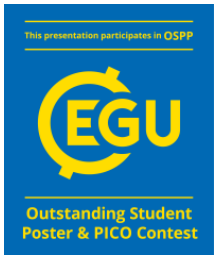
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776276



Geological mapping of an interesting lunar site: Tsiolkovskiy crater

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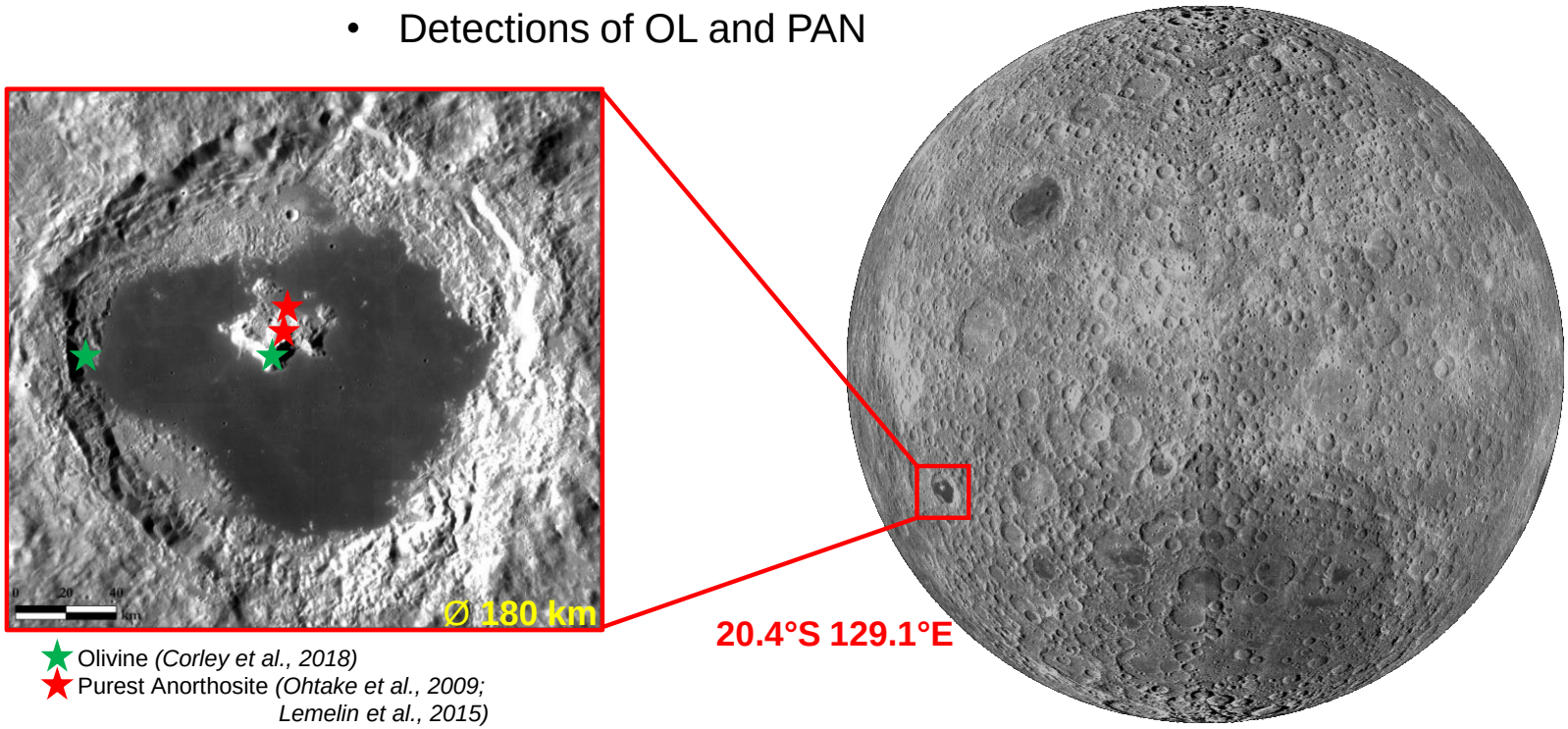
Tsiolkovskiy crater

- 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



Olivine *(Corley et al., 2018)*
Purest Anorthosite *(Ohtake et al., 2009; Lemelin et al., 2015)*

Data

➤ TOPOGRAPHIC DATA:

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

$S_m = R_r \times 2000$

S_m = mapping scale
R_r = raster resolution
(Tobler, 1987)

➤ MONOCHROME MOSAICS:

- LRO WAC *(Robinson et al., 2010)* Global Mosaic
- resolution of 100 mpp

Geomorphological mapping
S_m = 1:200.000

- LRO NAC *(Robinson et al., 2010)* mosaic
- resolution of 0,5 mpp (downscaled to 3 mpp)

High-resolution geological mapping
S_m = 1:6.000

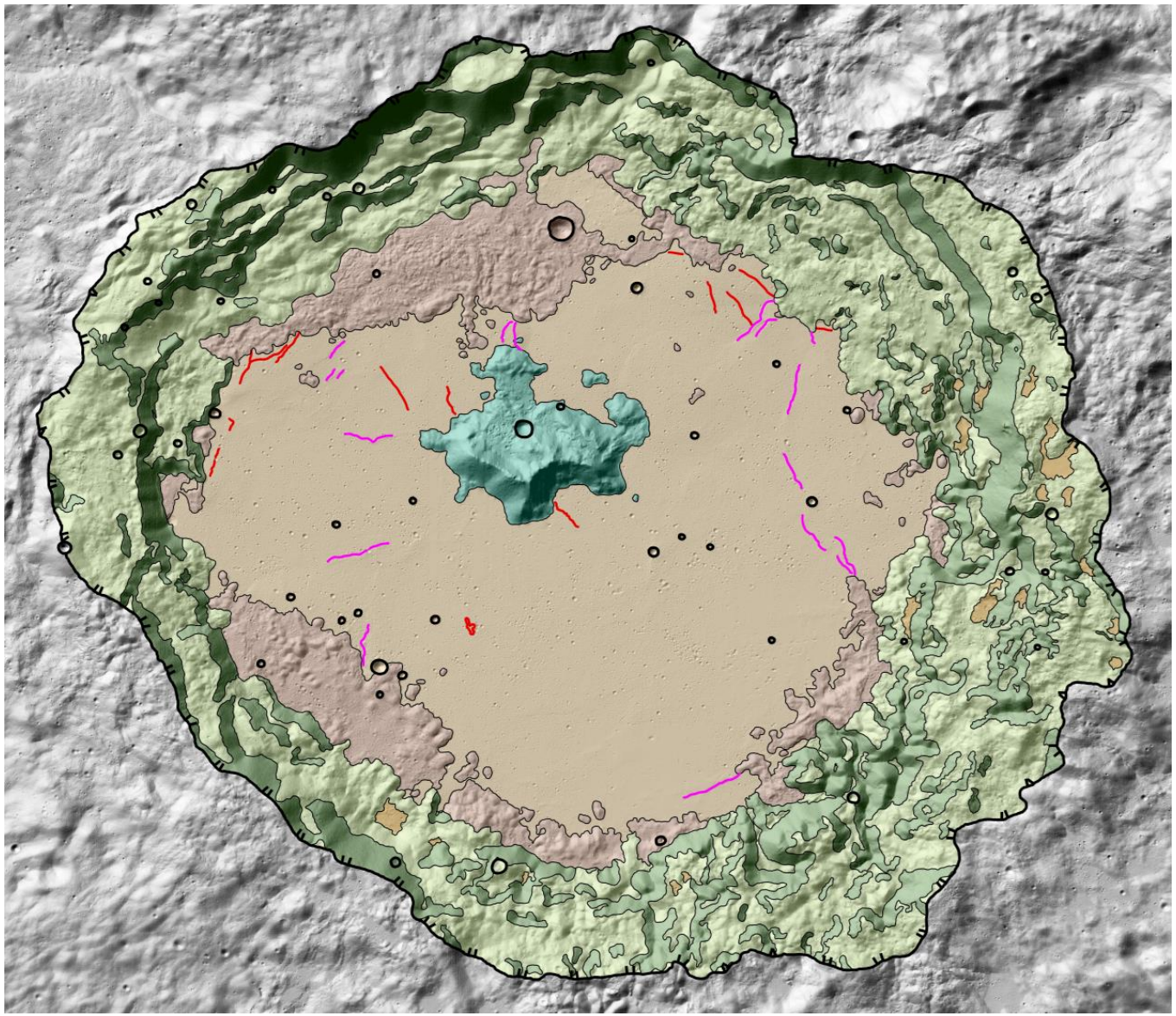
➤ COLOR MOSAIC:

- CLEMENTINE UVVIS Color Ratio *(Lucey et al. 2000)*
- resolution of 200 mpp

R: 750/415 nm G: 750/950 nm B: 415/750 nm

Spectral mapping
S_m = 1:400.000

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

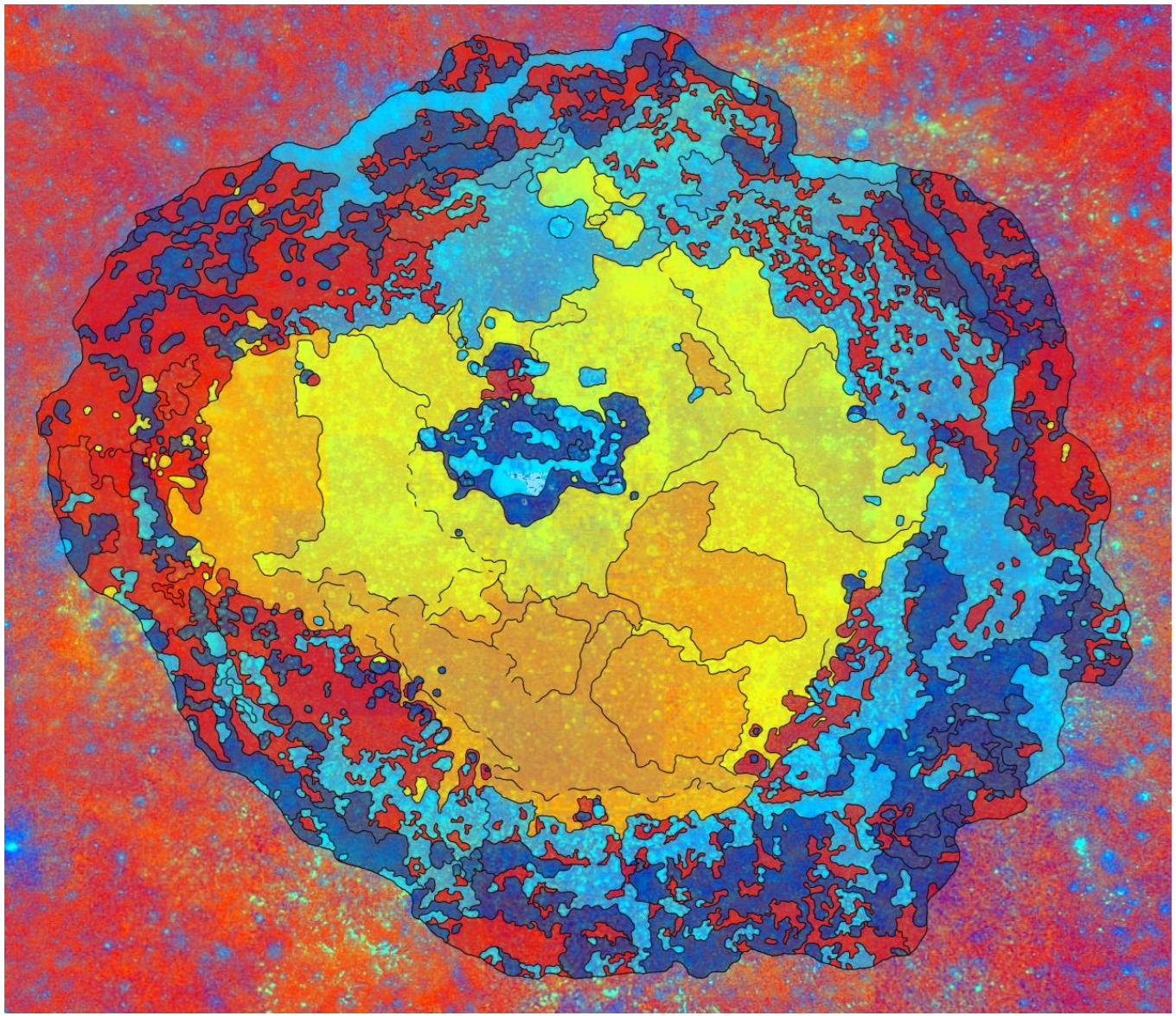
Structures

- wrinkle ridge

Geological units

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

Spectral mapping



Spectral contacts

contact, approximate

contact, certain

Spectral units

Fresher basalt

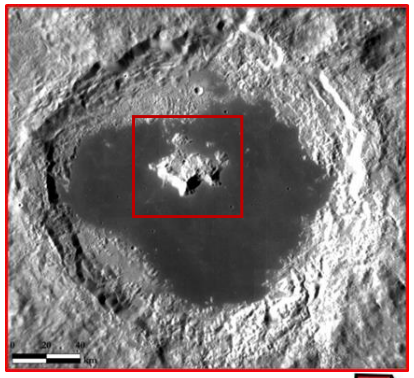
Basaltic plain

Noritic anorthosite - troctolite

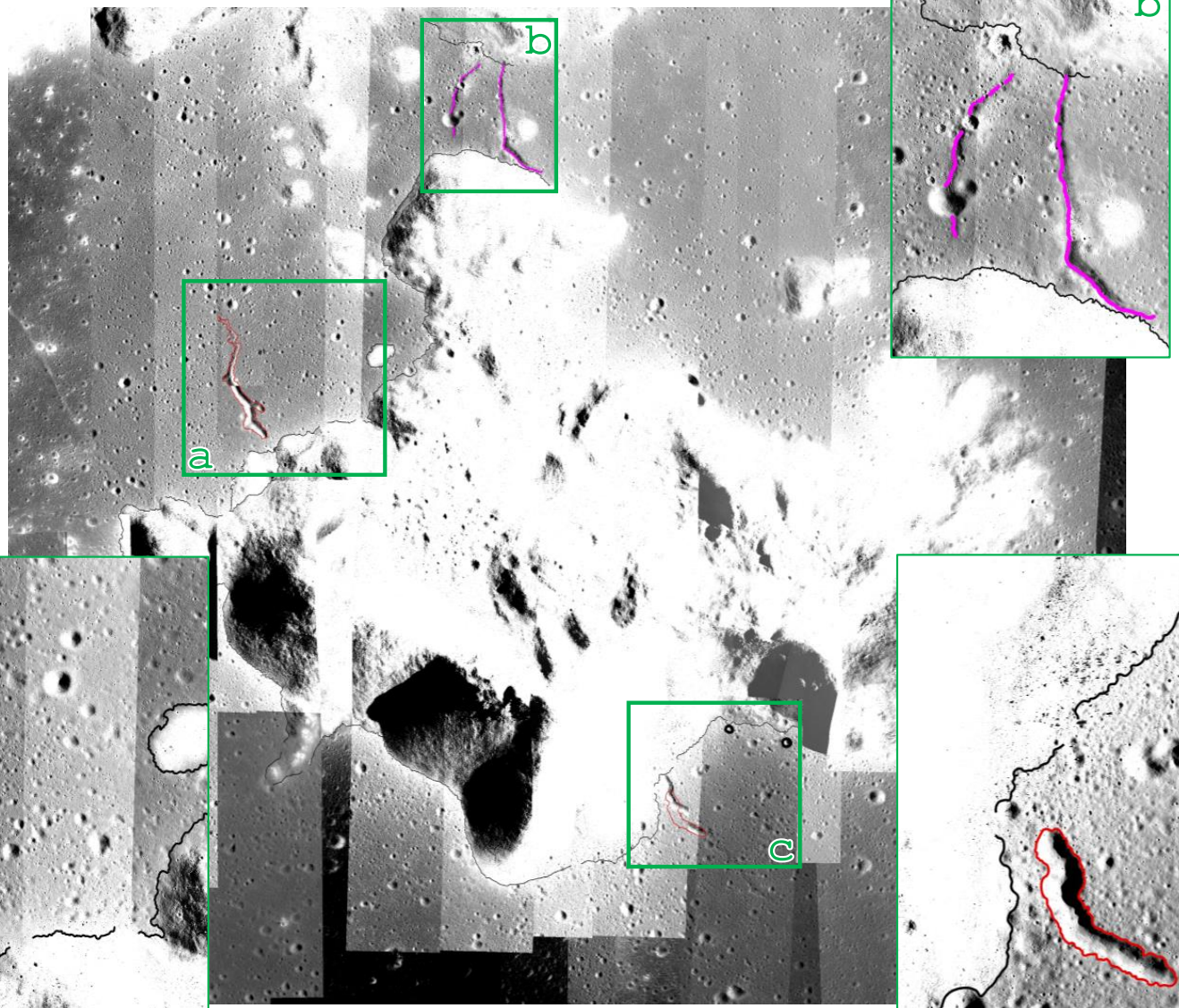
Anorthosite

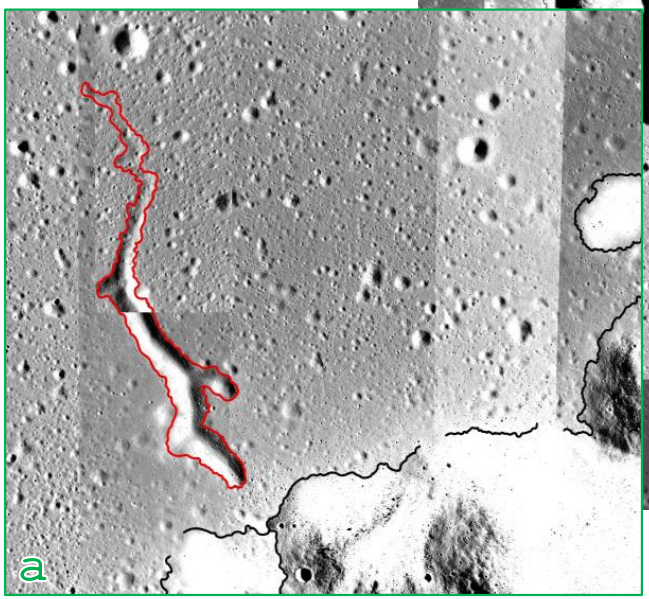
Mature highland soil

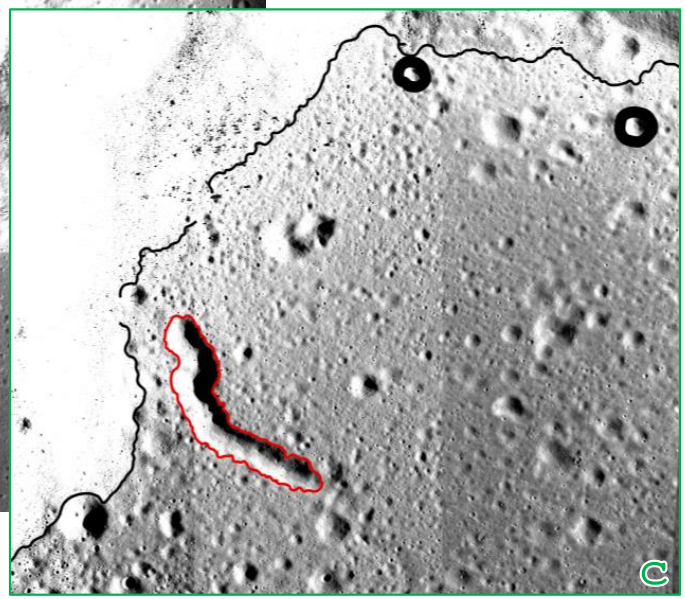
High-resolution geological mapping



S_M = 1 : 6.000







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

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