

Jezero Crater Watershed, Isidis Basin, Sulfate Deposits and Syrtis Major: A Compelling Exploration Zone for Human Exploration J. F. Mustard¹, T. A. Goudge², M. S. Bramble¹, B. L. Ehlmann³, J. W. Head¹, J. L. Dickson¹, C. I. Fassett⁴ and K. M. Cannon¹ ¹Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI 02912, ²UT Austin, ³Caltech/JPL, ⁴Mt. Holyoke College, John_Mustard@brown.edu.

The Late Noachian/Early Hesperian watershed for the Jezero Crater open basin lake, and associated delta deposits, lies at the compelling stratigraphic contact between the Noachian-aged Isidis basin and the Hesperian-aged Syrtis Major volcanic flows and the Noachian-aged Isidis Basin. The center of the Exploration Zone is 17.747° N 77.037° E. This well-studied region has an extensive literature supporting an exceptional geologic diversity with astrobiological significance and with high potential for resource exploitation. We propose this region as an Exploration Zone for Human Missions to Mars. It is a target-rich environment that fulfills all five science regions of interest (ROIs) and provides an intriguing set of ROIs that are likely to fulfill the resources requirements outlined in the ROI documents (www.hou.usra.edu/meetings/explorationzone2015). The science ROIs include sedimentary rocks in the Jezero Crater delta that have exceptionally well-preserved bottomset beds ideal for biosignature preservation of organic compounds, extensive deposits of ancient olivine that are variably altered to carbonate and serpentine (important for understanding past habitability and for biosignature preservation), exposure of pre-Isidis basement rocks rich in water-bearing phyllosilicates, a 500 meter thick stack of hydrous Mg-sulfate-bearing layered strata, and rocks from the Syrtis Major volcanics (Hesperian age) and Isidis basin material (Noachian age) important for fundamental Mars science. The science merit for this EZ is summarized under four headings: diversity of rocks and minerals, regional geologic context, habitability potential defined largely by water and its history, and the biosignature preservation potential or taphonomy.

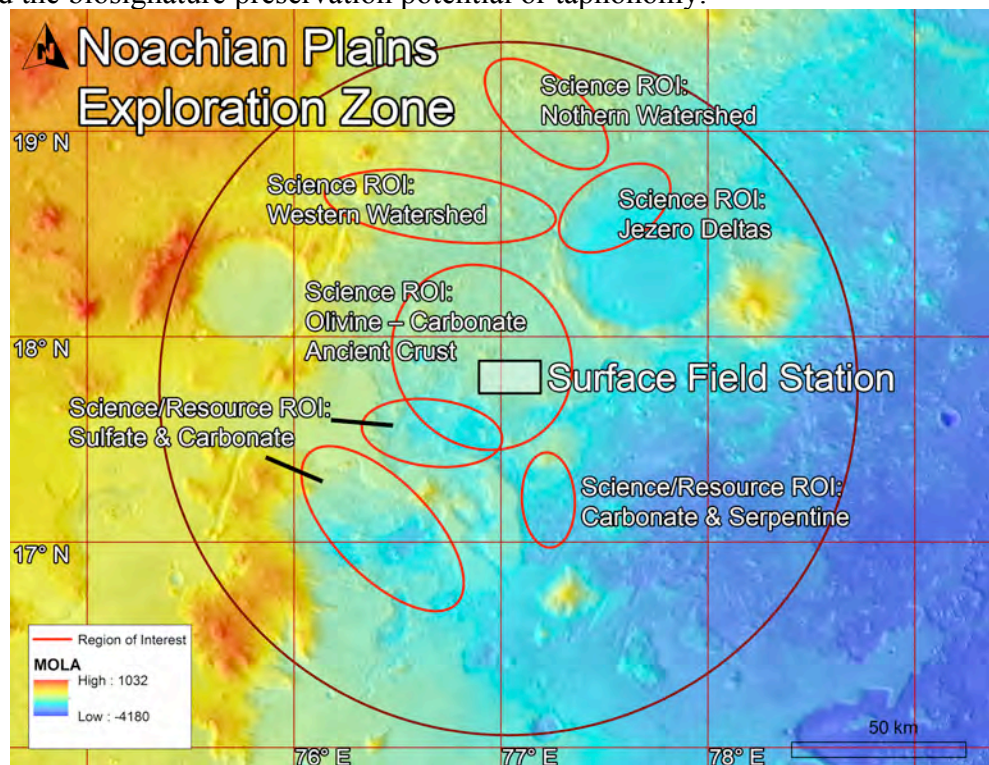


Figure 1. The exploration zone for the Jezero Crater delta watershed at the contact between the Isidis Basin the Syrtis Major volcanic region