NASA PLANETARY AEOLIAN LABORATORY: CURRENT STATUS AND FUTURE PLANS. D. A. Williams[1], J. K. Smith[1,2], H. V. Cummings[2], D. Banfield[2], [1]School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287-1404 (David.Williams@asu.edu), [2]NASA Ames Research Center, Moffett Field, CA.

Introduction: The NASA Planetary Aeolian Laboratory (PAL) located at NASA Ames Research Center has served the planetary science community for over 45 years, providing a place to conduct controlled experiments in aeolian (wind-related) processes in a variety of planetary conditions. The purpose of this abstract is to provide an update on the current status of the PAL, including recent upgrades since the COVID-19 Pandemic, and report on future plans on its administration and operation in coming years.

Background: The PAL opened in 1977 at NASA Ames Research Center (ARC) under the leadership of late Arizona State University (ASU) professor Ronald Greeley (1939-2011), who established the ASU-Ames partnership that managed the PAL from 1977-2023. The PAL has been in continuous operation since 1977, except for a closure caused by the COVID-19 Pandemic in 2020-2021. The PAL includes one of the nation's largest pressure chambers for conducting low-pressure research. PAL enables scientific research into aeolian processes under controlled laboratory conditions and enables testing and calibration of spacecraft instruments and components for NASA's Solar System missions, including those requiring a large volume of low atmospheric pressure.

The PAL consists of: (1) the Mars Surface Wind Tunnel (MARSWIT) and (2) the Titan Wind Tunnel (TWT) located in the Structural Dynamics Building (N-242) at the NASA ARC in Mountain View, California. The MARSWIT and TWT are supported by shops, instrument facilities, and imaging services at NASA-Ames. PAL facilities at ARC also have a full-time technician, Mr. James "Ken" Smith, to serve planetary users. The pressure chamber and the MARSWIT can be operated using Earth air: 1) under Earth ambient temperatures and pressures (25˚C, 1 bar), 2) under atmospheric conditions matching those found on the surface of Mars (down to 5 millibars and ~0˚C), and 3) atmospheric pressures between the two extremes. The TWT is a remodel of the Venus wind tunnel (operated 1981-1994) and became operational for Titan simulations in June 2012.

The Martian Surface Wind Tunnel (MARSWIT) was put into operation in 1977, and is used to investigate the physics of particle entrainment by the wind under terrestrial and Martian conditions, to conduct flow-field modeling experiments to assess wind erosion and deposition on scales ranging from small rocks to landforms (scaled) such as craters, and to test spacecraft instruments and other components under Martian atmospheric conditions. The MARSWIT is a 13-m long, open-circuit, boundary-layer wind tunnel within a large environmental chamber that operates at atmospheric pressures ranging from 1 bar (Earth) to 5 millibars (Mars), with maximum wind speeds of 10.5 m/sec at 1 bar (generated by a motorized fan) and 100 m/sec at 5 millibars (generated by air injectors within the tunnel). The wind tunnel is an open-circuit design and is situated on the floor of a large pressure chamber, which has an inside height of 30 m and an interior volume of 4,000 cubic meters. For low-pressure testing including operation of the open-circuit wind tunnel, the chamber is sealed and the air evacuated.

The Titan Wind Tunnel is a closed-circuit wind tunnel that can be pressurized to a maximum of 20 bars, a remodel of the Venus Wind Tunnel that operated between 1981-1994. The TWT has an overall dimension of 6-m by 2.3-m. Included in the remodel (supervised by project PI Devon Burr) were upgrades to a newer, higher performance motor, advanced motor controls, and new instrumentation.

Current Status and Recent Upgrades: The PAL was closed during the COVID-19 Pandemic, and upon reopening has been servicing about a half-dozen NASA-supported investigators who had projects funded prior to the Pandemic. Additionally, several upgrades have been made to the PAL, some funded by the NASA ROAMx project. These include three new bulkheads with upgraded power and connector interfaces, a new vacuum control system including a separate LabVIEW console in the control room, and a hand-held remote controller for the MARSWIT fan motor.

Future Plans: The PAL will continue to be managed by Arizona State University through the end of this Federal fiscal year, September 30, 2023. Starting October 1, 2023, the PAL will be solely managed and operated by NASA Ames for the next four years via a new Planetary Science Enabling Facility (PSEF) grant to NASA Ames. Dr. Haley Cummings will take over as Principal Investigator, and Dr. Donald Banfield will take over as Co-Principal Investigator. They can be reached at ARC-CAL-PAL@mail.nasa.gov. They will be the points of contact for letters of support for any proposals to use the PAL that are due after September 30, 2023. It is

anticipated the PAL Engineer Mr. James "Ken" Smith will continue to work in the PAL under the new administration as an ARC employee. We have revised the *PAL Guidebook to Proposers*, which provides more detail on the PAL wind tunnels and their capabilities, and information on how to propose to NASA R&A programs via ROSES to use the PAL. The *PAL Guidebook to Proposers* can be downloaded at this link: https://rgcps.asu.edu/documents/PAL_Proposers_Guidebook_2023_v10.pdf.

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