

STRUCTURING REAL-TIME SCIENCE SUPPORT OF ARTEMIS CREWED OPERATIONS: RESULTS FROM THE LUNAR SURFACE SCIENCE WORKSHOP #8. K. E. Young¹, J. M. Hurtado Jr.², S. Noble³, J. E. Bleacher^{3,1}, B. Bailey³, D. Needham³, A. Nahm⁴, S. Lawrence⁵, L. Aitchison³, and D. Draper³, ¹NASA Goddard Space Flight Center, 8800 Greenbelt Road, Greenbelt, MD, 20771 (kelsey.e.young@nasa.gov); ²The University of Texas, El Paso, 500 W. University Avenue, El Paso, TX, 79968 (jhurtado@utep.edu); ³NASA Headquarters, 300 E St SW, Washington, DC, 20546; ⁴Arctic Slope Technical Services, Inc. at NASA Headquarters, 300 E St SW, Washington, DC, 20546; ⁵NASA Johnson Space Center, 2101 E NASA Pkwy, Houston, TX, 77058

Introduction: The in-person Lunar Surface Science Workshop (LSSW), originally planned for April 2020, was cancelled due to the COVID-19 pandemic. Since then, the LSSW Organizing Committee (OC; made up of representatives from NASA Headquarters as well as NASA field centers) has begun a series of virtual workshops, occurring approximately every month, that touch on focused topics relevant to conducting science with the Artemis Program. The original goals of the LSSW were to gather community input on the various concepts and options to accomplish science on the lunar surface, including: planetary and lunar science; field geology; astrophysics; Earth observations; heliophysics; fundamental space biology; and human health and performance (<https://www.hou.usra.edu/meetings/lunarsurface2020/themes/>). In light of the COVID-19 pandemic, individual, 1-2 day, virtual meetings were scheduled, with each diving deep into a topic for which community input was solicited for the original LSSW. Topics and dates for the LSSW virtual meetings planned and executed so far are:

- Overview and Tools/Instruments: May 28-29, 2020
- Lunar Volatiles and Samples: July 29-30, 2020
- Lunar Dust and Regolith: August 20, 2020
- Planetary Protection/PSR Classification: September 30, 2020
- Science Enabled by Mobility: October 28, 2020
- Foundational Data Products: November 19, 2020
- Space Biology: Jan 20-21, 2021
- Structuring Real-Time Science Support of Artemis Crewed Operations: Feb 24-25, 2021

This contribution will summarize the results from the ‘Structuring Real-Time Science Support of Artemis Crewed Operations’ session. More information about the other LSSW virtual meetings can be found at the Lunar and Planetary Institute (LPI) meeting website (linked above), and at the Solar System Exploration Research Virtual Institute (SSERVI) website, which collects community feedback on the reports generated

from each virtual meeting (<https://lunarscience.arc.nasa.gov/lssw/>).

LSSW Format Overview: The format for each of the LSSW virtual meetings has been largely consistent. Each has included invited talks from NASA Headquarters (HQ) personnel and from academic, industry, international, and governmental community members. These have been followed by contributed talks from the community. These contributions come from both the abstracts originally submitted for the April 2020 LSSW as well as from additional abstract solicitations since then. Each virtual meeting has included at least two breakout sessions designed to facilitate more focused and inclusive community discussions. The breakout topics were determined based on the goals of each workshop. The plenary and talk components took place using the WebEx platform and the concurrent breakout sessions were conducted using Microsoft Teams. After each virtual meeting, the chairs and breakout facilitators were asked to generate reports summarizing major findings, including lessons learned and community action items. These reports are made available online, through the SSERVI website, for a two-week period of community comment, after which the reports are finalized. The final deliverables are now available online for use by the community, NASA HQ, and the Artemis Program for future mission planning and development.

The ‘Structuring Real-Time Science Support of Artemis Crewed Operations’ Session: The LSSW virtual meeting discussed here, taking place on Feb 24-25, 2021, focuses on preparation for real-time surface science operations during the Artemis Program. Invited speakers will include Apollo crewmembers and members of the Apollo Science Support Team, scientists with Mars rover operations experience, and flight controllers with both Space Shuttle and International Space Station operations experience as well as current leadership in the Artemis Flight Control Team. Contributed talks from the community discuss guiding principles and exploration strategies for lunar surface exploration, lessons learned from testing in a variety of analog environments, and perspectives on support tools and infrastructure necessary to support scientific surface exploration. Breakout sessions will include community discussions on Apollo lessons

learned as well as necessary tools, support systems, and an architecture for future Artemis science teams. Though this session of the LSSW has not taken place at the time of abstract submission, the LPSC presentation will focus on results from community discussions and summarize the report generated following the virtual meeting.

Acknowledgments: The LSSW OC would like to thank the LPI for organizing each LSSW virtual meeting, SSERVI for their expertise and time in helping to execute the virtual meetings, and the session chairs and early career scientist facilitators for their hard work in planning and executing each meeting as well as generating the summary reports. Finally, the LSSW OC thanks all authors who have contributed abstracts and/or given presentations throughout the LSSW virtual series, and specifically for this contribution, for the LSSW #8.