CREW, CAPCOM AND BACK-ROOM SCIENCE TEAMS ON THE GROUND: RIGOROUS EXPLORATION SIMULATIONS -- A VIEW FROM THE BACK ROOM. Patricia W. Dickerson, Jackson School of Geosciences & American Geosciences Institute, University of Texas – Austin, Stop C-1160, Austin, TX 78712. patdickerson@earthlink.net

For Artemis, as for the "J" missions of Apollo, commitment to the fidelity of surface exploration simulations is essential for mission success. At the Rio Grande gorge, NM – a 1:1 analogue for Hadley Rille – crew, Capcom and science back-room teams trained together on the ground – a fundamental precept of W.R. Muehlberger's exploration instruction. Mission videos of A16 and A17, for which WRM was PI, document the effectiveness of co-training in the field:

A-16 – Collection of "Big Muley" breccia sample, Plum Crater, Descartes Highlands https://www.youtube.com/watch?v=Gw4nXn89o2U&feature=youtu.be

A-17 – Discovery of orange soil, Shorty Crater, Taurus Littrow (~15:50 min in video) https://www.youtube.com/watch?v=mGl0EoEo38U

Boots-on-bedrock drills solidify selection of the right tool for the task. For South Pole Aitken Basin, traverses have been prioritized for Olivine Hill, Oppenheimer Basin, and Schrödinger Basin to address specific Science Concepts [1, 2}. Characterization of ancient impact melt in SPAB (SC 1), exhumed by the younger Schrödinger impact, can be advanced by *in situ* analyses (portable Raman spectroscopes) of those melts – compositions and suitability for dating. Ilmenite data from potential mantle material at Olivine Hill could contribute significantly regarding lunar magma evolution (SC 5) and mantle magma sources (SC 3). Gravity profiling would facilitate measurement of thickness and density of regolith – and of pyroclastic deposits, as at Oppenheimer and Schrödinger sites (SC 5).

In preparation for exploring another Solar System neighbor (Mars, 1990's initiative), we added gravity profiling to astronaut field instruction. Well suited for defining bedrock features through the sand that mantles much of Mars, gravimeters are passive (no energy input required), of low mass/volume, and space flight-tested (A17). Beneath thick alluvium in San Luis Basin, NM, teams discovered a buried normal fault with ~2.5 km offset of the basement surface.

Back-room science teams must be adaptable in the face of unexpected discoveries – consider the dialogues with A16 and A17 crews at Plum Crater and at Taurus Littrow. The lunar environment demands innovation.

References: [1] National Research Council (2007) South Pole Aitken, Scientific Concepts

[2] Kring, D. (2020?) Feasibility Assessment of All Science Concepts within South Pole-Aitken Basin: LPI, USRA, 86 p.