TREX PUBLIC ENGAGEMENT: PRODUCTS FROM THE FIRST FIELD SEASON. S. R. Buxner[1], A. R. Hendrix[1], M. D. Lane[2] E. Z. Noe Dobrea[1], N. Pearson[1], M. E. Banks[3], M. E. Borrelli[4], S. P. Wright[1], G. Kramer[1], D. Wettergreen[5], T. H. Prettyman[1], R. N. Clark[1], F. Vilas[1], A. Breitfeld[5], A. Candela[6], C. Thieberger[8], C. Ahrens[3], M. Hansen[5], G. Holsclaw[7], and S. Vijayarangan[5], [1]Planetary Science Institute (1700 E. Fort Lowell Suite 106, Tucson, AZ 85719, buxner@psi.edu), [2]Fibernetics LLC, Lititz, PA, [3]NASA Goddard Space Flight Center, Greenbelt, MD, [4]Arizona State University, Tempe, AZ , [5]Carnegie Mellon University, Pittsburgh, PA, [6]Jet Propulsion Lab, Pasadena, CA, [7]Laboratory for Atmospheric and Space Physics, U. Colorado, Boulder, CO, [8]Northern Arizona University, Flagstaff, AZ .

Introduction: The Toolbox for Research and Exploration (TREX) is a node of NASA's Solar System Exploration Research Virtual Institute (SSERVI). TREX aims to develop tools and research methods for exploration of airless bodies, like the Moon, Martian moons, and asteroids, that are coated in fine-particulate dust in order to prepare for human missions. The TREX team completes its science and exploration goals with four sub-teams aligned with the four Science and Exploration Themes of TREX: 1) TREX Spectral Library – the development of a UV-VNIR-MIR spectral reflectance library of planetary materials measured in labs under planetary conditions, when possible, (plus MIR emissivity and Raman spectra) 2) Lunar Datasets and Models - investigations of fine-particulate materials on the lunar surface applying Theme 1 lab data to investigate particle sizes, composition, and ISRU possibilities using a variety of lunar datasets and modeling, 3) Small Body Science - investigations of fine-particulate materials on the surfaces of small bodies applying Theme 1 lab data to investigate particle sizes, composition, and in-situ resource utilization possibilities using a variety of Phobos, Deimos, and asteroid datasets and modeling, and 4) Analog Environments - decision–making in a fine-particulate analog environment applying the results from Themes 1-3 toward software development and instrument testing for use in the field with a rover.

Field Work: In November 2021, the Theme 4 team tested autonomous rover science in the field by integrating multiple data sets from instruments attached to a rover and some as handheld [1]. Three scenarios were tested at two different sites in Northern Arizona [2]. These scenarios included 1) standard rover exploration where the science team chose waypoints for the rover based on analysis of images and multispectral data, 2) autonomous rover exploration where the rover chose its own path and waypoints based on data provided in advance along with analysis of data acquired at each waypoint, and 3) rover exploration along with a deployed astronaut who could take additional measurements and request additional images and data collection in real time. The three scenarios included a non-field science team (i.e., science back room), an onsite field team for taking field measurements and characterizing each site, and a rover team for issuing commands, updating software and monitoring the rover. The third scenario integrated an "astronaut" in the field with the rover who was a member of the non-field science team seeing the field for the first time during the mission.

The field team was made up of 14 scientists and engineers from the Planetary Science Institute, Carnegie Mellon University, University of Colorado, Northern Arizona University, the Jet Propulsion Lab, and Arizona State University. The "back-room" science team was made up of seven scientists from the Planetary Science Institute, NASA Goddard Space Flight Center, Fibernetics LLC, and Northern Arizona University.

Social Media: In addition to tweeting on the TREX Twitter account (@TREX_SSERVI), the TREX team took over the NASA Expeditions (@NASAExpeditions) Twitter feed from November 29 to December 3, 2021, as part of the follow up public engagement activities. The NASA Expeditions Twitter account recorded 130,000 total impressions and averaged 134 likes per day. On Facebook, the introductory post reached 129,000 people and logged over 1,800 engagements.

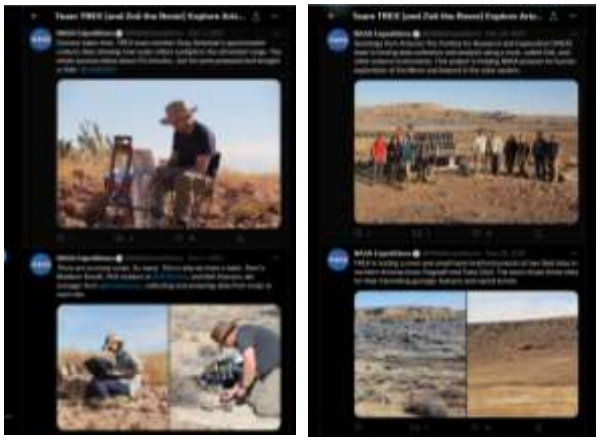

Fig 1. *Tweets about TREX field work appeared in @NASAExpeditions twitter feed.*

Documentary: The TREX team engaged documentary videographer Franklin Fitzgerald (Franklin Photo and Video) to film the field and science

teams. Members of each team were interviewed along with footage of the field work, including drone footage, to be made into a full-length documentary for public engagement and mini-films on each science and field team.

Future Engagement in Northern Arizona: Due to the ongoing COVID pandemic and public health concerns, the TREX field and science teams were not able to do any public engagement activities during the 2021 field season. Rock samples from each site were collected to make instructional rock kits for future planned visits to our focus communities outside of Flagstaff and Tuba City. The intention is to engage youth in the geology of regions near their homes.

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References: [1] Dobrea, E. N. (2022), LPS LIII Abstract # 1674. [2] Clark, R. (2022), LPS LIII Abstract # 2323.

Additional Information: Learn more at trex.psi.edu.