

THE ATMOSPHERIC CHARACTERIZATION FOR EXPLORATION AND SCIENCE (ACES) INSTRUMENT SUITE FOR MARS.
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The Atmospheric Characterization for Exploration and Science (ACES) instrument suite is designed to address the highest priority, lower atmosphere goals and investigations identified by MEPAG[1] and to address both exploration technology Strategic Knowledge Gaps (SKGs)[2]. The ACES instrument suite measures atmospheric dust properties, fundamental atmospheric parameters, and the energy inputs that drive the atmosphere in ways that far exceed previous landed experiments.

The data to be returned by ACES is the comprehensive and necessary type of information that has been sought after by the atmospheric, aeolian, and Entry, Descent, and Landing (EDL) communities since the Viking Landers provided the first in situ glimpse of Martian meteorology. The intervening experiments since Viking have only marginally increased the knowledge necessary to address Mars Exploration Program and Human Exploration and Operations Mission Directorate (HEOMD) goals; continuing to repeat these meteorological experiments is an exercise in diminishing returns.

In addition to temperature, pressure, and relative humidity, ACES measures for the first time airborne particle concentration and size distribution, 3D wind components, and infrared and visible radiative fluxes. By combining the unique capabilities of ACES to determine turbulent eddy momentum fluxes and dust characteristics, ACES also measures the wind stress that lifts sand and dust.

The ACES instrument sensors may be accommodated on a rover (Figure 1) or on a stationary lander. A boom for wind and temperature and in some cases vis and IR radiation flux minimizes potential thermal, mechanical and radiative contamination by the space-craft.

ACES is strengthened by internationally contributed sensors and electronics from the U.S.A., Finland, Denmark, Canada, and Belgium. The ACES science team is comprised of exceptional scientists and engineers from each of these countries.

Details on the capabilities and response of each instrument, power requirements, accommodation, observation strategy, and data products and volume will be detailed in the talk.

References

[1] MEPAG (2008), Mars Scientific Goals, Objectives, Investigations, and Priorities: 2008, J.R. Johnson, ed. [2] Precursor Strategy Analysis Group (P-SAG) (2012) Report.

キーワード: Mars, Meteorology, Atmosphere, Instrumentation, Mars Mission
Keywords: Mars, Meteorology, Atmosphere, Instrumentation, Mars Mission

PPS04-P05

会場:コンベンションホール

時間:5月27日 18:15-19:30

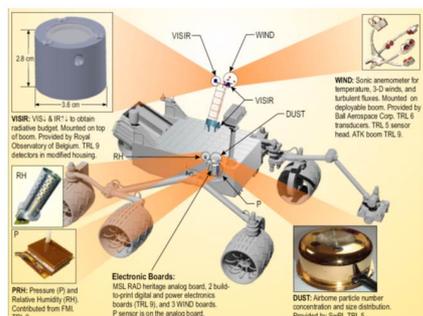


Figure 1. ACES Instrument sensors, electronics and notional accommodation on the 2020 Rover.