LEARNING LESSONS FROM APOLLO: APOLLO 17 IN REAL TIME APPLICATIONS TO ANGSA AND ARTEMIS.
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Introduction: Apollo missions to the lunar surface generated a tremendous volume of data, from images, transcripts, maps, 16mm film footage, TV broadcasts, audio recordings, to a wealth of data derived from samples [1]. For nearly 50 years this data existed in disparate, unconnected places, both physically and digitally [2]. The archive of this material represents perhaps the best recorded set of geologic field campaigns and will serve as the example of how to conduct field work on other planetary bodies for decades to come. However, that archive of material exists in disparate locations and formats with varying levels of completeness, making it not easily cross-referenceable. For the past several years a team has been working to unite Apollo mission data together, connecting them by time, when they occurred. This has reconstructed the temporal context of the mission [3].

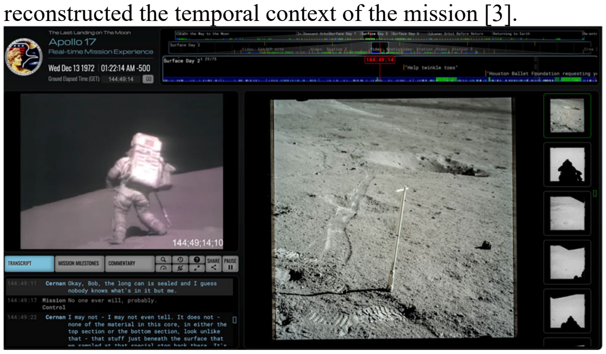

Figure 1: View of the Apollo in Real Time webpage, at the moment Apollo 17 Commander sealed Core Sample 73001. Note that while the core was being sealed the camera was pointed at LMP Schmitt. At top left is a view of the TV/film footage captured during the mission

The reconstruction of the Apollo 17 mission archive, from 2 hours prior to launch through splashdown, has generated an integrated record of the entire mission, resulting in searchable, synchronized image, voice, and video data, with geologic context provided at the time each sample was collected. Through https://apolloinrealtime.org/17/ the documentation of the field investigation conducted by the Apollo 17 crew is presented in chronologic sequence (Figure 1), with additional context provided by high-resolution Lunar Reconnaissance Orbiter Camera (LROC) Narrow Angle Camera (NAC) images and a corresponding digital terrain model (DTM) of the Taurus-Littrow Valley.

Applications to ANGSA: Sample context is critical to interpreting the geologic history and implications of samples. All 410 surface samples collected by the crew were precisely timed using the bag numbers announced by the crew at the time of collection cross referenced with the lunar sample numbers assigned by the Lunar Sample Laboratory Facility. Using these moments in the mission as anchor points, Apollo in Real Time allows researchers to find all academic papers written that reference each sample number from within the context of the mission itself. This enables the context of collection and the ensuing years of research that each sample has led to, to be fully appreciated.

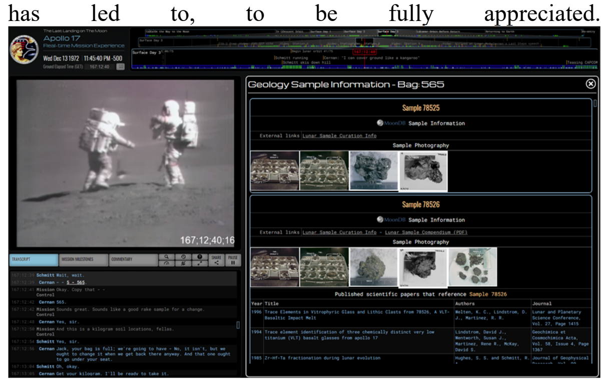

Figure 2: View of sample curation data and research papers placed in context with historical mission elements.

Sample research is placed in line with crew commentary, images, and summary of curatorial images, resources, and publications featuring each specific sample.
For samples 73001/2 the context of collection, including a description of the spillage of material from the bottom of core 73002 (the uppermost of the two core samples), an important context given the ongoing study of the core sample [4].

Artemis Applications: Planning for Artemis surface activities are underway; part of that planning includes the desire to combine mission data (that is surface data and operations data) into a single time-ordered location. We can use Apollo in Real Time as a model for the starting point of how Artemis data could be presented in context to maximize their value to the scientific community.

Artemis Curation: Understanding in detail what actions were taken to collect, store, and return each sample has been a longstanding challenge to astromaterials curators. Informing curation practices with the preservation of an unbroken chain of sample management events, stored and studied temporally, leads to new techniques for advance curation.

References: [1] Shearer, C. K., et al., (2022), *LPI Contributions*,Abst. #2546. [2] Feist, B., et al., (2018) Documentation of Geologic Field Activities in Real-Time in Four Dimensions: Apollo 17 as a Case Study for Terrestrial Analogues and Future Exploration, 2681. [3] Pittman, C. W., et al., (2021), Supporting Real-Time EVA Science via Horizontally Integrated Informatics Structure Across Artemis Activities. [4] Sun, L., et al., (2022) this workshop,