GEOLOGIC MAPPING OF THE JEZERO AND NORTHEAST SYRTIS REGIONS OF MARS. V. Z. Sun and K. M. Stack, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA (Vivian.Sun@jpl.caltech.edu).

Introduction: The landing site for the Mars 2020 rover was recently selected to be Jezero crater, a 50 km diameter impact crater preserving an ancient lake environment and deltaic deposits[1-3]. The ancient Noachian terrains outside Jezero hosted two other landing site candidates: Northeast (NE) Syrtis[4-6] and Midway, a site with NE Syrtis-like terrains that Mars 2020 may have the opportunity to explore during its extended mission.

The geologic units and history preserved at both Jezero and Midway/NE Syrtis may be related, and some units may be correlative, given the close proximity of these two areas. Geologic units with similar morphologic characteristics and mineralogy have been identified at both sites **(Fig. 1)**[1-6]. Despite the similarities between these Jezero and NE Syrtis units, the two sites have been hypothesized to represent different, and generally unrelated, ancient habitable settings, with Jezero representing surface habitability[1-3] and NE Syrtis representing subsurface habitability[4-7].

We will present an initial geologic map of the Jezero and NE Syrtis/Midway regions **(Fig. 2)**. Regional maps over this area have previously been produced for NE Syrtis[6] and Jezero crater[3], but these previous maps cover different spatial extents at variable mapped scales. A geologic map at a consistent map scale that encompasses NE Syrtis and Jezero crater will enable scientists to make connections between two sites with distinct habitable settings, but with similar geologic units and correlated mineralogy. Identifying the distribution and continuity of common geologic units throughout this region will enable our understanding of:

1) The complete geologic history in this region, including source to sink processes and the emplacement of the oldest to youngest geologic units.

2) The relationship between habitable environments in different settings (surface vs. subsurface).

3) The diversity and distribution of habitable environments that may be explored and potentially sampled by Mars 2020.

Methods: We are constructing a geologic map encompassing NE Syrtis, the western portion of Jezero crater, and the area between them. The map is being constructed at 1:20,000 Digital Mapping Scale and printed at 1:75,000 Publication Map Scale. We aim to publish this map prior to the Mars 2020 landing in February 2021, so as to provide a valuable and timely resource for the Mars community. Mapping is being performed in ArcGIS on a CTX basemap, supplemented by HiRISE data to ensure accurate identification and characterization of geologic units. Future work will involved determination of crater count-derived ages to obtain absolute ages of geologic units when possible.

Results: Three main geologic sequences are present throughout the map area: 1) Basement rocks, that are associated with pyroxene and clay spectral signatures in CRISM, of likely Noachian age and that may

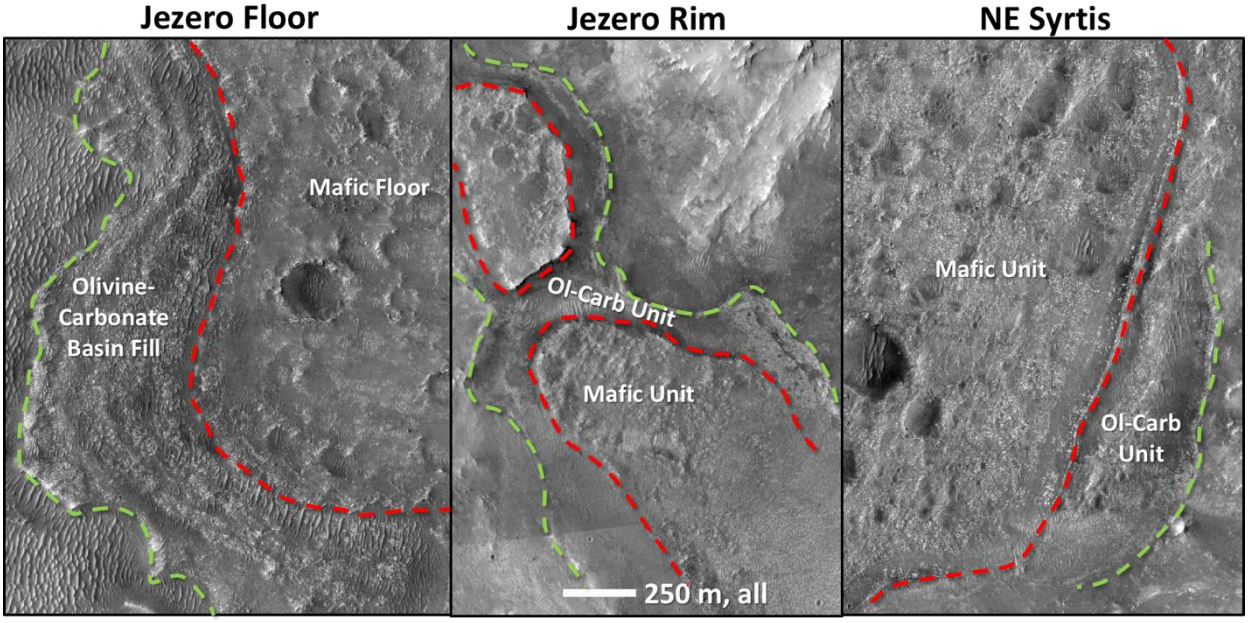
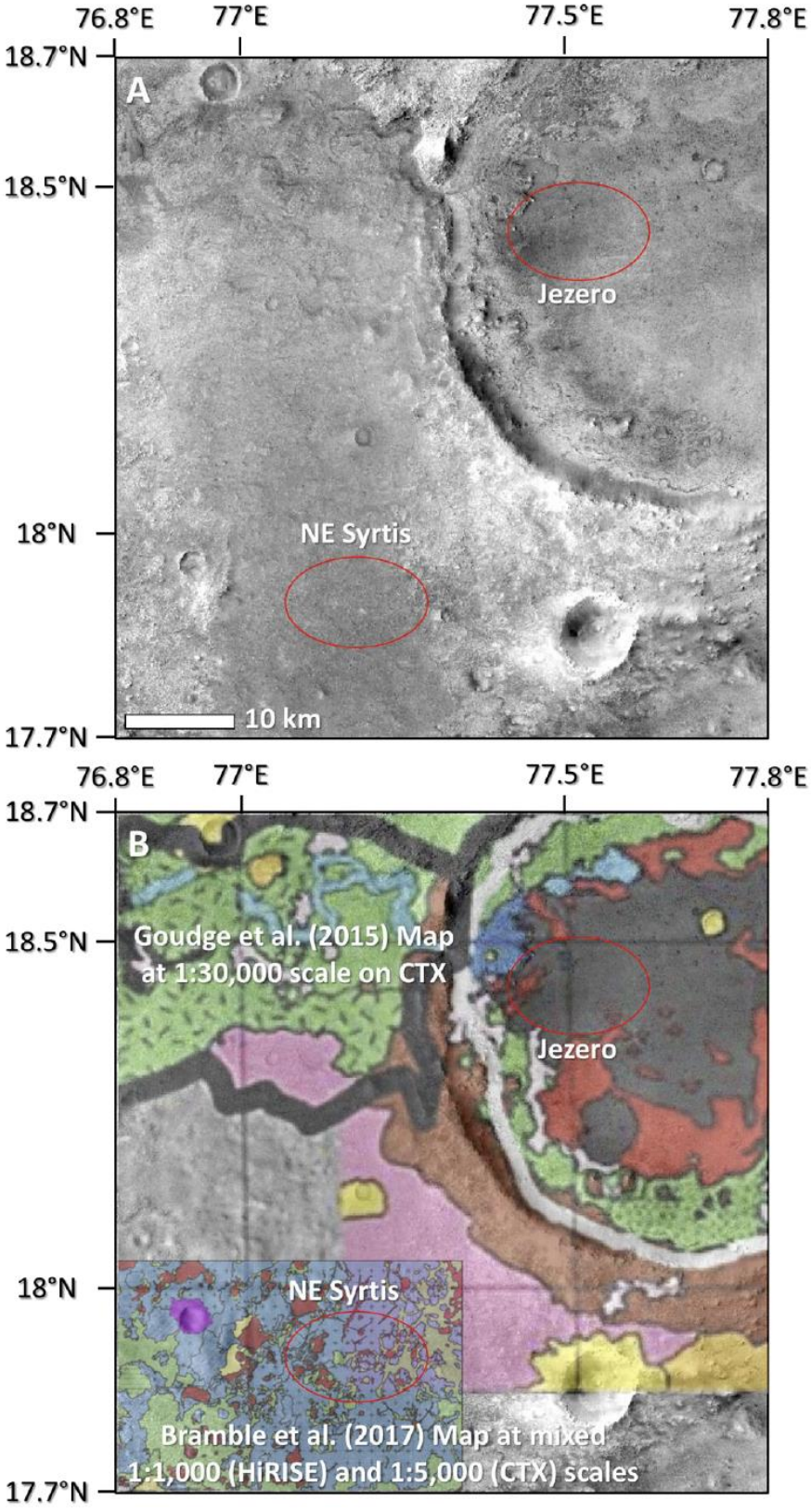


Figure 1. Comparison of the mafic unit and the olivine-carbonate-bearing unit on Jezero's floor, on Jezero's rim, and at NE Syrtis.

exhibit layering, 2) Light-toned fractured units that are associated with olivine and variable carbonate spectral signatures, and 3) A cratered mafic unit that superposes the light-toned fractured units and that occurs within Jezero, on Jezero's rim, and in NE Syrtis **(Fig. 1)**. Textural variations are observed in all of these three main materials and we will map subunits as appropriate at our mapping scale



Expected Significance: This geologic map of the greater Jezero region will enhance future scientific investigations of this important region of Mars. This map will provide broad geologic context for orbiter or future Mars 2020 rover observations of rocks studied and samples collected in this region. The geologic units identified in this regional map could serve as proxies for associated mineralogic composition in areas where there is no orbital spectroscopic data, as distinct geologic units in this region are strongly correlated with particular mineral compositions[6], but this region has incomplete coverage of orbital mineralogic data, particularly in the area between the Jezero and NE Syrtis ellipses. Lastly, the production of a geologic map following the standardized USGS framework will allow for units in this region to be assigned chronostratigraphic ages through crater-count age dating and comparison with the regional stratigraphy in previous USGS maps.

References: [1] Fassett and Head (2005), *GRL* 32, L023456. [2] Ehlmann et al. (2008), *Science* 322, 1828-1832. [3] Goudge et al. (2015), *JGR-Planets* 120, E004782. [4] Mustard et al. (2009), *JGR* 114, E00D12. [5] Ehlmann and Mustard (2012), *GRL* 39, L11202. [6] Bramble et al. (2017), *Icarus* 293, 66-93. [7] Mangold et al. (2007), *JGR-Planets* 112, E002835.

Figure 2. A) Extent of the map area, on a CTX basemap. **B)** The map area with previous maps overlaid.