

Near-Infrared Study of Asteroid 433 Eros from NEAR Spacecraft

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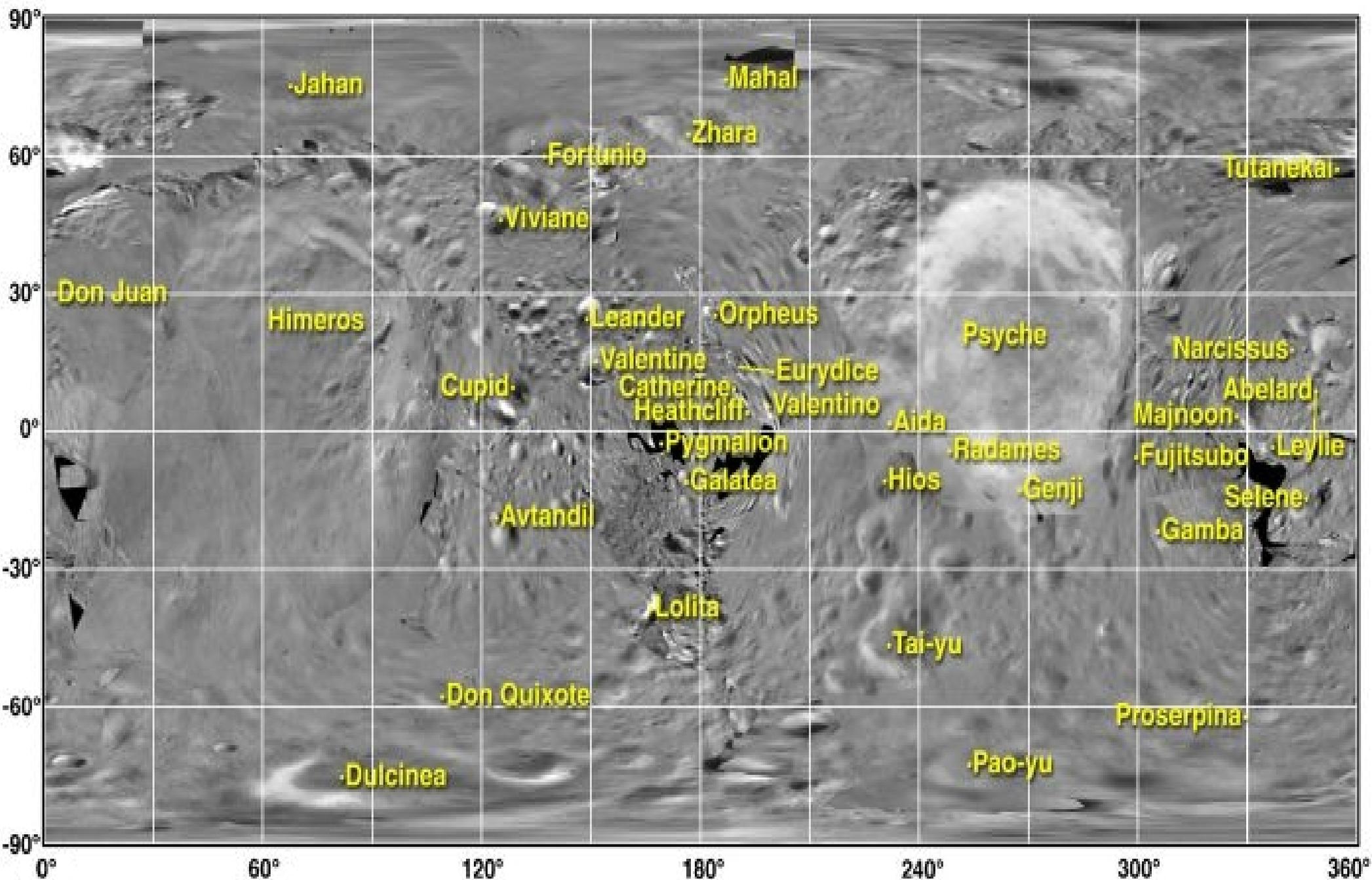
LAFEX

Brazilian Center of Physics Research

Analysis of the six Images of Eros at 1- μm (= 1.000 nm) Bandwidth

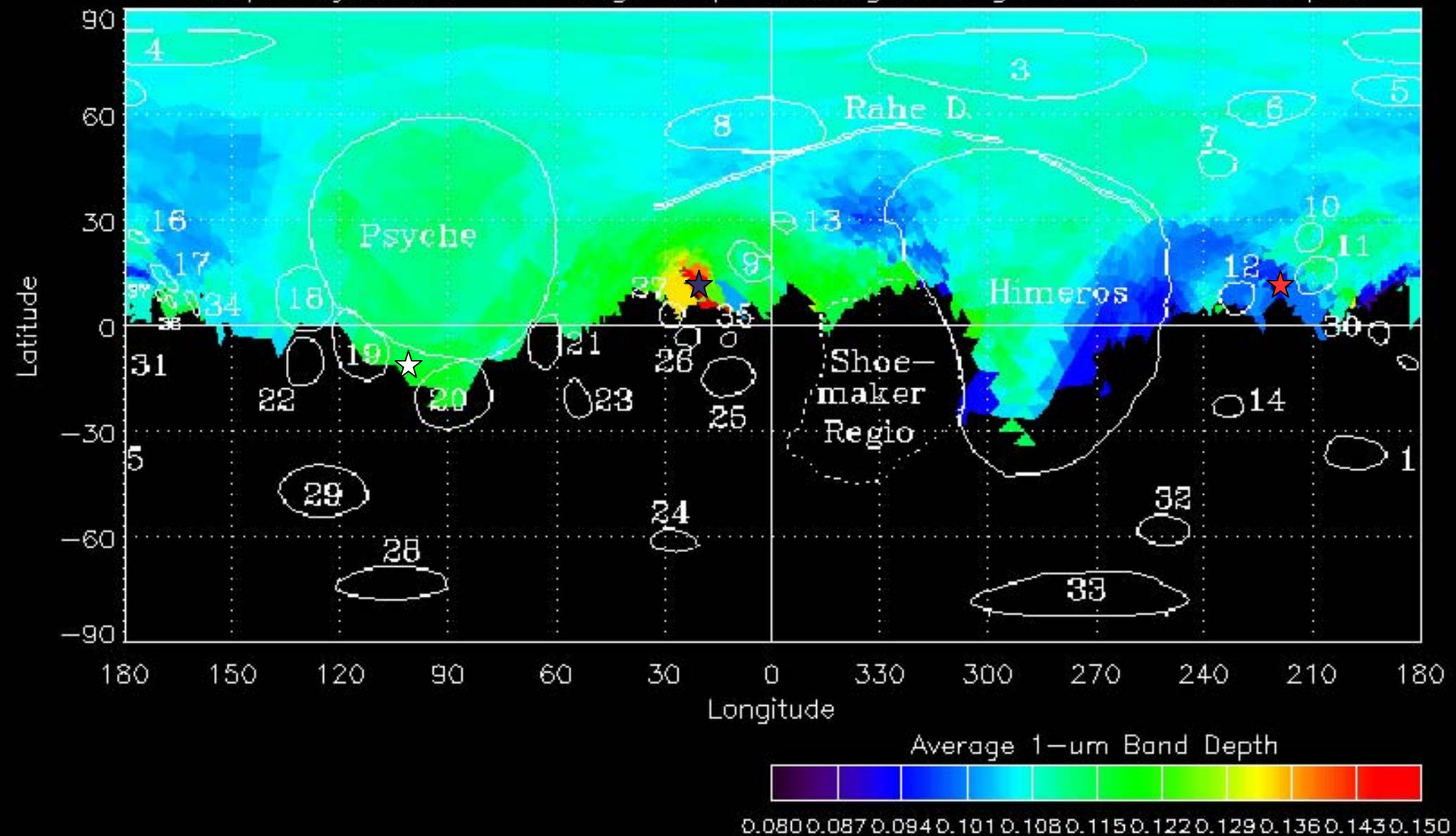
- The following images of asteroid 433 Eros were taken at near-infrared spectrum bandwidth, using the Multi-Spectral Imager (MSI) on-board the Near Earth Asteroid Rendezvous (NEAR) mission spacecraft, in 2000.
- The near-infrared electromagnetic spectrum ranges from about 800 nm to 2500 nm. And the visible one ranges from about 400 nm to 700 nm.
- Software used in the analysis of data extracted from MSI archives was SAOImage DS9, by Smithsonian Astrophysical Observatory.
- Filter characteristics are:
 - Filter wheel position: 4
 - Passband center wavelength (nm): 950
 - % of light reflected by Eros: 0.197

Map of Eros



Map of 1- μm Band Depth

Simple Cylindrical Coverage Map Showing Average 1- μm Band Depth



m0150579206f4_2p_cif_fit.jpg

Latitude: +12

Longitude: 219

Altitude of NEAR spacecraft to Eros asteroid: 197.5 Km



- Cratering -

- Some craters on its surface. We can better see them close to the boundary between the Sun-illuminated and the shadow region in this image. And we cannot see many craters in the middle of this image (brighter area), with more scattered sunlight.
- The number of craters counted in this location of Eros at this altitude (197.5 Km) is 57.

- Specific Features -

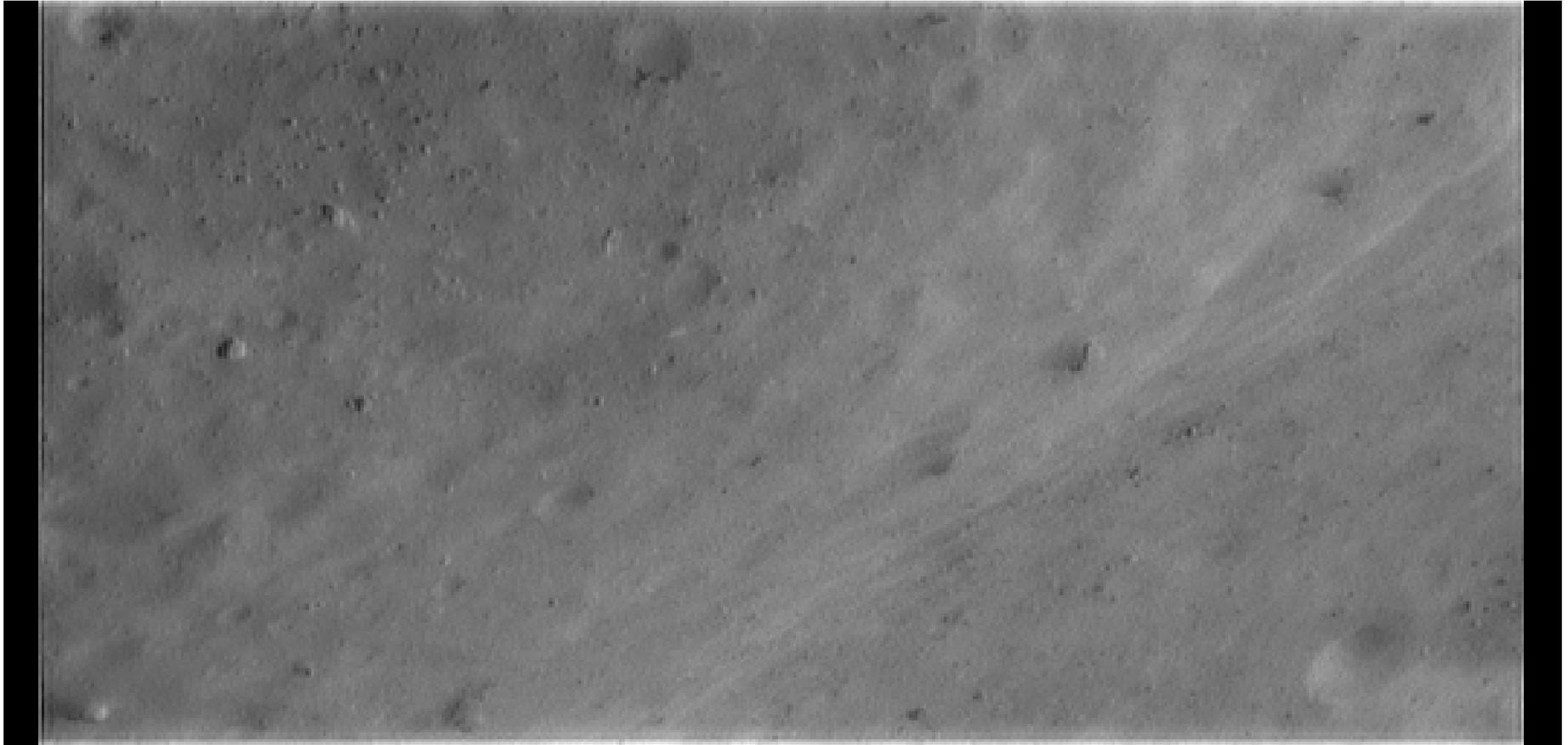
- Two valley-like features, as darker linear ridges, located close to the light-shadow boundary, one at the lower-left area and other at the upper-middle area of this image.
- A brighter region on the middle of this image.

m0137901875f4_2p_cif_dbl_fit.jpg

Latitude: +12

Longitude: 219

Altitude of NEAR spacecraft to Eros asteroid: 51.8 Km



- Cratering -

- Some craters scattered more in the left side, and almost none on the right side on this image of the surface of Eros.

- The number of craters counted in this location of Eros at this altitude (51.8 Km) is 280.

- Specific Features -

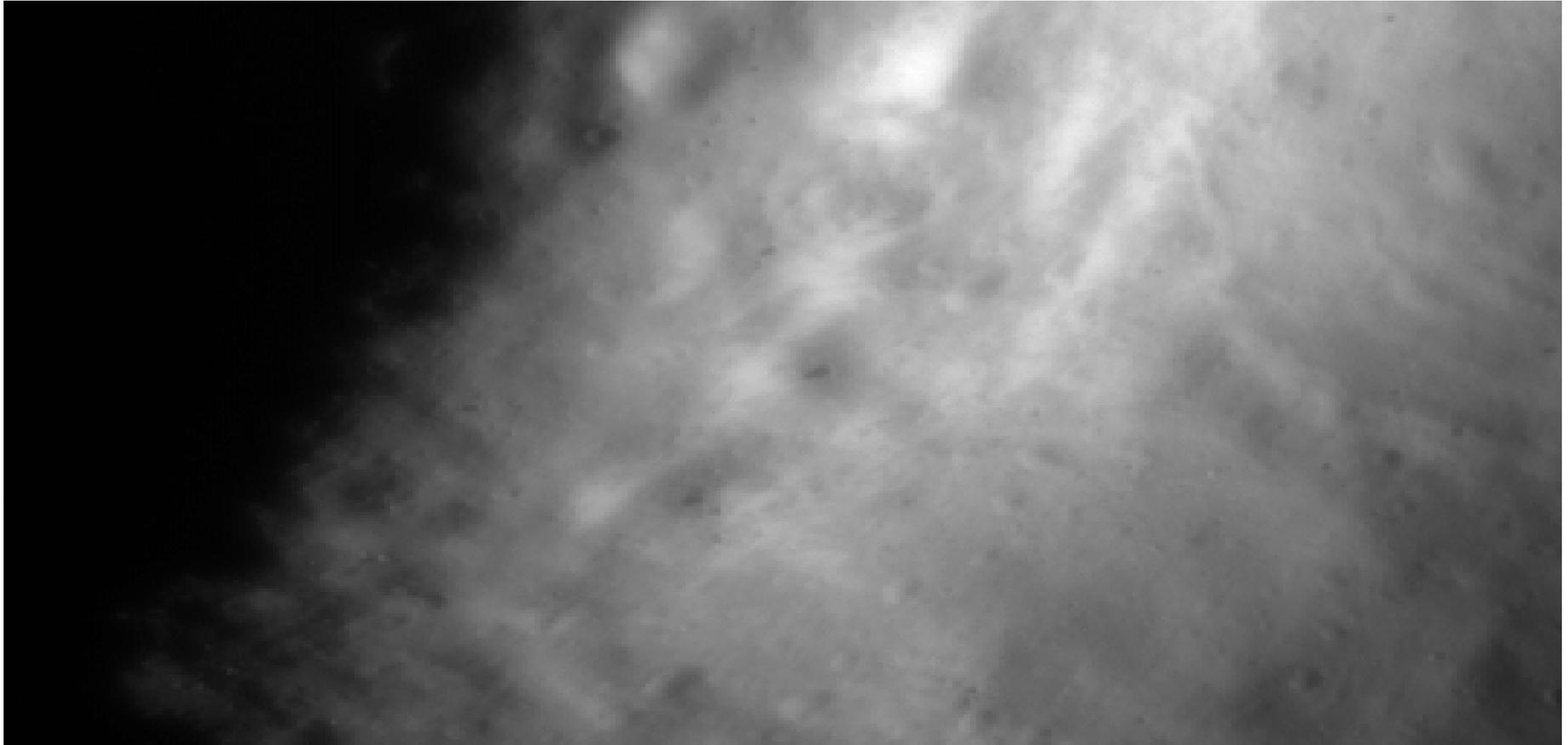
- Some boulders casting shadows on the surface on the towards the middle/upper-left corner on this image.

m013033686714_2p_iof_fit.jpg

Latitude: -9

Longitude: 99

Altitude of NEAR spacecraft to Eros asteroid: 101.7 Km



- Cratering -

- Some craters on its surface.
- The number of craters counted in this location of Eros at this altitude (101.7 Km) is 77.

- Specific Features -

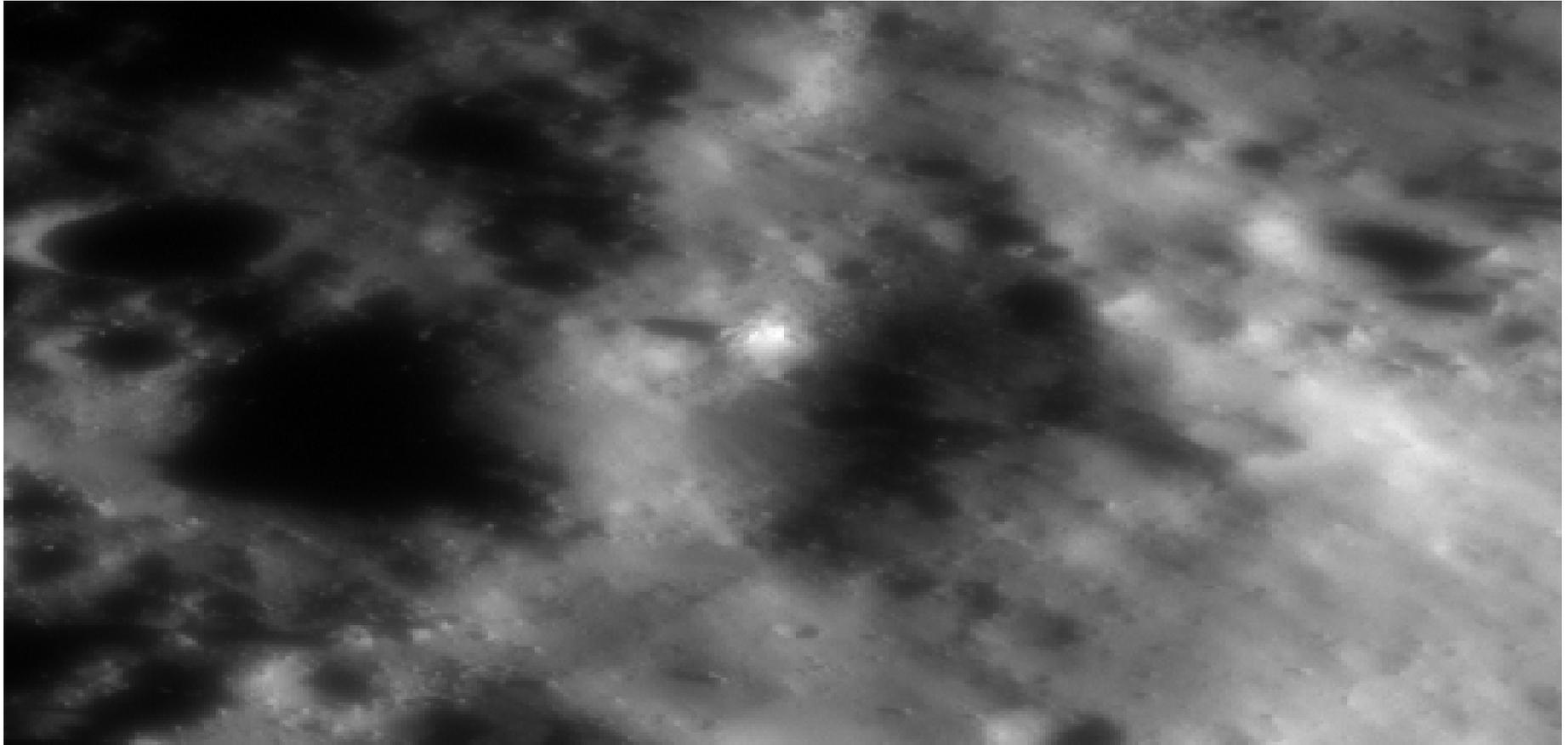
- Some boulders casting shadows on the surface.
- Bright patches on the middle of this image.
- A feature on the surface, a crater with three concentric rings with a fourth semi-ring (at the upper-right), located at the upper-middle region on the image of Eros. crater's

m0153839393f4_2p_iof_fit.jpg

Latitude: -9

Longitude: 99

Altitude of NEAR spacecraft to Eros asteroid: 37.5 Km



- Cratering -

- Several craters scattered all over its surface.
- The number of craters counted in this location of Eros at this altitude (101.7 Km) is 58.

- Specific Features -

- Some boulders casting shadows.
- The rims of two big craters, one at the left and the other in the rightside.

m0148912393f4_2p_iof_fit.jpg

Latitude: +12

Longitude: 21

Altitude of NEAR spacecraft to Eros asteroid: 195.6 Km



- Cratering -

- Several craters scattered all over the surface of Eros.
- The number of craters counted in this location of Eros at this altitude (195.6 Km) is 120.

- Specific Features -

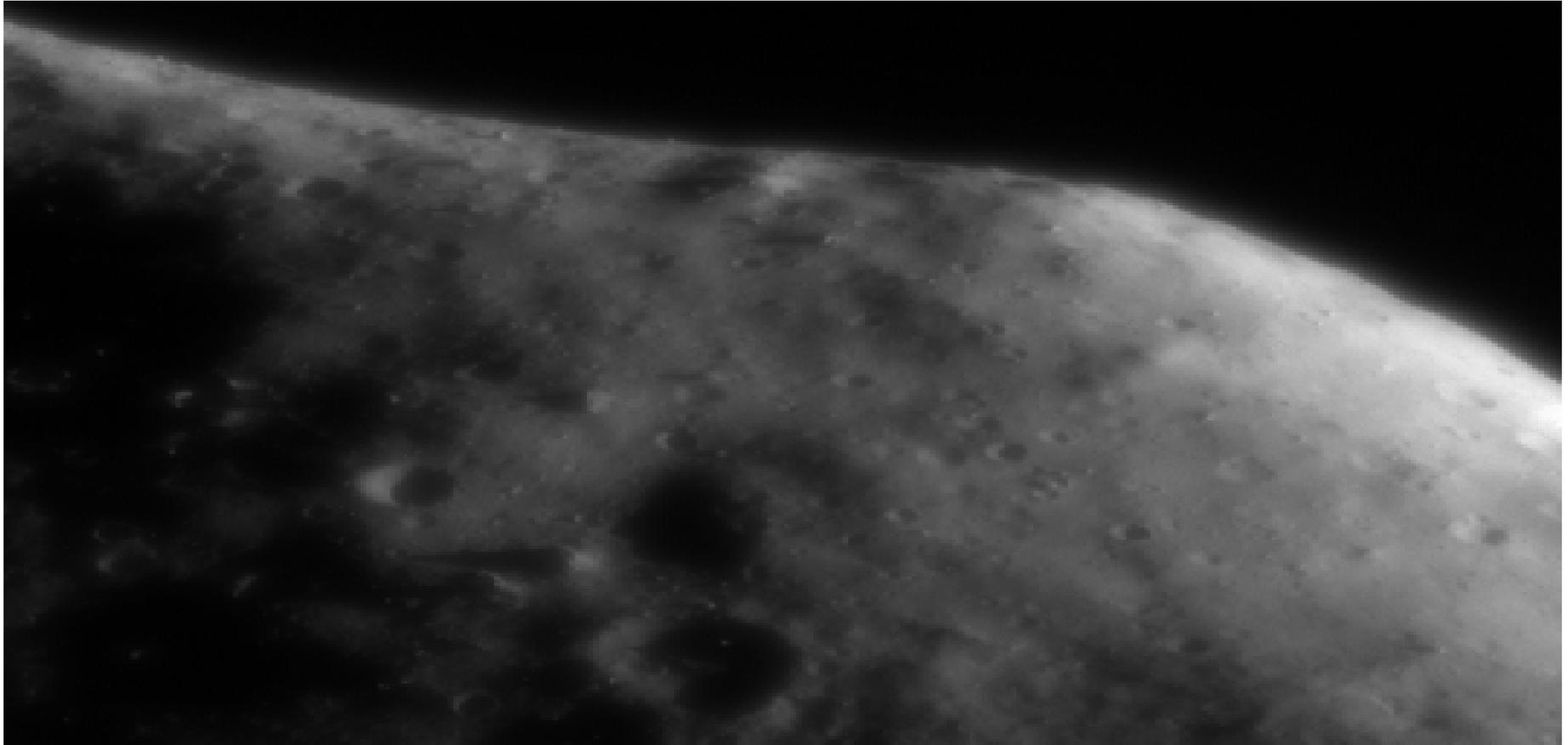
- Some boulders casting shadows on the surface on the lower-middle of this image.
- A bright area of Eros well visible on the lower-right corner.

m0138091138f4_2p_iof_fit.jpg

Latitude: +12

Longitude: 21

Altitude of NEAR spacecraft to Eros asteroid: 51.0 Km



- Cratering -

- Several craters scattered all over its surface.
- The number of craters counted in this location of Eros at this altitude (51.0 Km) is 60.

- Specific Features -

- Several boulders spreaded over this region casting shadows on the surface.
- Some boulders and craters' rims casting dim sunlight within the non-illuminated area.

Conclusions

Over all the asteroid 433 Eros analysed in these six images, we can observe that this asteroid has a surface covered with many craters of different sizes, and also with some tall boulders.

It also has a feature, an impact crater with four concentric rings, which could have been formed by two consecutive impacts with wave-like molding of the terrain.

Next Step

Our next step on the analysis will be the correlation of the near-infrared spectral data with the terrains at low altitudes.