GOBI DESERT DELTAS AS ANALOGS FOR JEZERO DELTA MARS L. A. Scuderi[1]. D. P. Mason[1]
[1]Department of Earth & Planetary Sciences, Northrop Hall MSC03 2040, U. New Mexico, Albuquerque, NM 87131, USA (tree@unm.edu, danmason@unm.edu);

Introduction: Mission science goals for the 2020 Mars rover required a landing site hosting characteristics for in situ investigations including astrobiologically relevant ancient environments with biosignature preservation potential [1]. On Earth, deltas contain diverse sub environments that both support and preserve microorganisms. Rapid burial potential makes deltaic deposits an ideal environment for organic material sequestration and potential biosignature preservation. For this reason, the large delta in Jezero Crater was selected as the landing site for the Mars 2020 Perseverance rover.

Few large deltas in environmentally similar areas on Earth are available for use as Jezero delta analogs. Wax Lake delta (WLD-Louisiana, USA) and the New Rhine Lake Constance delta (RLC- Austria) have been used to test formation timing for the Jezero delta [2]. Both are classic river-dominated deltas with well-documented histories, and detailed study of their sedimentological and surficial geomorphic characteristics [3]. However, neither is located in a cold-desert arid environment currently dominated by aeolian processes, thus they may not be adequate analogs for understanding Jezero delta processes.

Much like the Jezero delta, the deltas of the Gobi Desert (**Fig. 1**) exhibit classic river-dominated lobate features. Data on the geometry and morphometrics of these lobate deposits, channel-size distributions, bifurcation rates, and distributary numbers of these deltas as well as analysis of cross-section stratigraphy may provide high quality analogues for Jezero and other river-dominated deltas on Mars. The North Basin delta (**Fig. 2a**) adds an additional characteristic of interest since it likely is one of a small number of Jezero delta (**Fig. 2b**) analogs on Earth that drains a significant area of basaltic rock [4, 5].

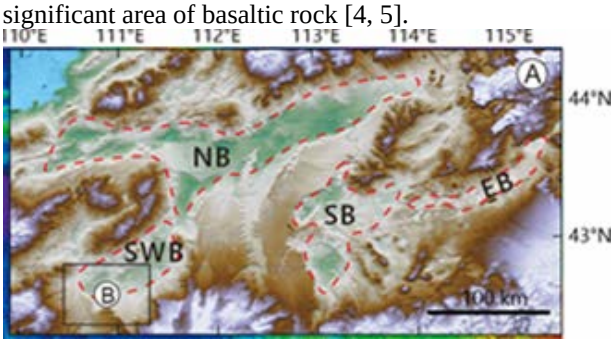
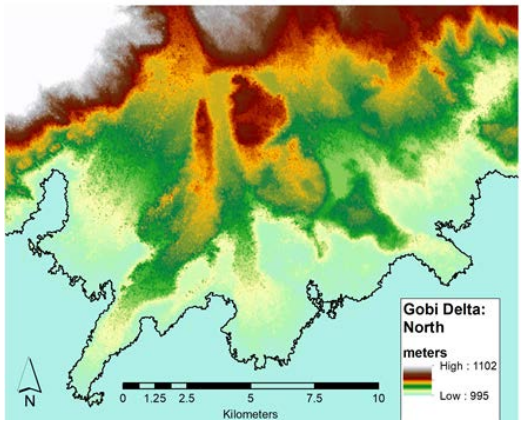
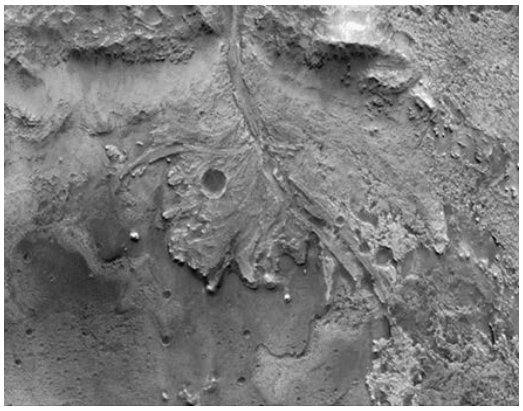


Fig. 1. Study area in China's Gobi desert. NB, EB, SB and SWB are North, East, South and Southwest sub-basins respectively.



a.



b.

Fig. 2 a. North Gobi Basin delta of similar size and form as the target site delta in Jezero Crater. The 995m contour line for this North Basin delta is shown in black and represents the outer edge of the delta.
b. Jezero delta (N to right). Remnants of the eroded delta are visible to the left of the lower center of the image. Both deltas exhibit lobate forms. Scale is the same for a. and b.

Conclusions: The deltas of China's Gobi Desert may represent a useful analog for Martian lacustrine deltas. The Gobi has been dry and dusty for much of its geologic history [6] with infrequent and brief lake formation during some interglacial periods. This environmental setting with infrequent but rapid deltaic formation may be more like Martian conditions than terrestrial deltas currently used as analogs.

References: [1] Mustard et al., 2013, Report of the Mars 2020 Science Definition Team. [2] Salese et al., 2020, Astrobiology 20:977. [3] Wood, 2006 GSA Bull. 118(5/6):557–66. [4] Chen et al., 2015, J. Vol & Geothermal Res. 305:30-44. [5] Zhang and Guo, 2016 Gondwana Res. 37:130-151. [6] Lu et al., 2019 Earth-Science Reviews 194:251-263.