Geological mapping of an interesting lunar site: Tsiolkovskiy crater

G. Tognon\textsuperscript{1}, R. Pozzobon\textsuperscript{2}, M. Massironi\textsuperscript{2}

\textsuperscript{1} Center of Studies and Activities for Space “G. Colombo” (CISAS), UNIPD
\textsuperscript{2} Department of Geosciences, UNIPD
Tsiolkovskiy crater

• Far side
• Feldspathic Highlands Terrane
• Oblique impact NW-SE
• Best example of farside mare volcanism (Pieters & Tompkins, 1999)
• Elevation floor difference ~450m (Mouginis-Mark & Boyce, 2017)
• Well-preserved central peak Ø
• Detections of OL and PAN

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Data

➤ TOPOGRAPHIC DATA:

• LRO LOLA and KAGUYA DEM Merge (Barker et al. 2016)
  - horizontal resolution of 59 mpp
  - vertical resolution of 3-4 m

➤ MONOCHROME MOSAICS:

• LRO WAC (Robinson et al., 2010) Global Mosaic
  - resolution of 100 mpp
• LRO NAC (Robinson et al., 2010) mosaic
  - resolution of 0.5 mpp (downscaled to 3 mpp)

➤ COLOR MOSAIC:

• CLEMENTINE UVVIS Color Ratio (Lucey et al. 2000)
  - resolution of 200 mpp
  R: 750/415 nm   G: 750/950 nm   B: 415/750 nm

Sm = Rr x 2000
Sm = mapping scale
Rr = raster resolution
(Tobler, 1987)

Geomorphological mapping
Sm = 1:200.000
High-resolution geological mapping
Sm = 1:6.000
Spectral mapping
Sm = 1:400.000

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Geomorphological mapping

Geological contacts
- contact, approximate
- contact, certain

Morphologies
- crest of crater rim D<20 km
- crest of crater rim D>20 km
- mare rill

Structures
- wrinkle ridge

Geological units
- CF smooth material
- CF hummocky material
- CF central peak
- CW smooth ponds
- CW steep scarps
- CW rim

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High-resolution geological mapping

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Contacts
- contact, approximate
- contact, certain

Morphologies
- mare rill
- crater, slope >15°

Structures
- wrinkle ridge
Future works

- Finalization of the high-resolution geological mapping by means of the LRO NAC 3 mpp mosaic, implemented also to 0.5 mpp
- Radar investigation for the presence of deep structures, such as voids and lava pile emplacements, by means of Kaguya LRS (Ono et al., 2010) data
- Complete characterization (e.g. steepness analysis, boulders and craters counting for hazard analysis, landing ellipses and route traverses definition) as a possible landing site

Bibliography


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