**DOCUMENTING OF GEOLOGIC FIELD ACTIVITIES IN REAL TIME IN FOUR DIMENSIONS: APOLLO TEMPORAL DATA MANAGEMENT AS A CASE STUDY FOR TERRESTRIAL ANALOGUES AND FUTURE EXPLORATION.** B. Feist[1], J. E. Bleacher[2], N. E. Petro[3] and P. B. Niles[4], [1]Jacobs Technology Inc. (bf@benfeist.com), [2]Planetary Geology, Geophysics, and Geochemistry Lab, NASA Goddard Space Flight Center [3]NASA HQ, HEO [4]NASA Johnson Space Center

**Introduction:** A more than nine-year-long undertaking to reconstruct and reconcile the Apollo 11 and Apollo 17 mission data, from launch through splashdown, has resulted in an integrated record of these missions that is searchable, contains synchronized image, voice, and video data, with geologic context provided for the time each sample was collected. Through www.apolloinrealtime.org (formerly Apollo17.org) the documentation of the field investigations conducted by the Apollo 11 and 17 crews 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) [1] of the Taurus-Littrow Valley.

**Establishing a Temporal Thread Across Disparate Datatypes:**

The effort to create this archive required the compilation and correction of all available audio, video, image, sample data, and voice transcripts. Ensuring correct timestamps for all mission assets was key for correctly placing all events into the exact moment in time.

**Apollo Field Activities in Context:**

Temporally corrected mission archives bring each aspect of a mission together. For example, the observations of similar small boulders at Apollo 17 Station 8 with the exception of a larger boulder uphill from the LRV reinforces the uniqueness of the sample and its likely origin from further up slope in the Sculptured Hills (http://apollo17.org?t=166:52:10) [2]. The complete documentation of the collection of these samples (78135, 78238, 78255) are enhanced by context in which they were collected.

**Application to Misson Control Center Operations Analysis, Future Analogues, and Missions:**

The real-time data record of Apollo 11 includes newly digitized mission control audio [3] consisting of 48 channels of operational chatter placed within the real-time context. This puts the limited science objectives of Apollo 11 in context with the significant operations required to enable the mission science objectives. The need to better understand mission control decision making during a lunar EVA has never been greater. This tool enables such investigation.

The Apollo in real time project has produced a number of recommendations for future analogue studies or crewed missions that were recently applied during a field analog test in the Potrillo Volcano field of New Mexico, supported by the SSERVI RIS[4]E team [5].

**References:**

[1] Henriksen, M. R., et al., (2017) *Icarus*, 283, 122-137. [2] Schmitt, H. H., et al., (2017) *Icarus*, 298, 2-33. [3] D. Oard et al., (2013) "Reconstruction of apollo mission control center activity." First Workshop on the Exploration, Navigation and Retrieval of Information in Cultural Heritage (ENRICH), [4] Wright, K. (2017) http://www.aps.org/publications/apsnews/201712/flood.cfm

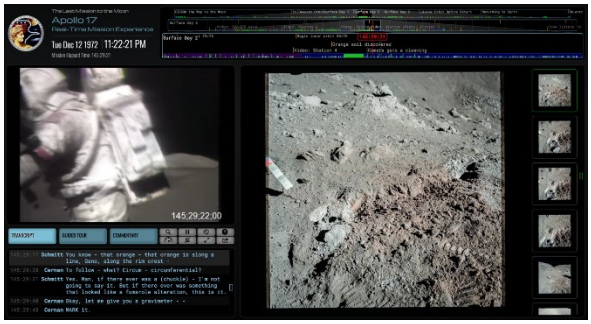


*Figure 1. Capture of apollo17.org interface of the moment of documenting the orange soil at Station 4. At that moment the crew had identified the orange soil and were preparing a revised sampling plan (apollo17.org?t=145:29:17)*