**A SCIENCE-DRIVEN STRATEGY FOR CLPS LANDING SITE SELECTION.** A.L. Fagan[1], B.W. Denevi[2], B. Greenhagen[2], J. Heldmann[3], J.T. Keane[4], and M.S. Robinson[5], [1]Western Carolina University (alfagan@wcu.edu), [2]Johns Hopkins University Applied Physics Laboratory, [3]NASA Ames Research Center, [4]Jet Propulsion Laboratory, California Institute of Technology, [5]School of Earth and Space Exploration, Arizona State University, Tempe, AZ.

**Current Status:** With multiple intended flights to the lunar surface planned per year, NASA's Commercial Lunar Payload Services (CLPS) and Payloads and Research Investigations on the Surface of the Moon (PRISM) programs have the potential to be paradigm-changing. However, these programs are not driven by an integrated strategic plan to address top priority lunar science goals; thus, PRISM has not demonstrated a coherent strategy governing the landing site selection process nor how lander capabilities (as dictated in PRISM calls) are determined. NASA has stated that CLPS/PRISM mission architecture decisions at NASA Headquarters are, at a high level, guided by community documents, Decadal Survey priorities, etc. [e.g., 1], but the process lacks transparency regarding why and how specific landing sites are chosen.

Although some science goals can be achieved at a broad range of landing sites (site-agnostic science), the current process of pre-selecting landing sites in advance of science priorities and payloads can result in a mismatch between science goals and the landing site and will likely hinder NASA's ability to implement a strategic science and exploration plan for the Moon. For example, the payloads selected for the PRISM 1 landing site at Schrödinger are focused on important lunar science objectives, but none that are related to that specific basin, and thus these investigations may be better conducted at other farside locations (e.g., thick highland crust). In addition, it is important that NASA not inadvertently preclude the selection of future site-specific science missions to Schrödinger because it has already sent a mission (PRISM 1) to this locale. For PRISM 2, no science questions were articulated for the selection of the Gruithuisen Domes landing site. Although this site has been identified [2] as one that could address several major overarching science themes [3, 4], other locations may have been able to address more or higher priority themes. The PRISM process is in contrast to the established and successful Science Mission Directorate methodology of priority science questions guiding landing site selection.

An integrated science strategy should also address science objectives that can be accomplished via CLPS in contrast to science that requires larger (Discovery, New Frontiers, Flagship) class missions. Such distinctions are important for guiding PRISM mission calls and selections, and also critical for ensuring that high-priority science requiring larger missions is not precluded by the impression that PRISM/CLPS can address all lunar science objectives. Pre-determined landing sites also typically afford only one opportunity to propose a concept whereas a science-driven approach allows for iteration and improvement over multiple proposal cycles, thereby increasing overall proposal quality and incentivizing PIs and institutions who may not be able to support one-off mission proposals to one specific site.

Science objectives can and should also guide a need for CLPS-provided capabilities, such as mobility. At present, there is a lack of traceability between lander capabilities, landing site selection, instrument selection, and broader science goals.

**Potential Path Forward:** To ensure that science is maximized within the CLPS/PRISM programs, we encourage the following: In conjunction with active community engagement**,** develop and communicate a CLPS/PRISM Strategic Plan that centers on addressing high priority science goals. In addition, the solicitation of science investigations (e.g., mobility-enabled investigations; far-side oriented investigations) can drive the expansion of CLPS capabilities consistent with the *Strategic Plan* while also allowing teams to propose both a landing site and instrument suite to address their specific science question(s). Prioritized [3, 5, 6] and unprioritized [4, 6, 7] goals are reported in several documents to guide the development of the Strategic Plan, and the forthcoming Decadal Survey may also provide updated prioritized lunar science goals. Rather than pre-selecting landing sites, PRISM calls could solicit investigations to address specific high-priority objectives identified in this Strategic Plan.

**Conclusion:** The CLPS and PRISM programs have enormous potential to address high priority planetary science goals at the Moon. However, without centering science in key decisions, this progress will be diminished. Addressing this deficiency is necessary to ensure the longevity of these programs, buy-in from the science community, and public support for continued lunar exploration.

**References:** [1] Kearns J. (2021) *LSSW- Progress and Challenges*. [2] Jawin E. R. et al. (2019) *Earth and Space Sci., 6,* 2-40. [3] NRC (2007). *The Scientific Context for Exploration of the Moon*. [4] LEAG (2017) *Advancing Science of the Moon Specific Action Team*. [5] NRC (2011) *Visions and Voyages*. [6] LEAG (2016) *Lunar Exploration Roadmap*, https://www.lpi.usra.edu/leag/roadmap/. [7] NASA (2020) *Artemis III Sci. Def. Team Rpt*.