

MARGULIS AND ROEMER CRATERS: EVIDENCE FOR RESURFACING AND DENUDATION ON MARS. C. Robas^{1,2}, A. Molina¹, I. López², O. Prieto-Ballesteros¹, A. G. Fairén^{1,3}, Centro de Astrobiología (INTA-CSIC), Torrejón de Ardoz, Madrid 28850, Spain, ²Universidad Rey Juan Carlos, Móstoles, Madrid 28933, Spain, ³Department of Astronomy, Cornell University, Ithaca 14853 NY, USA.

Introduction: We have produced a 1:650,000 scale geomorphological map of the southwest Sinus Sabaeus, a region of Mars approximately centered at 25.0° S and 6.5° E and located in the most gradual topographic transition of the planet, between Arabia Terra and Noachis Terra, in the Martian highlands.

Our map (Fig. 1) was produced through the analysis of a combination of available imagery data from CTX (the Context Camera, on board the Mars Reconnaissance Orbiter spacecraft [1]), topography derived from MOLA (Mars Orbiter Laser Altimeter, on board Mars Global Surveyor [2]), and MOLA-HRSC (High Resolution Stereo Camera, on Mars Express [3]), and thermal inertia from THEMIS (the Thermal Emission Imaging System, on Mars Odyssey [4, 5]), which together allow detailing the complex valley network system, known as Marikh Vallis, and the remains of other indicators of water erosion and deposition processes.

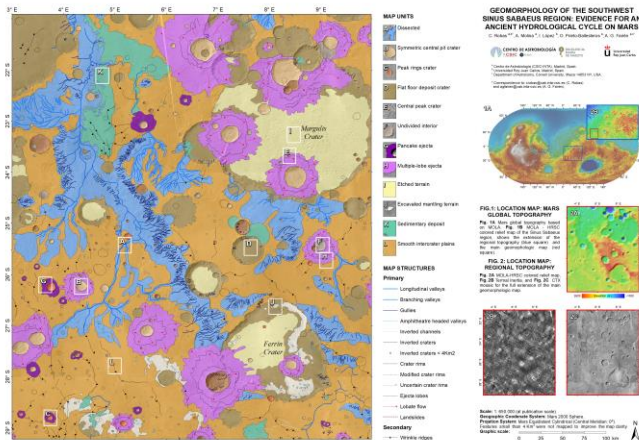


Fig. 1: Southwest Sinus Sabaeus geomorphologic map.

On the map, two impact craters stand out due to their large size, their old age and the geological units they contain. We named them as a tribute to two women scientists who played a prominent role in the field of space sciences.

Margulis crater: We named Margulis (International Astronomical Union approval on April 21, 2021) an impact crater 180 Km diameter located on the Southwest of Sinus Sabaeus quadrangle (centered approximately at -23.16° S and 8.49° E) (Fig. 2).

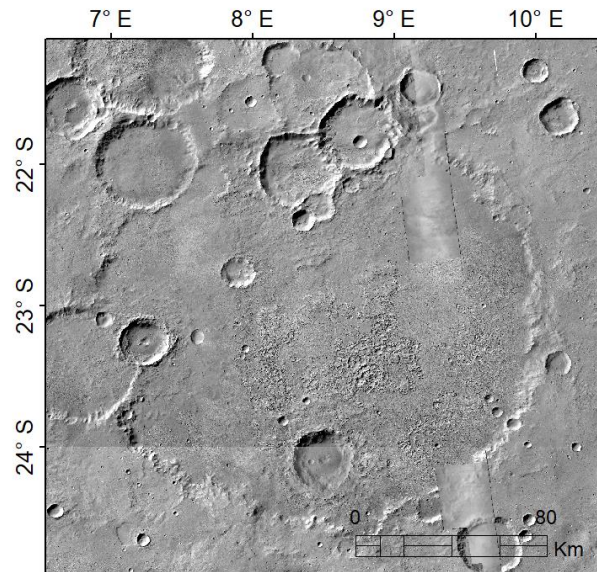


Fig. 2: Margulis crater.

Roemer crater: We named Roemer (International Astronomical Union approval on April 21, 2021) an impact crater 120 Km diameter located on the Southwest of Sinus Sabaeus quadrangle (centered approximately at -27.46° S and 8.09° E) (Fig. 3).

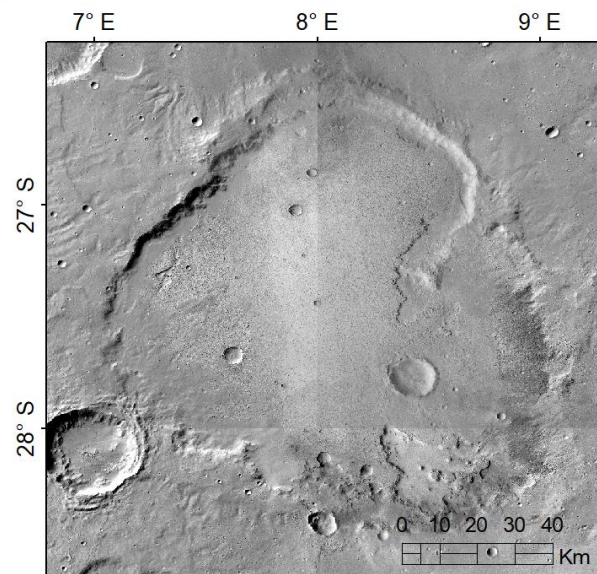


Fig. 3: Roemer crater.

Both impact craters are highly modified and Noachian in age [6]. Their interiors exhibit etched terrain units, which show remnants of sedimentary material,

suggesting that the craters were subjected to widespread episodes of resurfacing and denudation.

Conclusions: This new map constrain better the hydrogeological evolution of Sinus Sabaeus, providing a basis for identifying the ancient presence of water in the region, both in the liquid state and in the ice phase. We have defined different geomorphological units in this area, cataloguing 14 different structure types and 12 textural units.

Acknowledgments: This research is funded by the Project ‘MarsFirstWater’, European Research Council Consolidator Grant no. 818602. IL and OPB are supported by the AEI grant Project PID2019-107442RB-C32. The authors also thank the Agencia Estatal de Investigación (AEI) project no. MDM-2017-0737 Unidad de Excelencia ‘María de Maeztu’, and Rey Juan Carlos University.

References: [1] Malin, M. et al. (2007) *Journal of Geophysical Research Planets*, 112. [2] Smith et al. (2001) *Journal of Geophysical Research*, 106. [3] Fergason, R.L. et al. (2018) *Astrogeology PDS Annex*, USGS. [4] Christensen, P.R et al. (2004). *Space Science Reviews*, 110 (1), 85–130. [5] Fergason, R.L. et al. (2006) *Journal of Geophysical research*, 111. [6] Tanaka, K.L., et al. (2014). U.S. Geological Survey Scientific Investigations Map 3292.