

Development of the Midway Ellipse

With support from NASA Science Mission Directorate and Mars Exploration Program, the Mars 2020 project is investigating mission scenarios that include exploration and sampling in and around a landing ellipse that meets Mars 2020 requirements for entry, descent and landing (EDL) safety, followed by a traverse toward a second landing ellipse (that also meets Mars 2020 EDL safety requirements) with exploration and sampling along the way. Such a mission could culminate in the delivery of a returnable cache of samples to a location offering high probability of successful recovery by a possible future mission that could land in the second ellipse.

Candidate landing ellipses at Jezero and NE Syrtis are approximately 37 km apart -- close enough for regional geologic correlation, but probably too far for a Mars 2020 mission that traverses between the two according to the scenario outlined above. Recognizing 1) that the stratigraphic sequence in the NE Syrtis ellipse is broadly exposed in the terrain between NE Syrtis and Jezero ellipses, and 2) the potential for scientific diversity offered by a Mars 2020 mission that explores and samples sequences in and outside Jezero crater, scientists and engineers associated with the Mars 2020 project sought to identify a safe landing ellipse that exposed stratigraphic units identified at NE Syrtis but was located close enough to Jezero crater to enable a traverse between the two with a high probability of success. Such an ellipse was identified in early 2018 and informally named "Midway" in reference to its location between candidate ellipses at NE Syrtis and Jezero. The center of the Midway ellipse is located approximately 27 km west-southwest of the center of the Jezero ellipse. The terrain in and around Midway was evaluated for landing safety and traversability, and for specific occurrences of rock units previously identified in the NE Syrtis ellipse. Although the highest resolution CRISM data are not available for the Midway ellipse, lower resolution CRISM data combined with geomorphic mapping indicate the presence of all units previously mapped within the NE Syrtis ellipse with the possible exception of a hypothesized kaolinite-bearing unit. Based on this work, exposures and accessibility of NE Syrtis-type stratigraphy in the Midway ellipse has been deemed roughly equivalent to the original NE Syrtis ellipse by multiple subject matter experts. Multiple safe routes into or out of Jezero crater have been identified by the Mars 2020 Project.

At the October 2018 Landing Site Selection Workshop, Mars 2020 team members will present detailed information about work to-date on the Midway ellipse and mission scenarios connecting the Jezero and NE Syrtis regions for consideration by the broader community. Additional observations and perspectives on these mission scenarios from non-Mars 2020 science team members are encouraged.