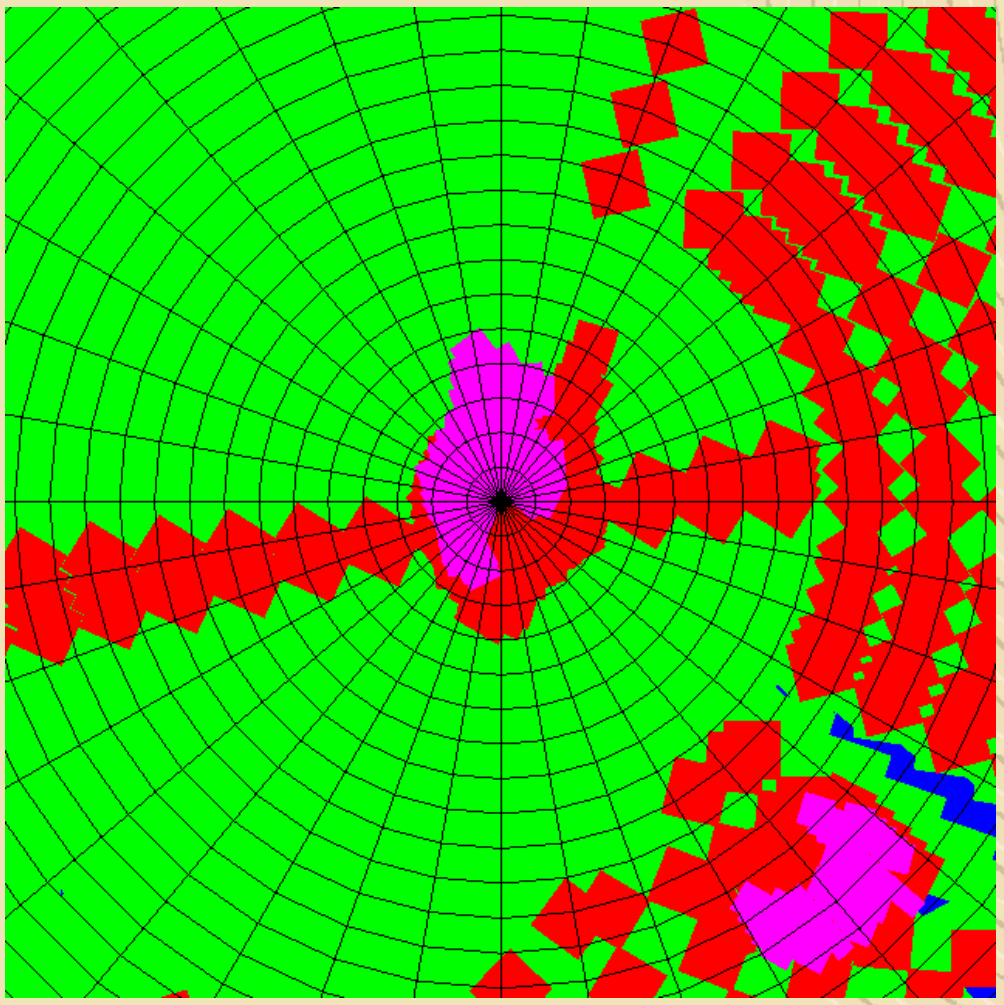


- Better than 250 m/pixel
- Better than 50 m/pixel
- Better than 100 m/pixel
- Better than 35 m/pixel

Mercator mosaic (75°S–60°N)

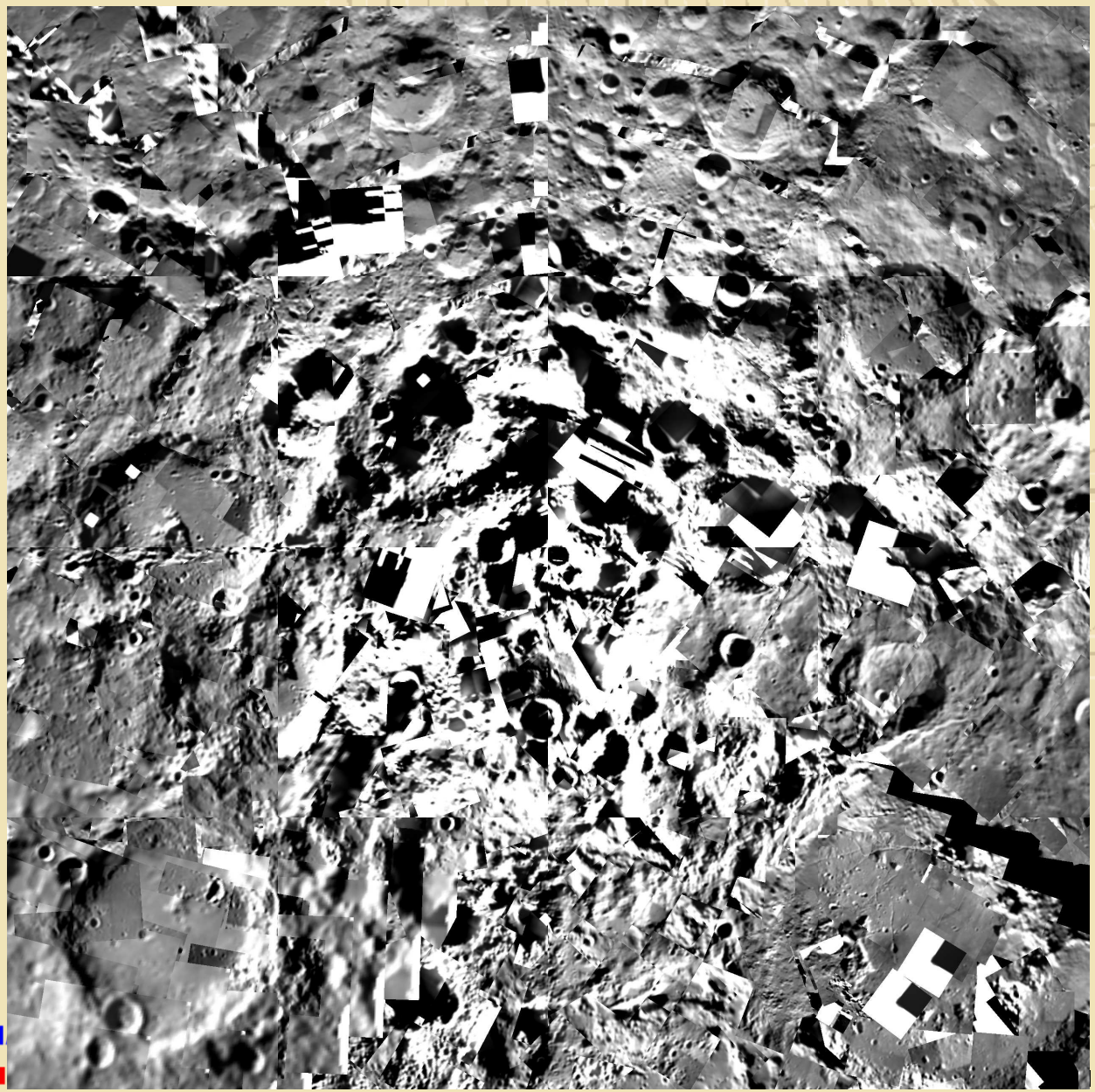


Resolution near the south pole

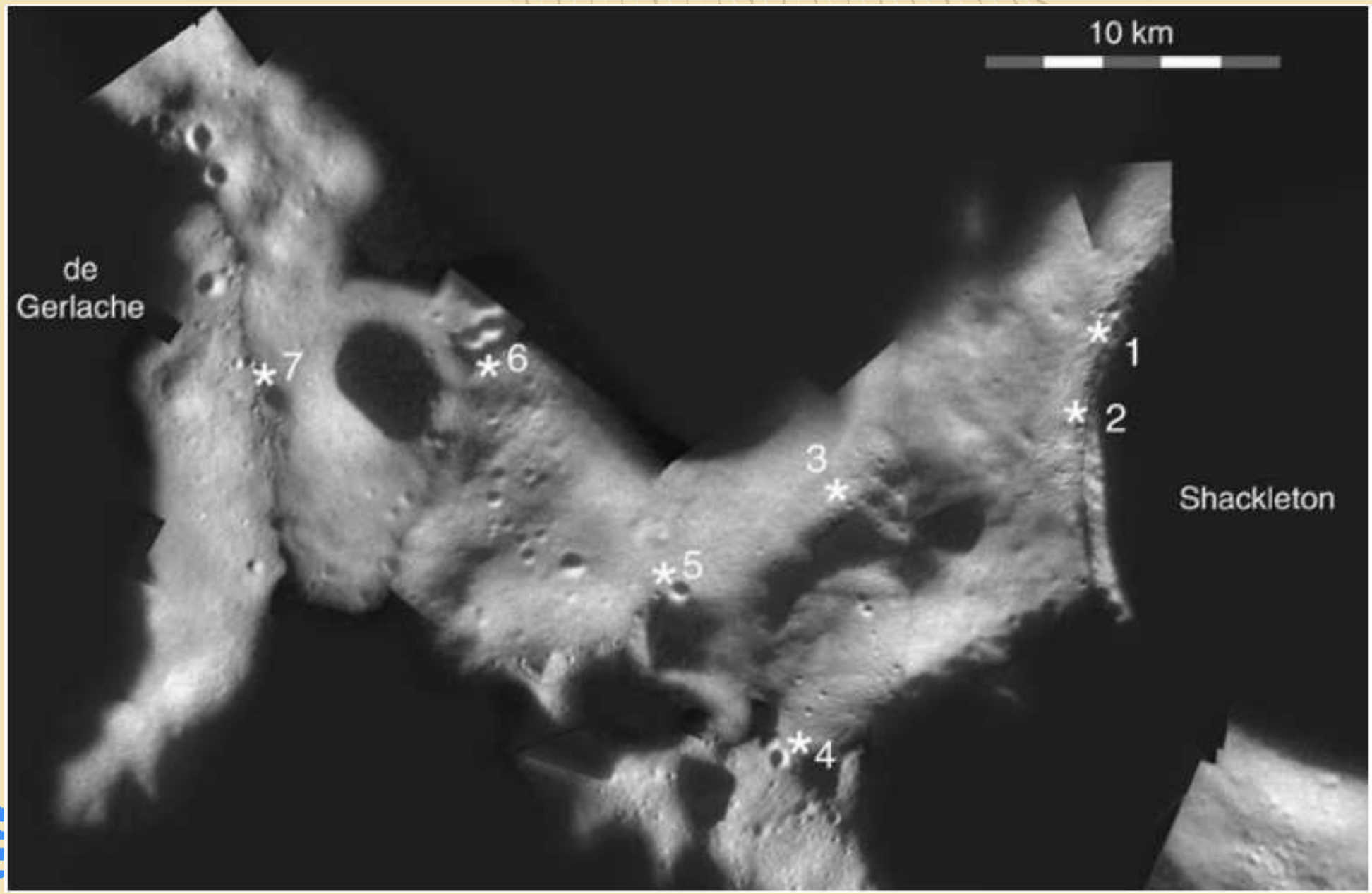


- Better than 250 m/pixel
- Better than 100 m/pixel
- Better than 50 m/pixel
- Better than 35 m/pixel

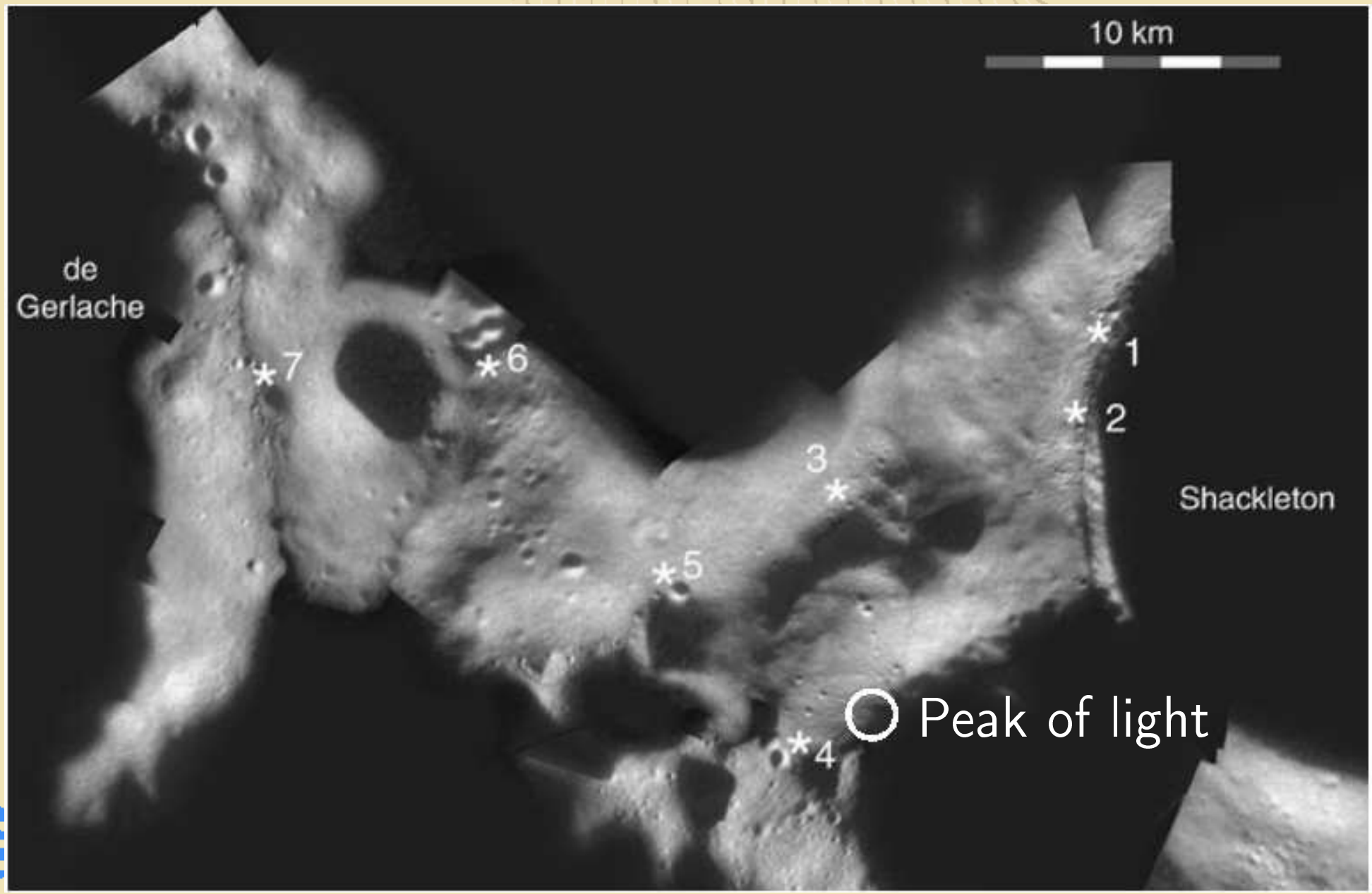
South polar mosaic (south of 75°S)



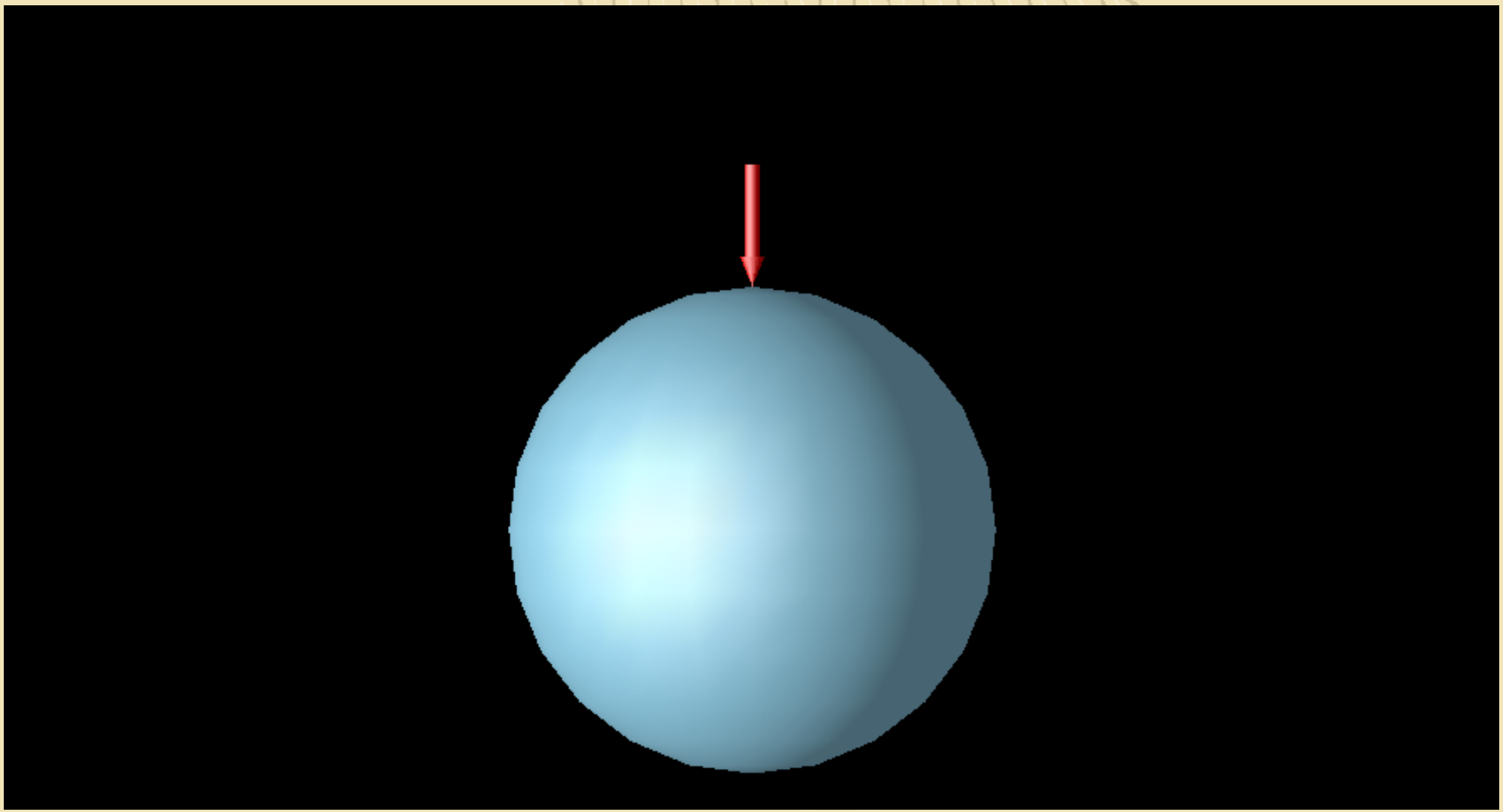
Clementine mosaic by Philip J. Stooke



Clementine mosaic by Philip J. Stooke

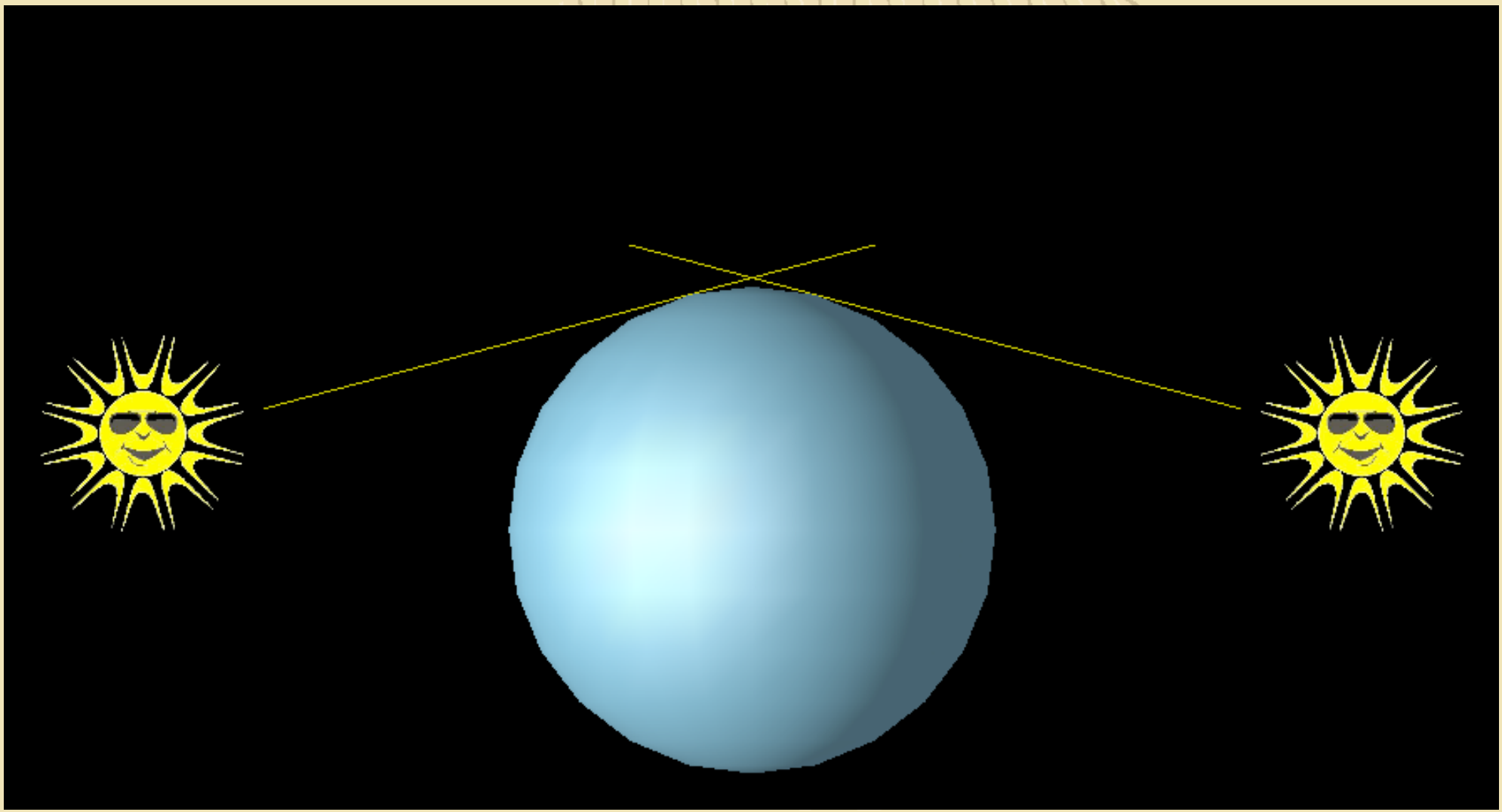


The pole

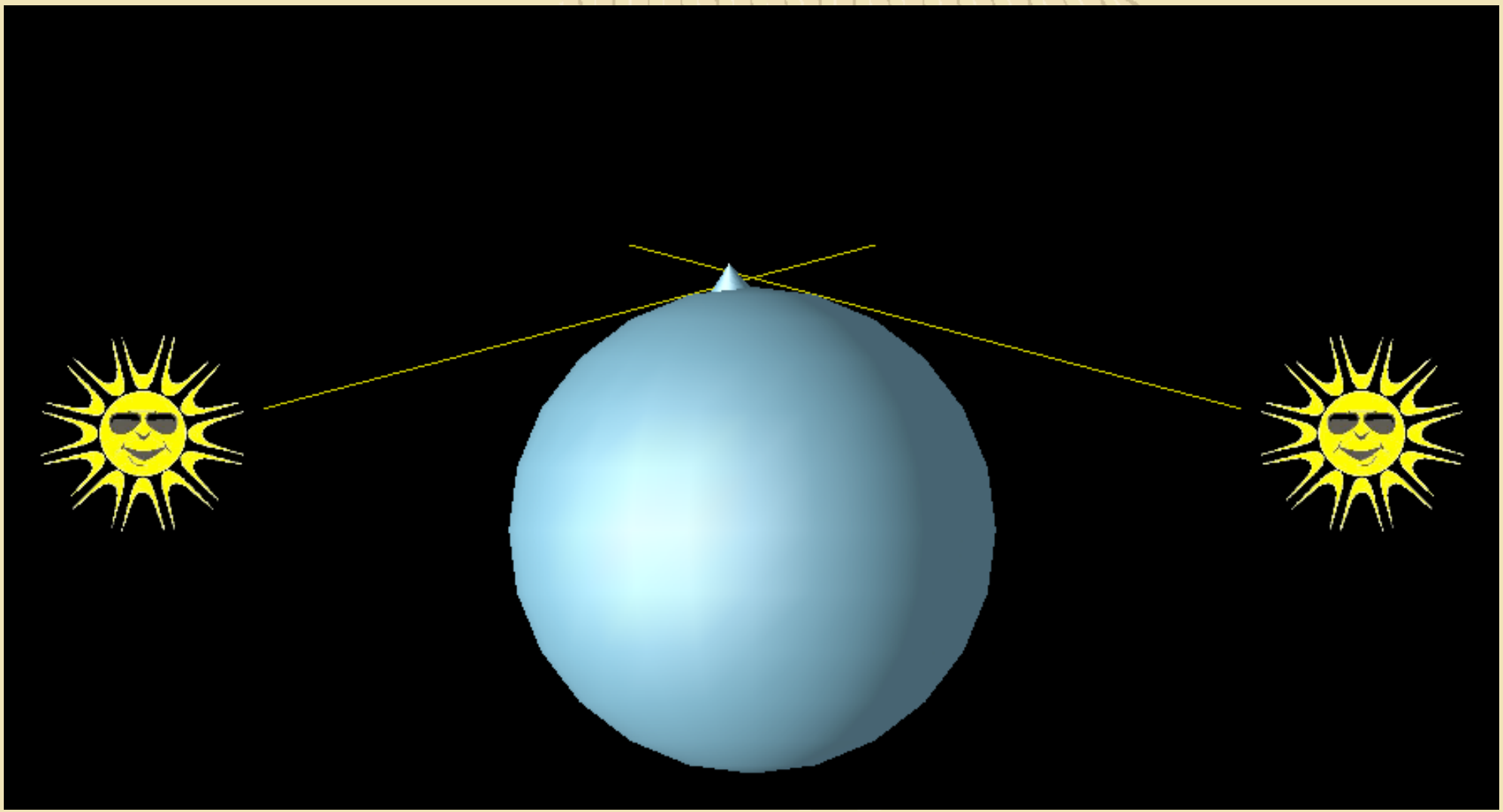


Summer

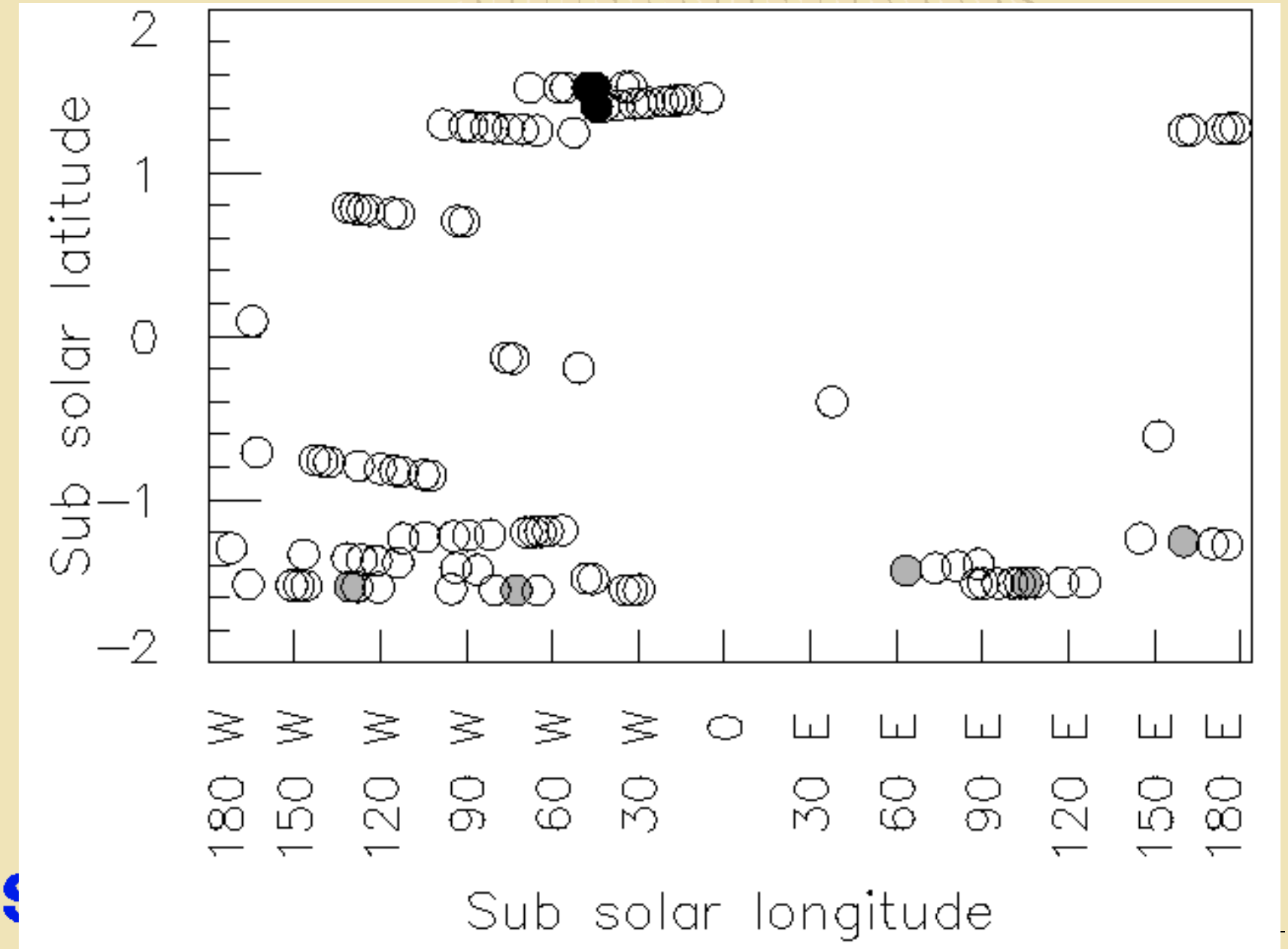
Winter



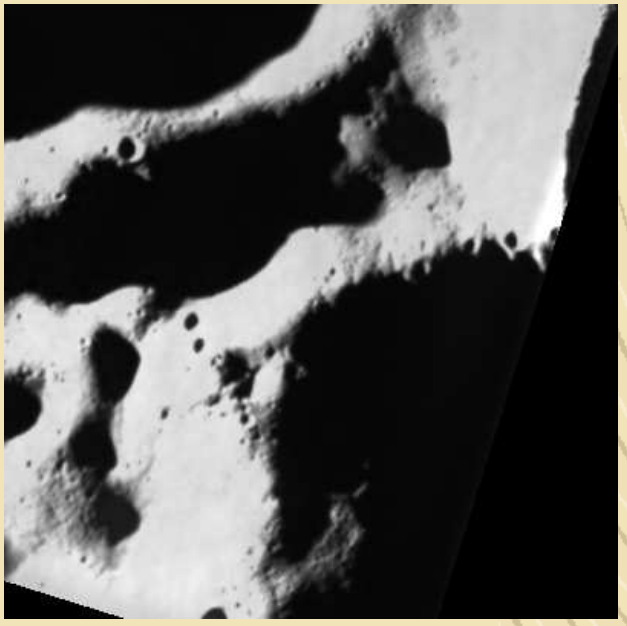
Peak of eternal light

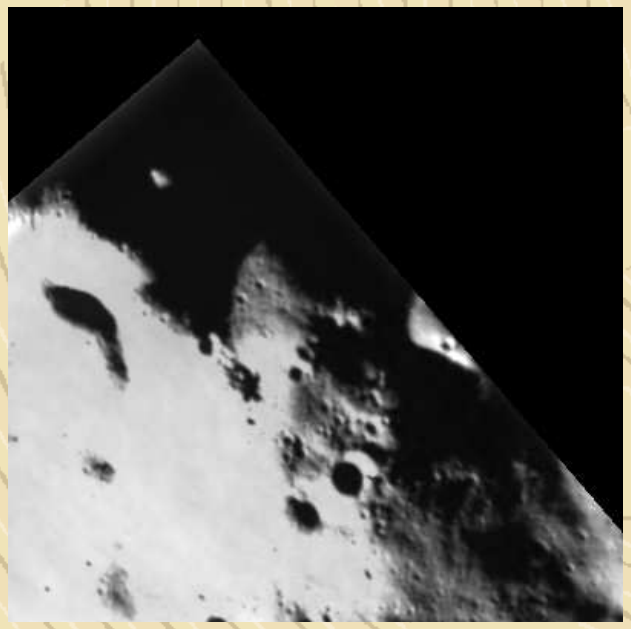


Illumination of the peak in 113 AMIE images

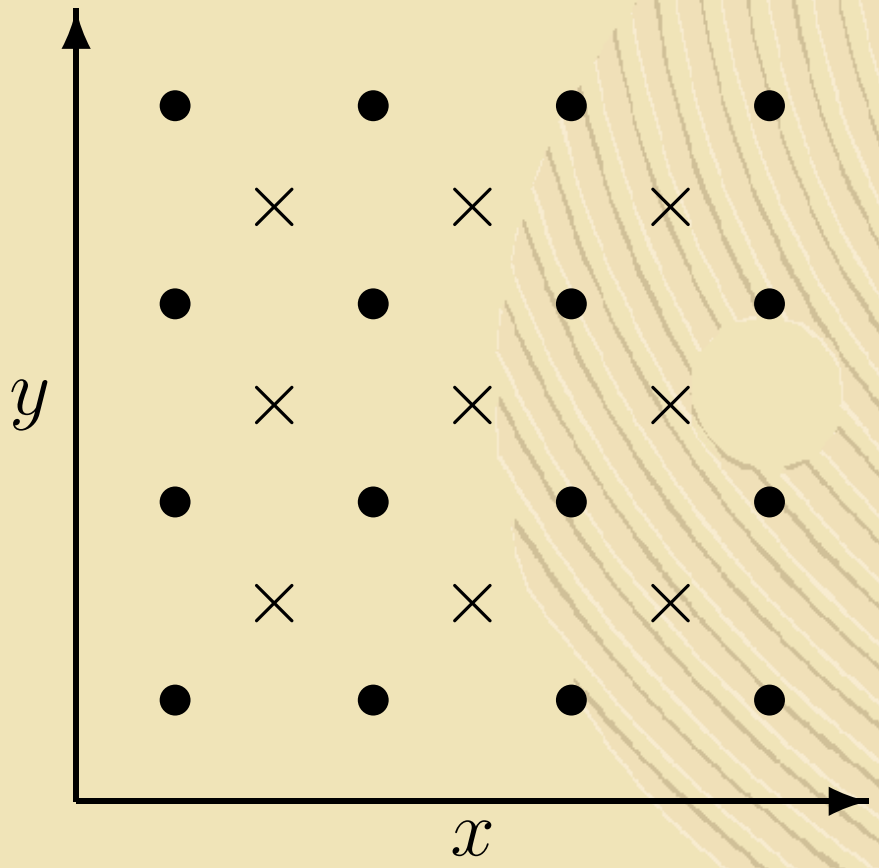


Images selected for concerted shape from shading



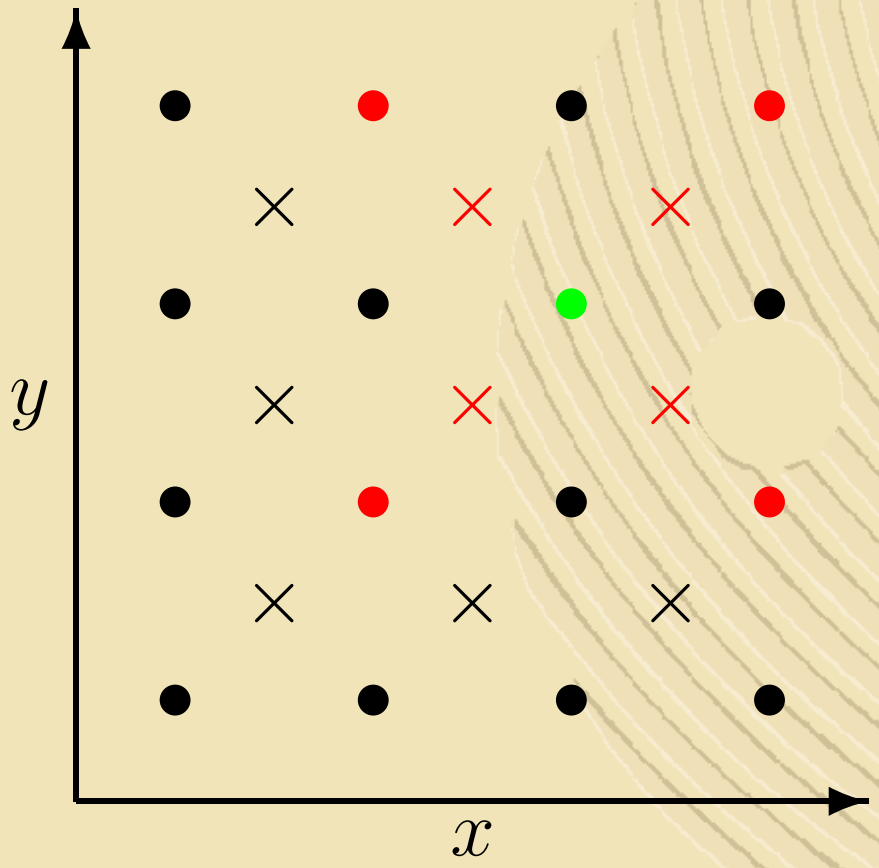


Grids of brightness and elevation



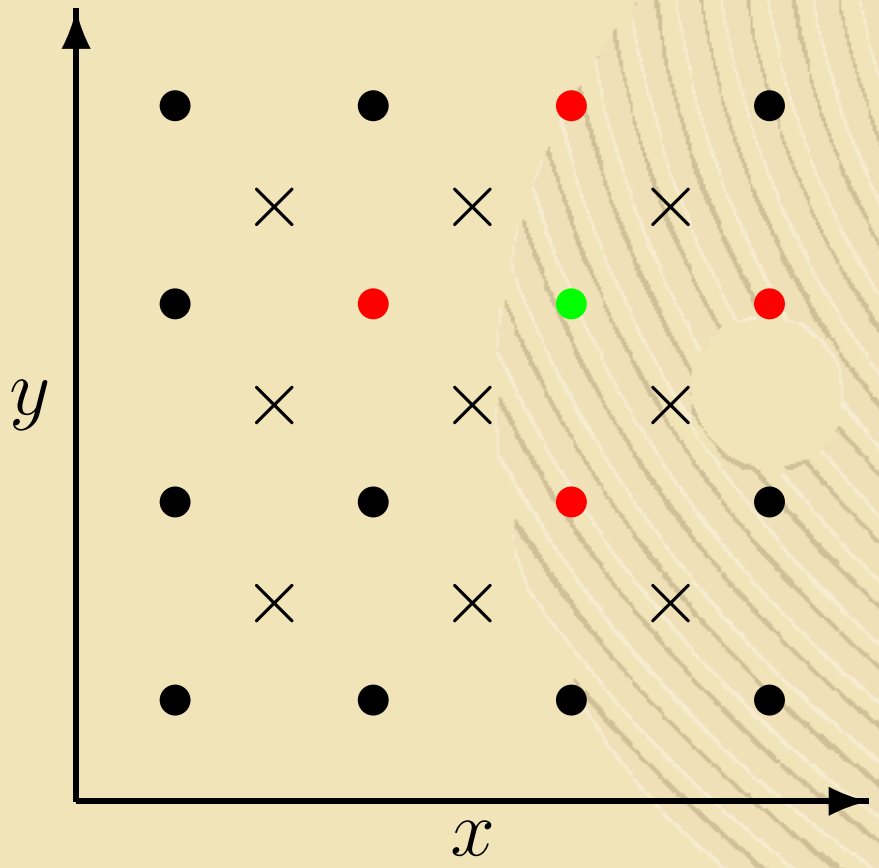
- DTM elevation grid points (402×402)
- × Brightness grid points (401×401)

Slope constraints



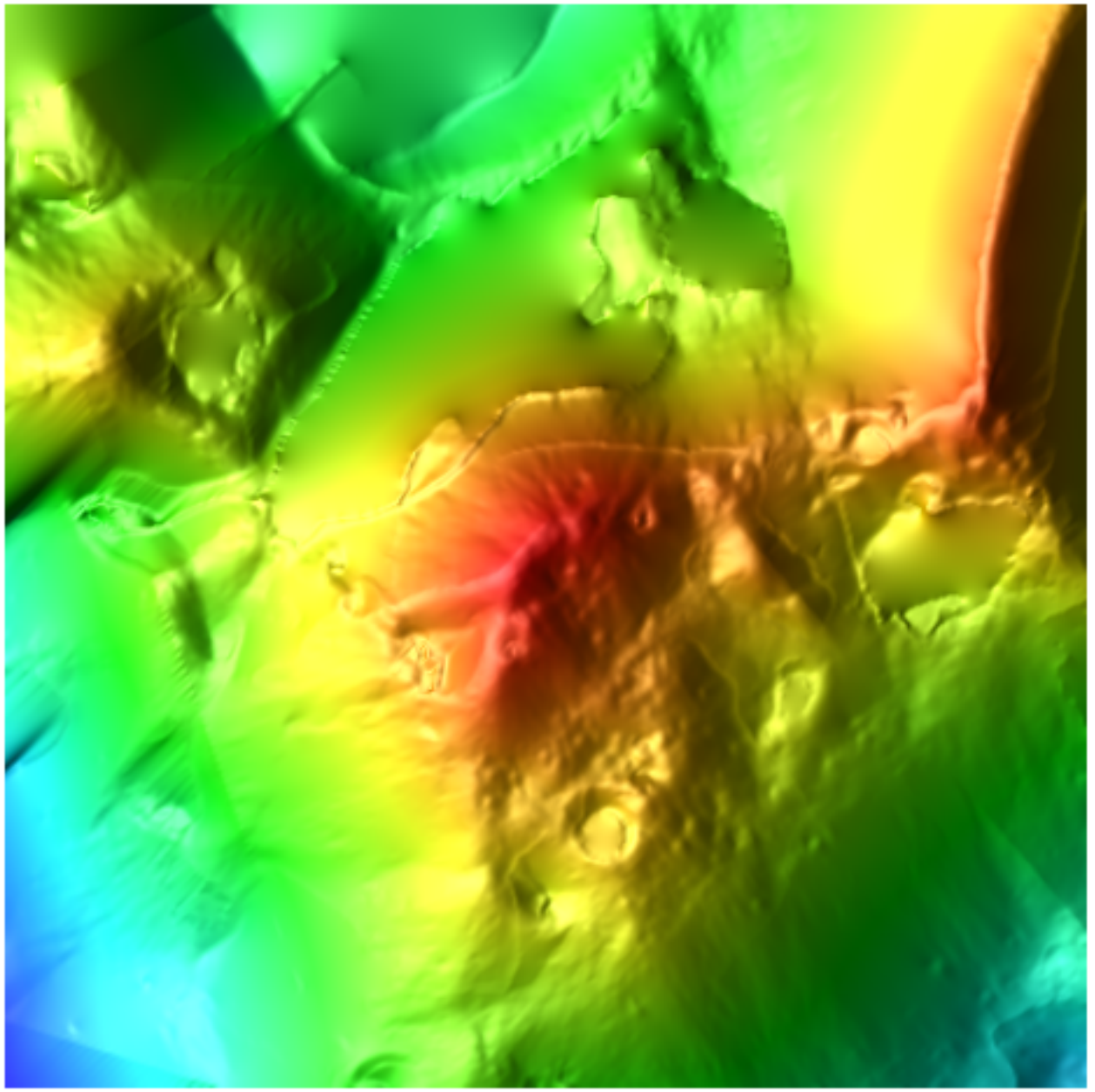
- DTM elevation grid points (402×402)
- × Brightness grid points (401×401)

Smoothness constraints

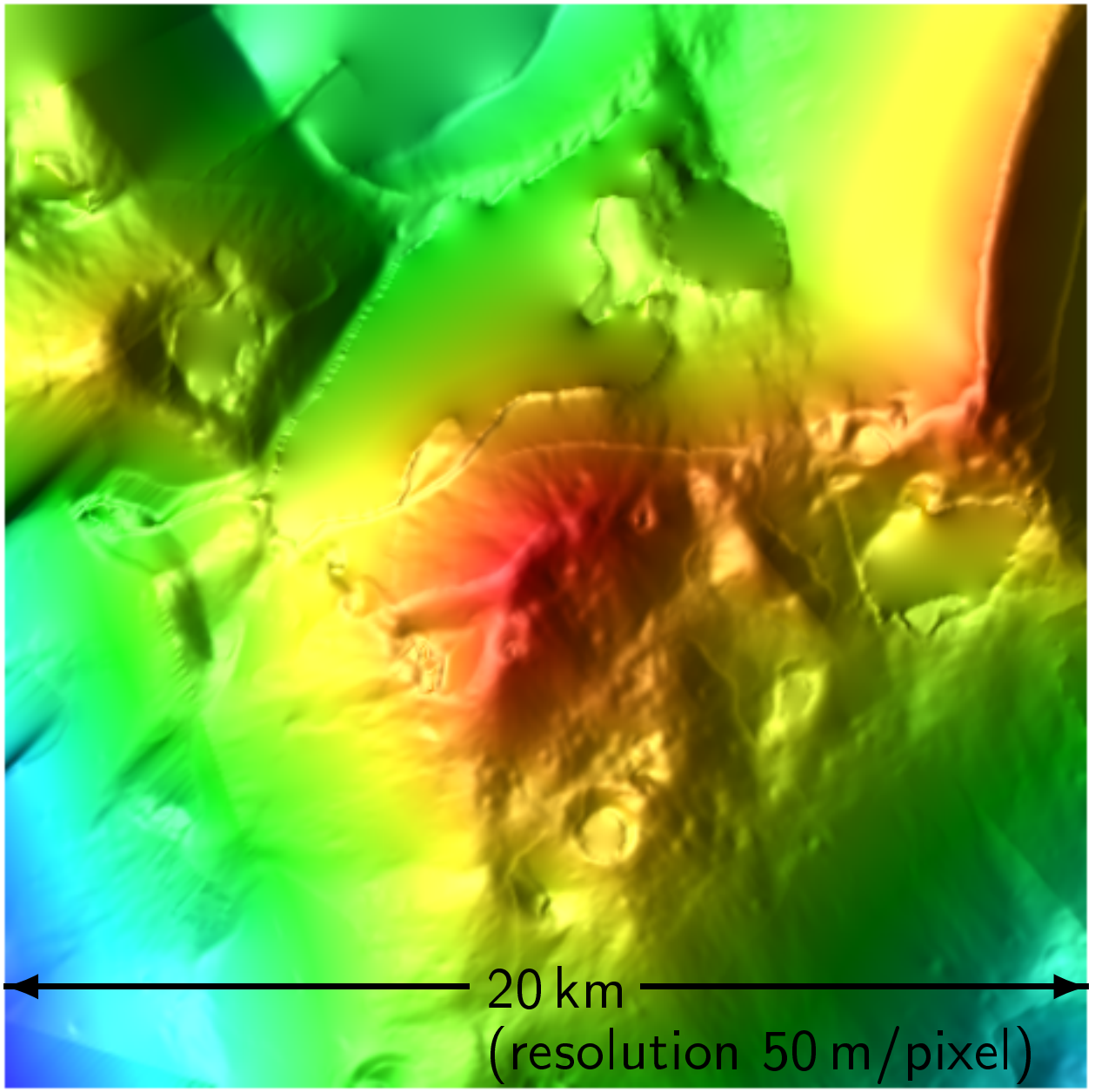


- DTM elevation grid points (402×402)
- × Brightness grid points (401×401)

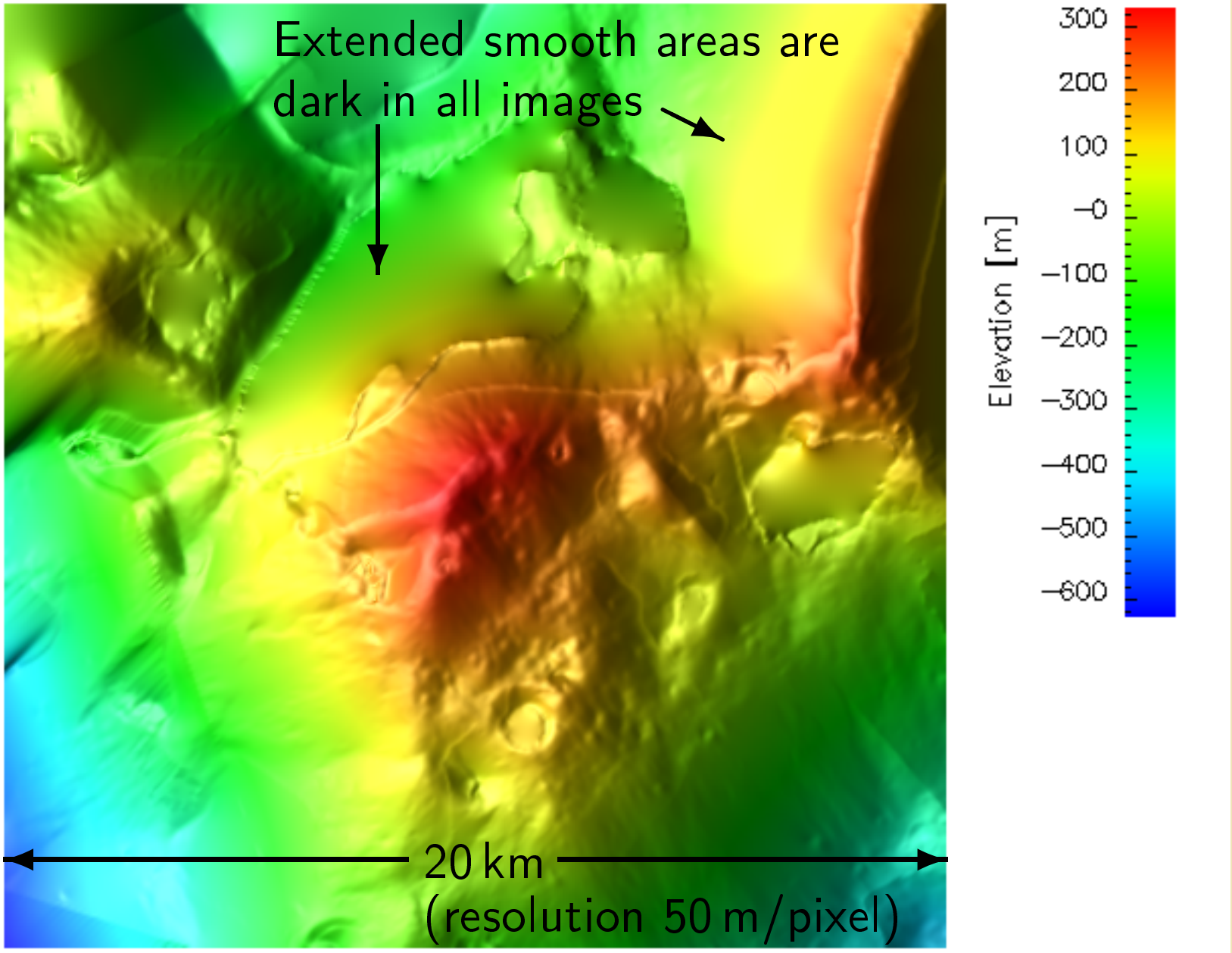
Retrieved digital terrain model



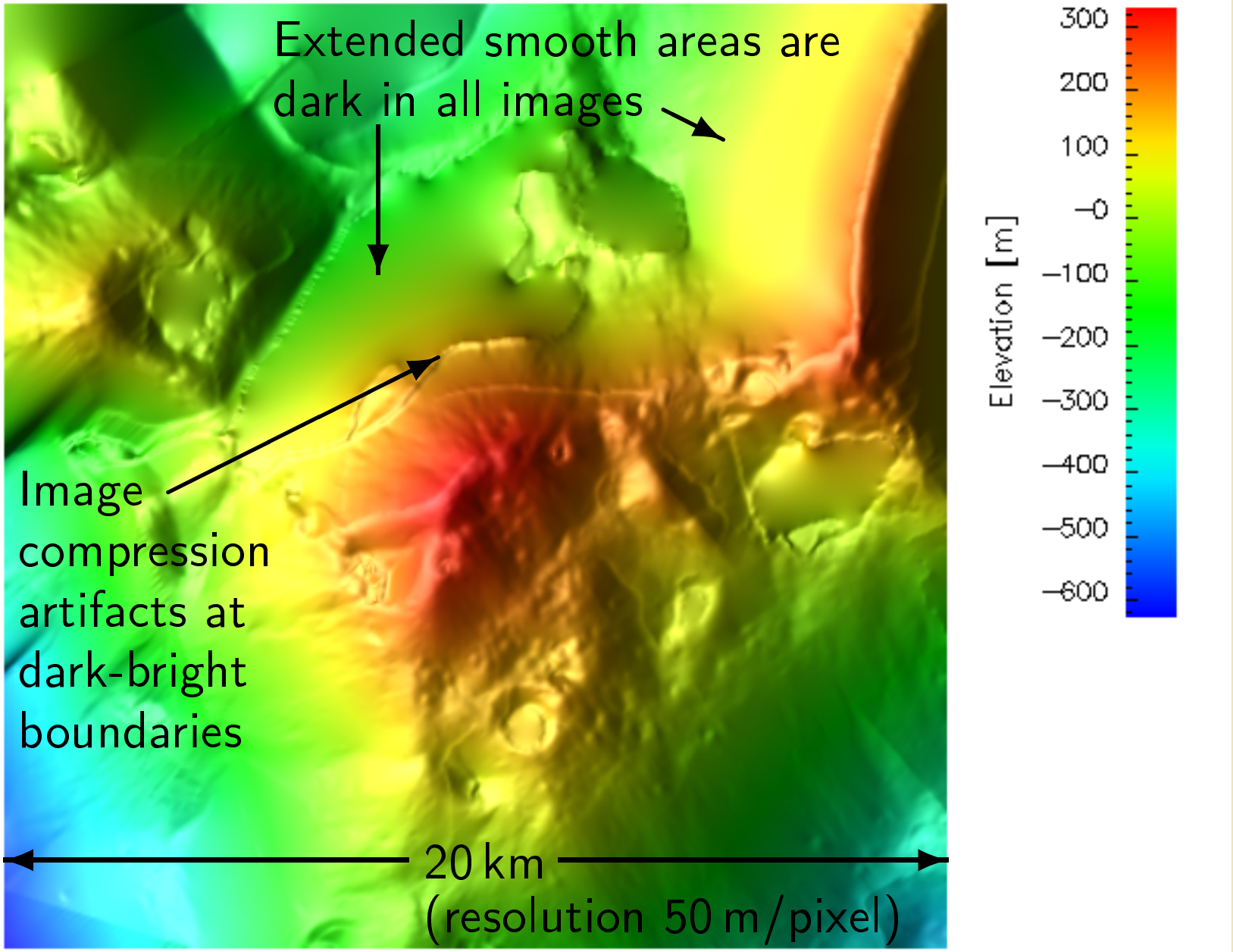
Retrieved digital terrain model



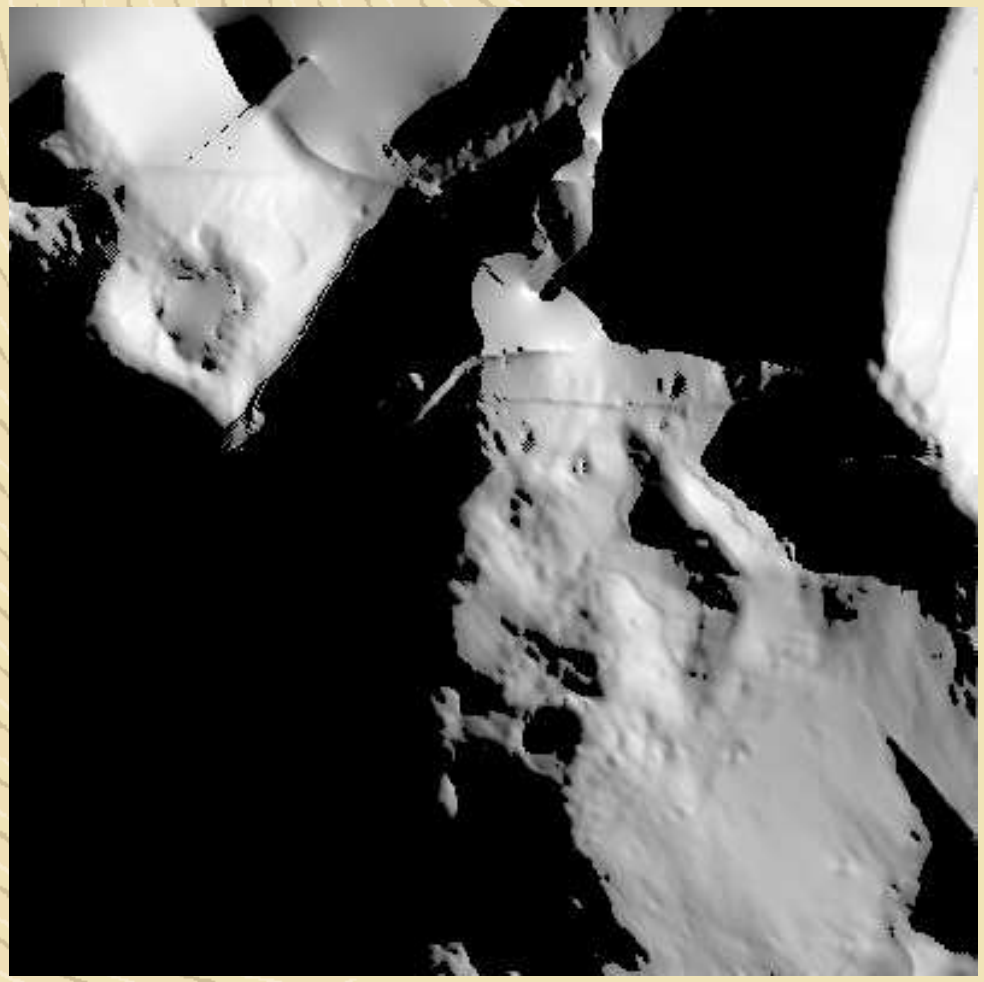
Retrieved digital terrain model

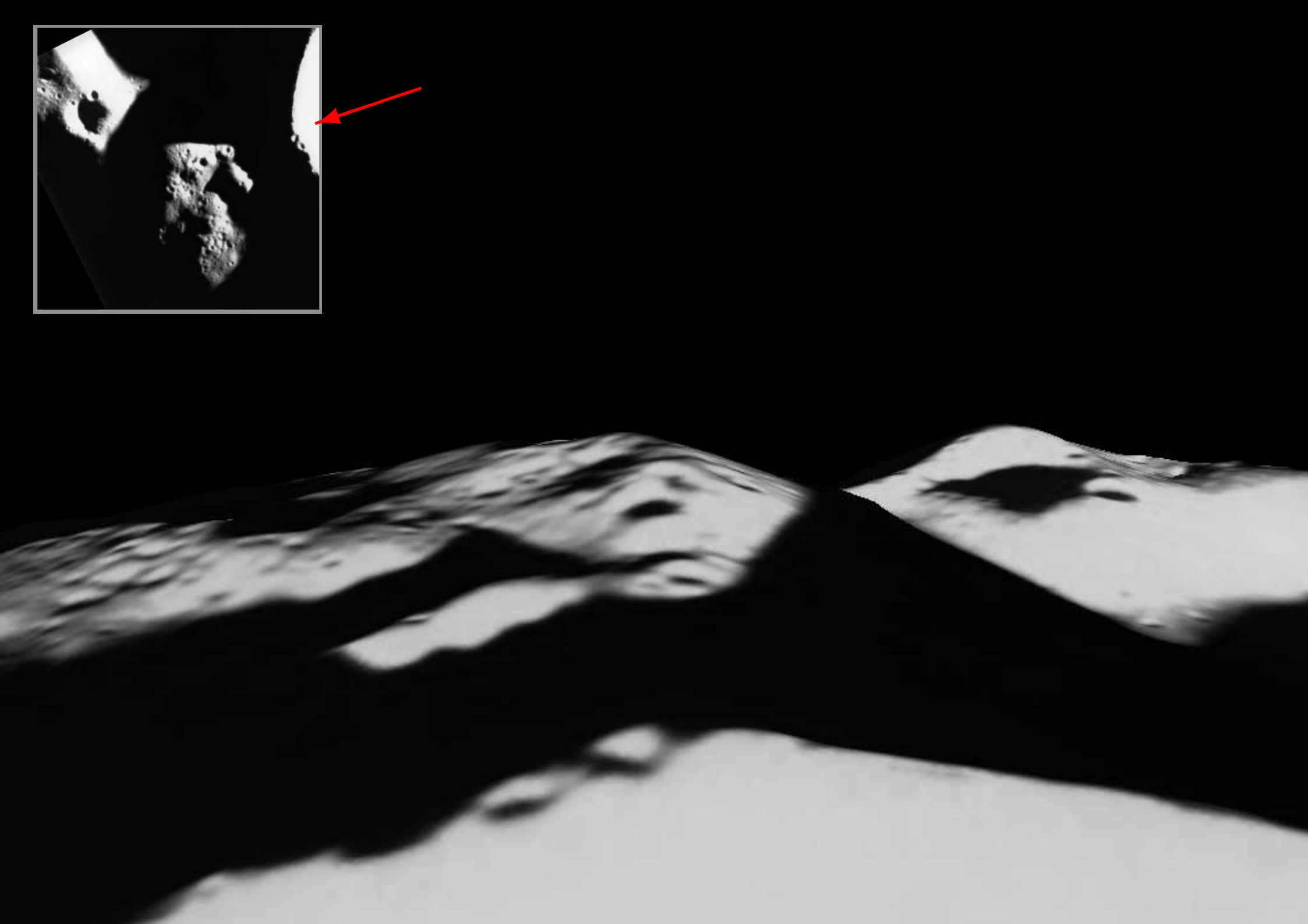


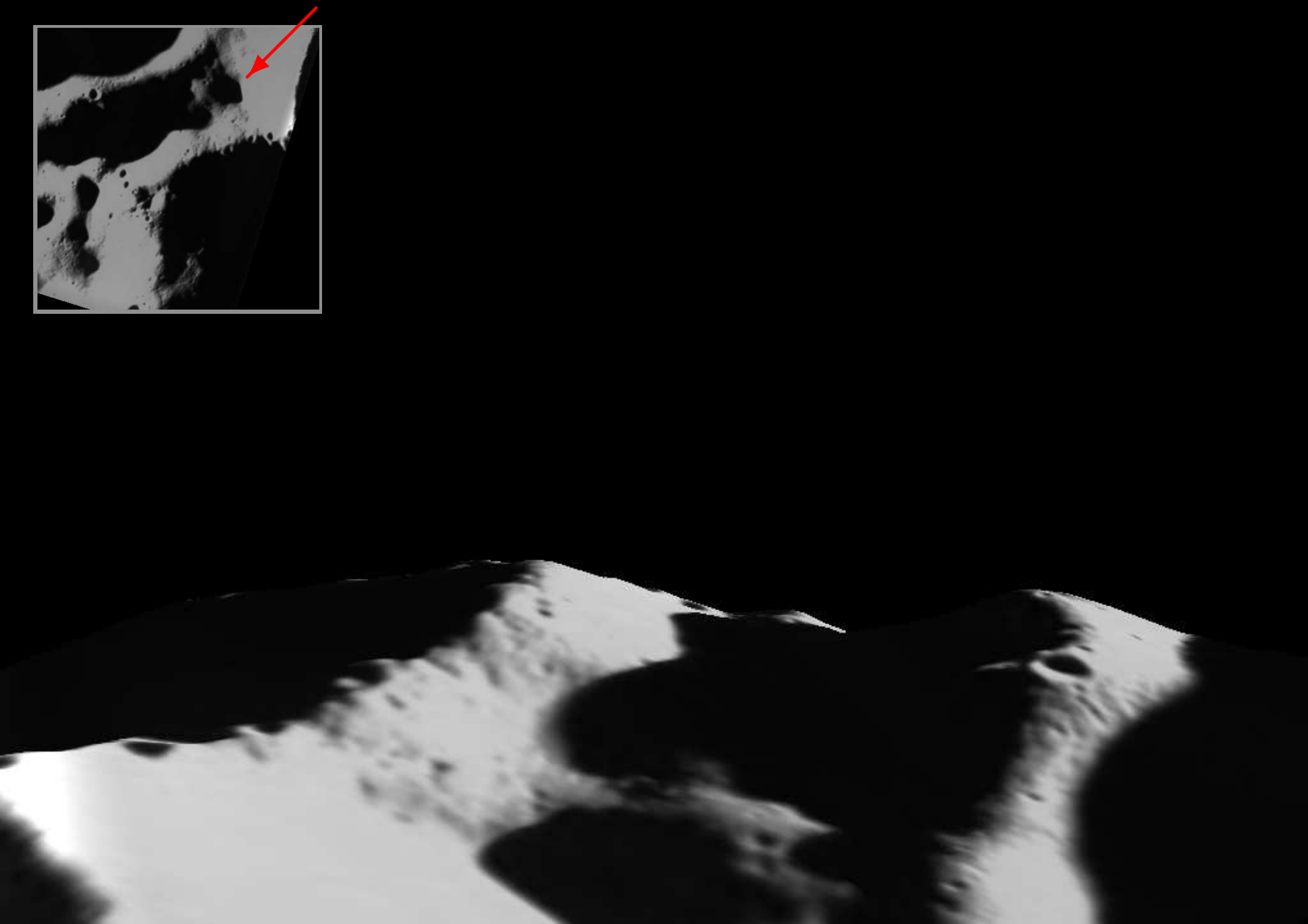
Retrieved digital terrain model

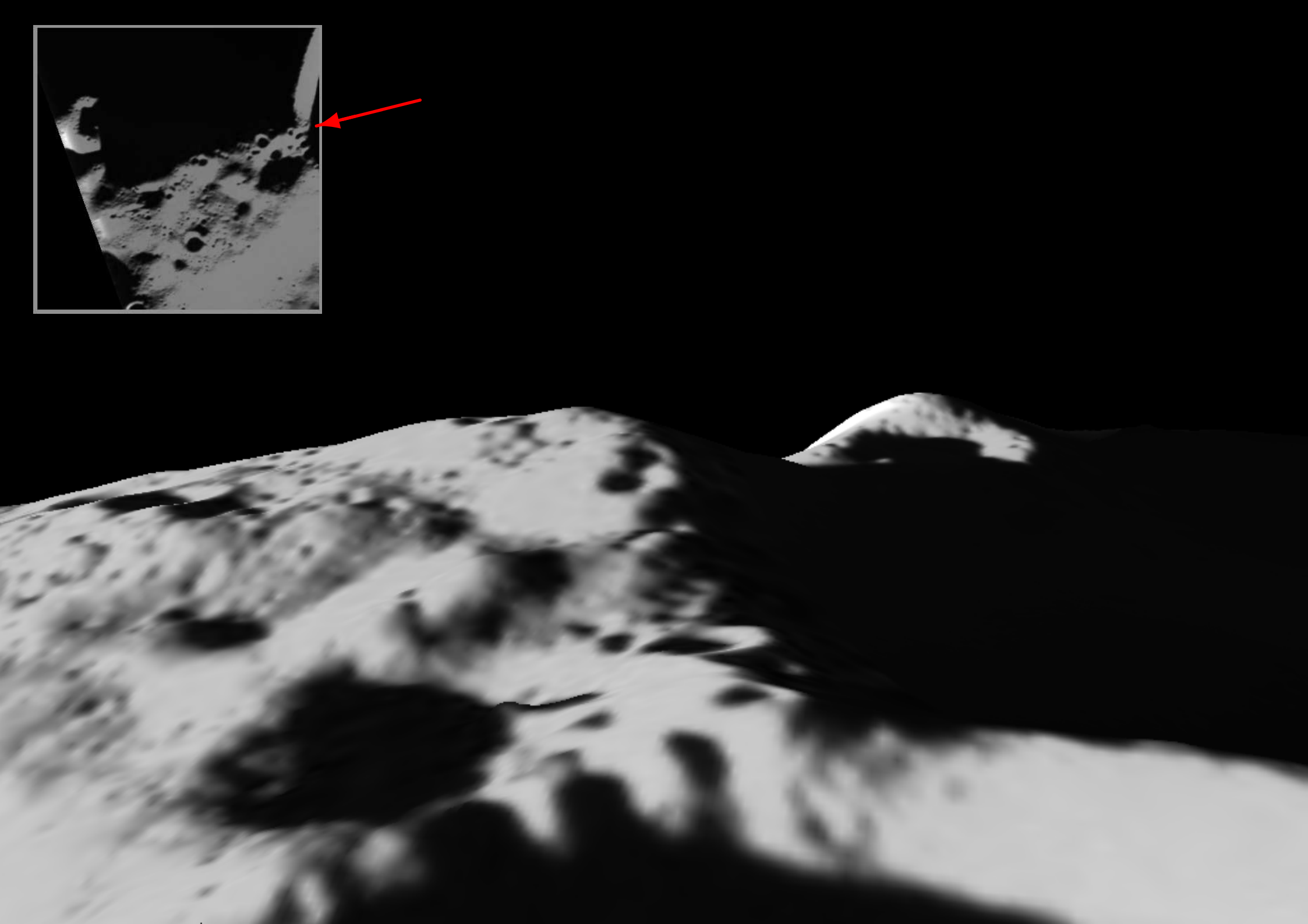


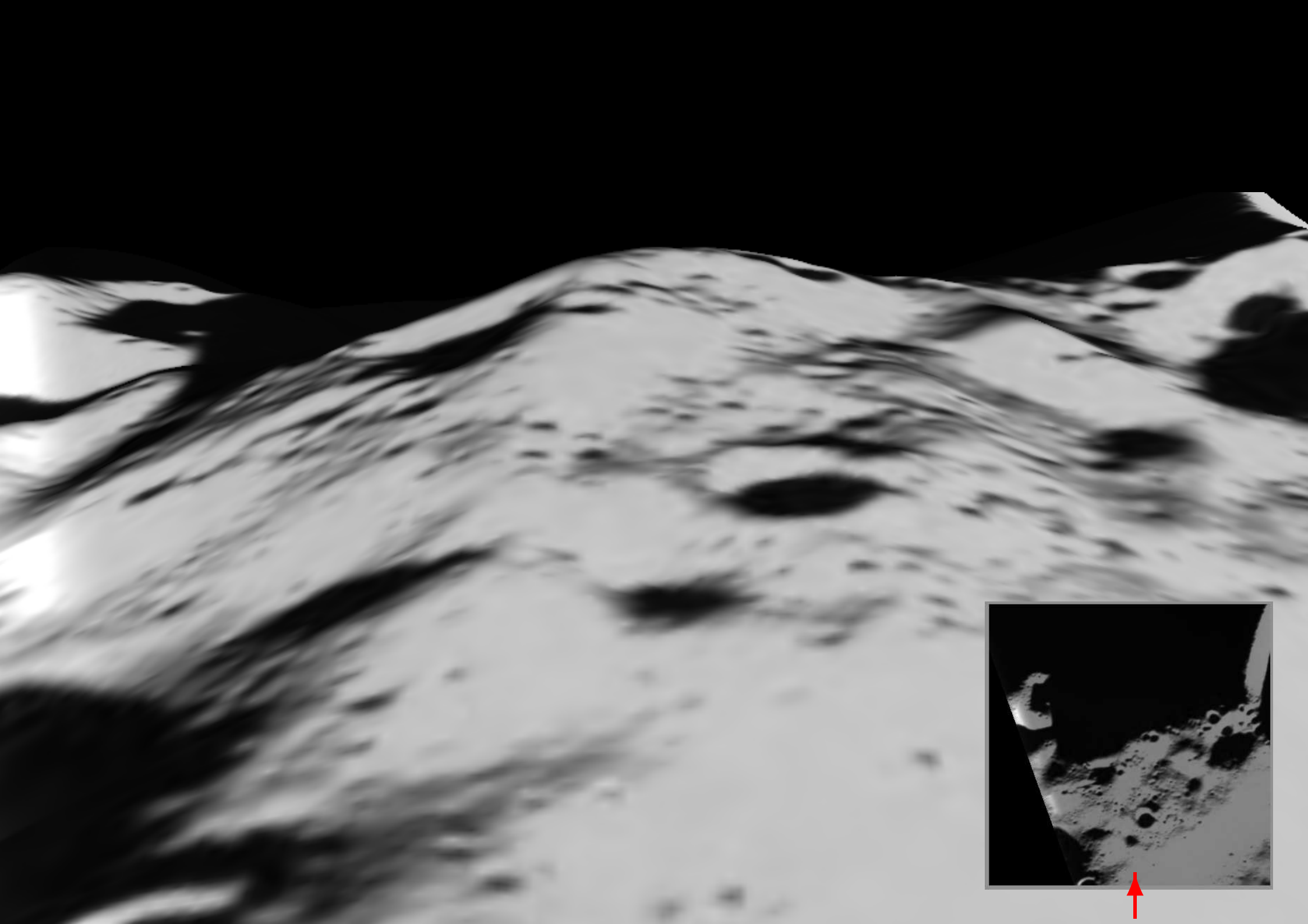
Check of the brightness scaling factor

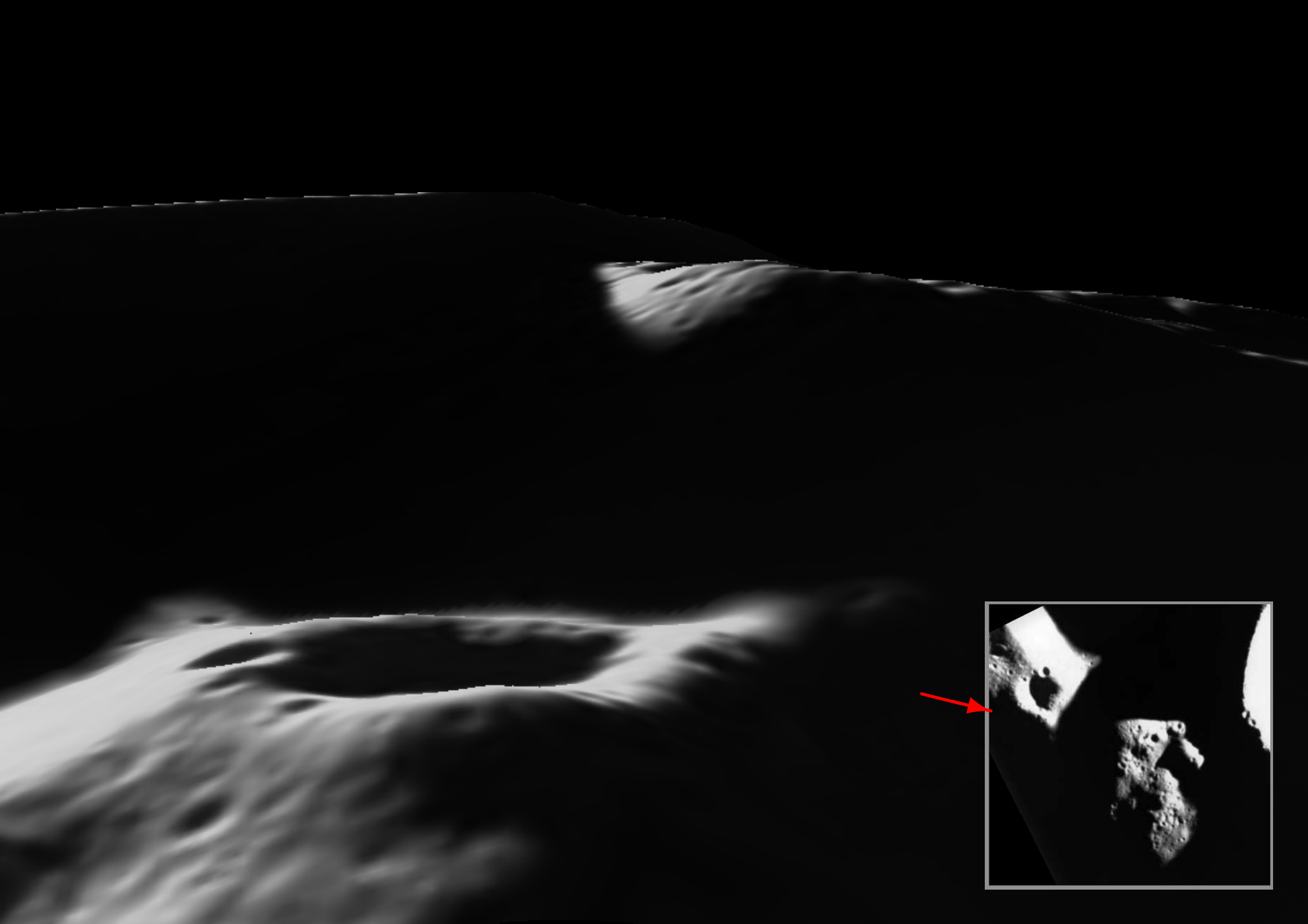


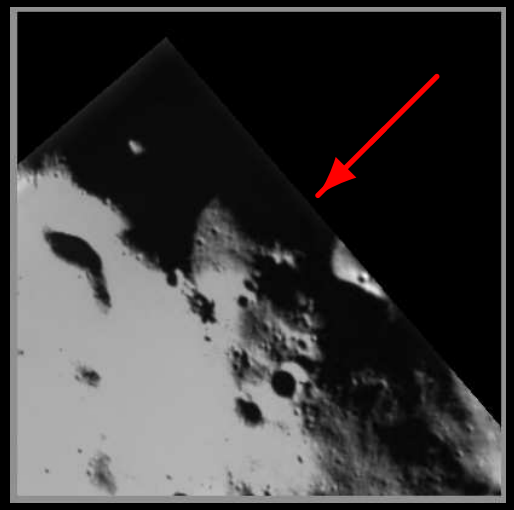












There is also a little movie

The Peak of Light

to be found at

http://www.esa.int/SPECIALS/SMART-1/SEMIYBE3GXF_0.html

or

http://astronomy2009.esa.int/science-e/www/object/index.cfm?fobjectid=45362