CONCEPT FOR ON-BOARD SAFE LANDING TARGET SELECTION AND LANDING FOR THE M2020 MISSION.

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Abstract: This paper presents a concept for a potential enhancement to the Mars 2020 mission that would enable landing on more hazardous landing sites. The Mars 2020 Science Definition Team identified this capability as a high priority because it could provide access to a wider set of high interest landing sites [1].

This concept builds on the MSL Entry Descent and Landing heritage system. It would add Terrain Relative Localization and a Multi-target selection logic and divert capability. This paper describes the adaptation of the MSL EDL system to achieve this capability. The Terrain Relative Localization would be provided by a Lander Vision System, which during the on-chute phase provides localization of the vehicle with respect to a landing map. The Multi-target selection logic would use the localization information to select a safe landing (e.g., free of slopes and large rocks) site from an on-board map-based multi-landing-target set within the powered descent divert reachable space. A modified powered descent guidance then would generate a trajectory to the desired target. The MSL-powered descent system would then used to follow this trajectory and land the vehicle using the skycrane landing system.

References:

[1] J.F. Mustard et al. "Report of the Mars 2020 Science Definition Team" http://mepag.jpl.nasa.gov/reports/MEP/Mars_2020_SDT_Report_Final.pdf