



Submillimeter Solar Observation Lunar Volatiles Experiment (SSOLVE)

PI: Timothy A. Livengood/University of Maryland

Platform: Lander; adaptable to Orbiter

Science:

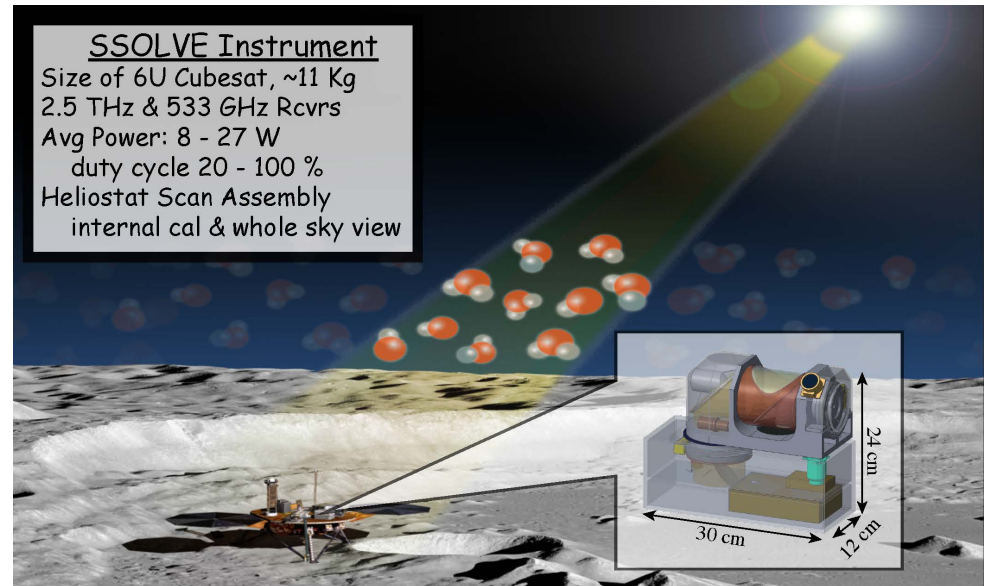
- Establish whether Moon's atmosphere is truly a surface-bounded exosphere.
- Discriminate between models of indigenous or exogenous water.
- Observe water in process of horizontal transport
- Identify chemical state - H₂O or OH
- Evaluate total volatile water budget

Objectives:

- Raise TRL of 2.5 THz receiver from 4 - 6
- Validate optical design and instrument package
- Demonstrate performance of receiver over 10-70°C temperature range
- Test & Select THz radome and absorber material
- Advance Heliostat Scan Assembly (HSA) TRL to 6
- Optimize duty cycle for power, thermal management, and measurement uncertainty
- Conduct vibration & thermal vacuum tests
- Raise SSOLVE TRL to 6 by demonstrating measurements in relevant environment
- Develop Flight Mission and Implementation Plan to infuse SSOLVE technology

CoIs: Goddard Space Flight Center: C. M. Anderson, D. C. Bradley, B. T. Bulcha, G. Chin, T. L. Jamison-Hooks, P. E. Racette; University of Maryland: T. Hewagama

Partners: Virginia Diodes, Inc. & Newton Engineering



SSOLVE quantifies the principal components of water in Moon's exosphere by measuring submm solar absorption of H₂O, OH, and HDO

Key Milestones:

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| • Authority to proceed | 1/2019 |
| • Requirements Review | 5/2019 |
| • Preliminary Design Review | 11/2019 |
| • THz Rcvr Prototype test (TRL 5) | 4/2020 |
| • HSA verification/function (TRL 5) | 7/2020 |
| • Antenna/Optics test (TRL 5) | 5/2020 |
| • Critical Design Review | 7/2020 |
| • Instrument Ambient test (TRL 5) | 8/2021 |
| • SSOLVE Instrument at TRL 6 | 10/2021 |
| • SSOLVE Flight Mission Plan | 12/2021 |

TRL 4 to 6