Planetary Exploration
Science Technology Office

Opportunities for SmallSats in Planetary Science

S. A. Rinehart (NASA HQ)

And the PESTO Team

What is PESTO?

Planetary Exploration
Science Technology Office

Planetary Exploration Science Technology Office
Headquarters Office, Managed at GRC

Carolyn Mercer – Propulsion, Power, Autonomy
Stephen Rinehart – Instruments, Science
Pat Beauchamp – Planetary Protection, Science
Rainee Simons – Instruments, Communication Tech
Ryan Stephan – Heat Shields, Ice Mechanisms, Lunar
Quang-Viet Nguyen – Precision Landing, Electronics, Computing

PICASSO
Stephen Rinehart

MatISSE
Rainee Simons

NPLP
Ryan Stephan

COLDTech - Inst
Stephen Rinehart

DALI
Rainee Simons

LSITP
Ryan Stephan

Instruments

HOTTech
Viet Nguyen

COLDTech
Ryan Stephan

Astrodynamics
Ryan Stephan

SESAME
Ryan Stephan

Spacecraft and Ground Tech

PESTO supports the Planetary Science Division in developing technologies needed to advance Division objectives.

Technology Development

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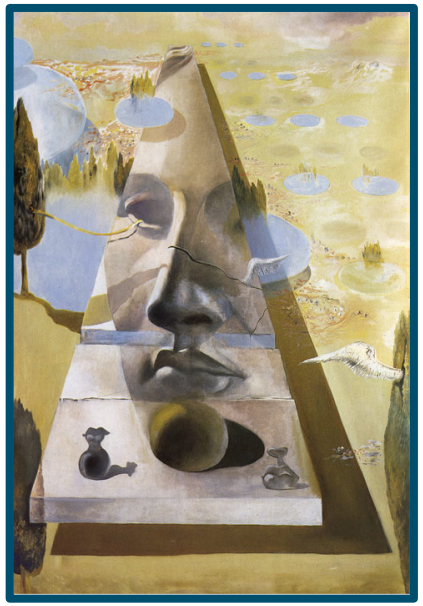
PICASSO
Annual
Low-TRL
~$300K/year

MatISSE
Biennial
Mid-TRL
~$1M/year

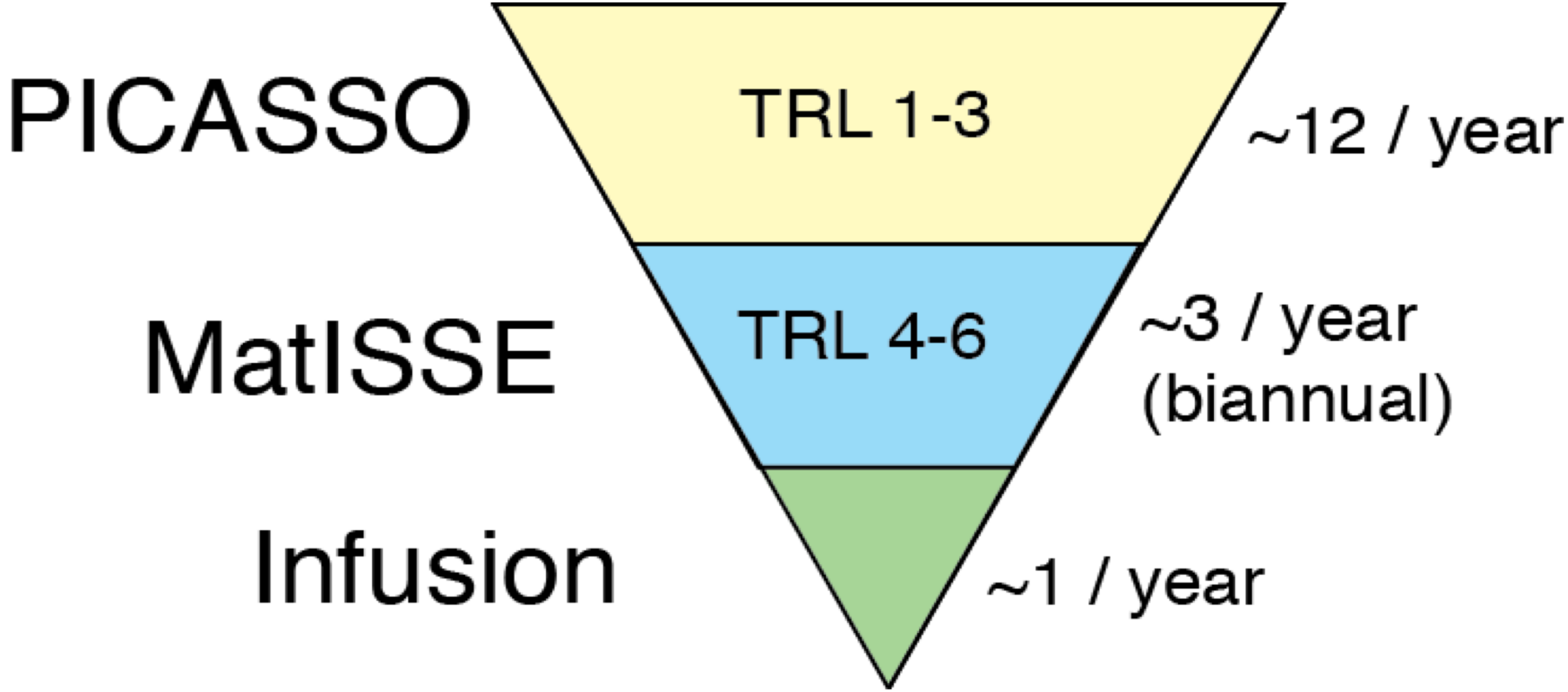


DALI
Annual
Mid-TRL
~$1M/year (Lunar)

Other Calls:

- Coldtech (outer planets)
  - Both instrument and spacecraft tech
- HotTech (Venus)
  - Spacecraft Tech
- NPLP (Lunar)
- LSITP (Lunar)
- SESAME (Europa)

Technology Development



SIMPLEX (The Call)

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Small Innovative Missions for Planetary Exploration (SIMPLEx)

Solicitation Requirements

- Must address planetary science
- CubeSat up to 180 kg
- $15M - $55M USD cost cap
- Must propose to ride as a secondary for a specific launch opportunity

Solicitation Structure

- Continuously open call, with deadlines for specific launch opportunities
  - Last “deadline” was July 24, 2018
- Up to 50% of the total mission cost may be from non-U.S. contributions

SIMPLEx (The Selections)

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- 12 Proposals Received
- Selections announced on 19 June, 2019
  - Janus (D. Scheeres, U. Colorado)
  - EscaPADE (R. Lillis, UC Berkeley)
  - Lunar Trailblazer (B. Ehlmann, CalTech)

Launch with Psyche

Launch with Commercial Lunar

- The three programs will have a 1-year Phase A/B study culminating in PDR and downselect.

Janus

Reconnaissance Missions to Binary Asteroids:

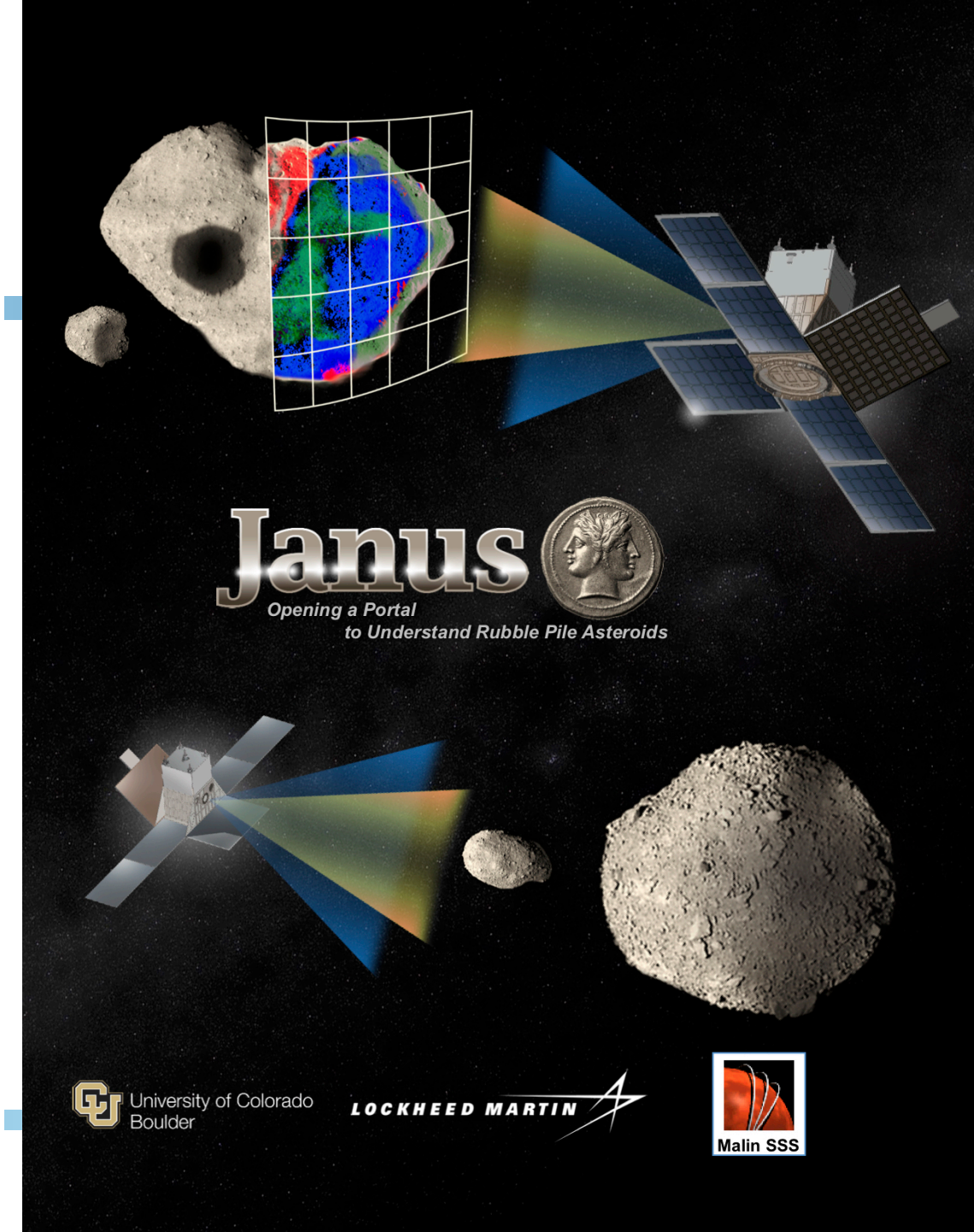
- 1991 VH (excited S-Type on 3/3/2026)
- 1996 FG3 (relaxed C-Type on 4/20/2026)

Obtain fundamental data on size, shape, structure, and regolith properties during flyby

Study the formation and evolutionary implications for small “rubble pile” asteroids and build an accurate model of the two binary asteroid bodies.

Key Team Members:

Daniel Scheeres, PI, University of Colorado
J. McMahon, D-PI, University of Colorado
Edward Beau Bierhaus, PS, Lockheed Martin,Thomas McCaa, PM, Lockheed Martin

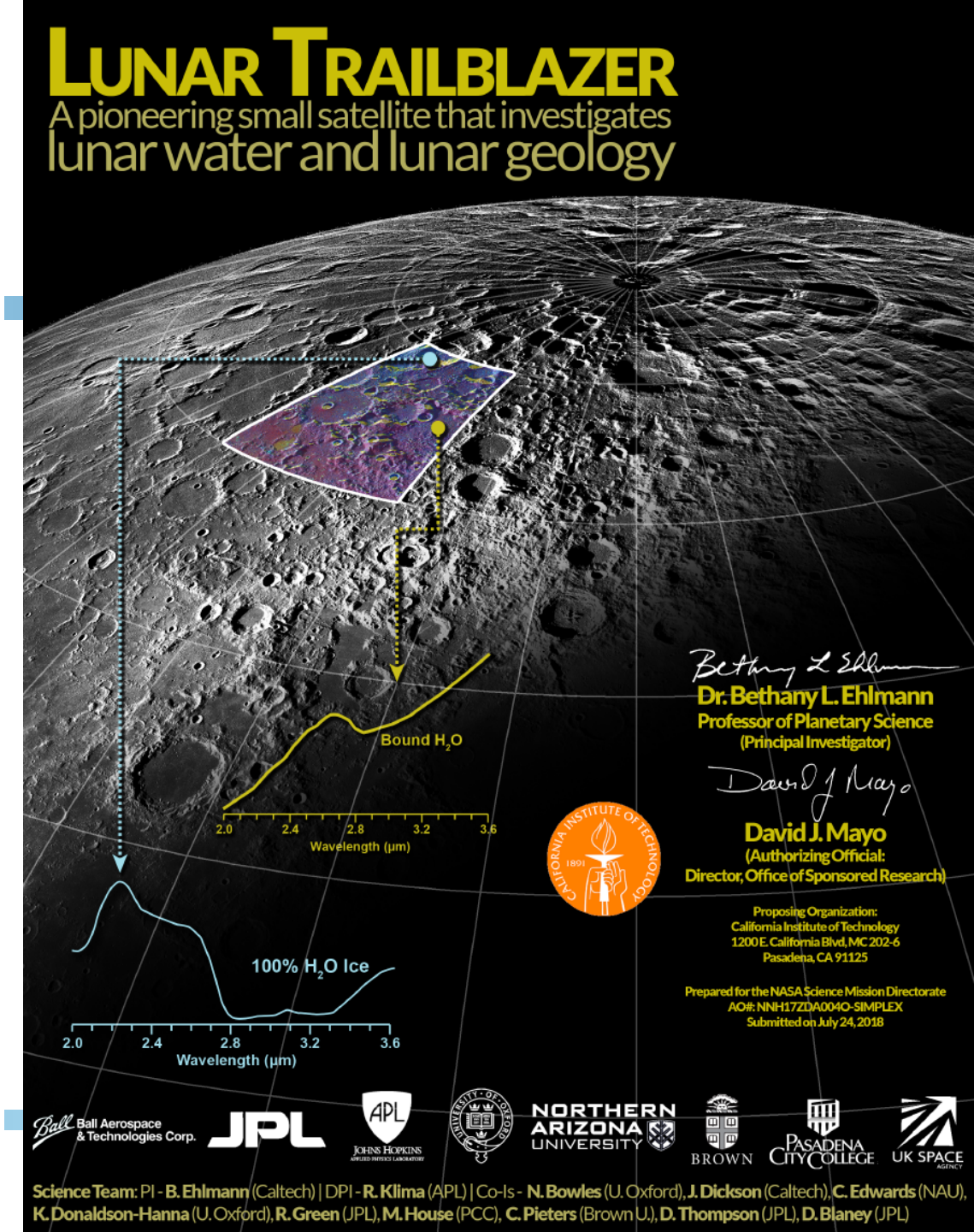


Lunar Trailblazer

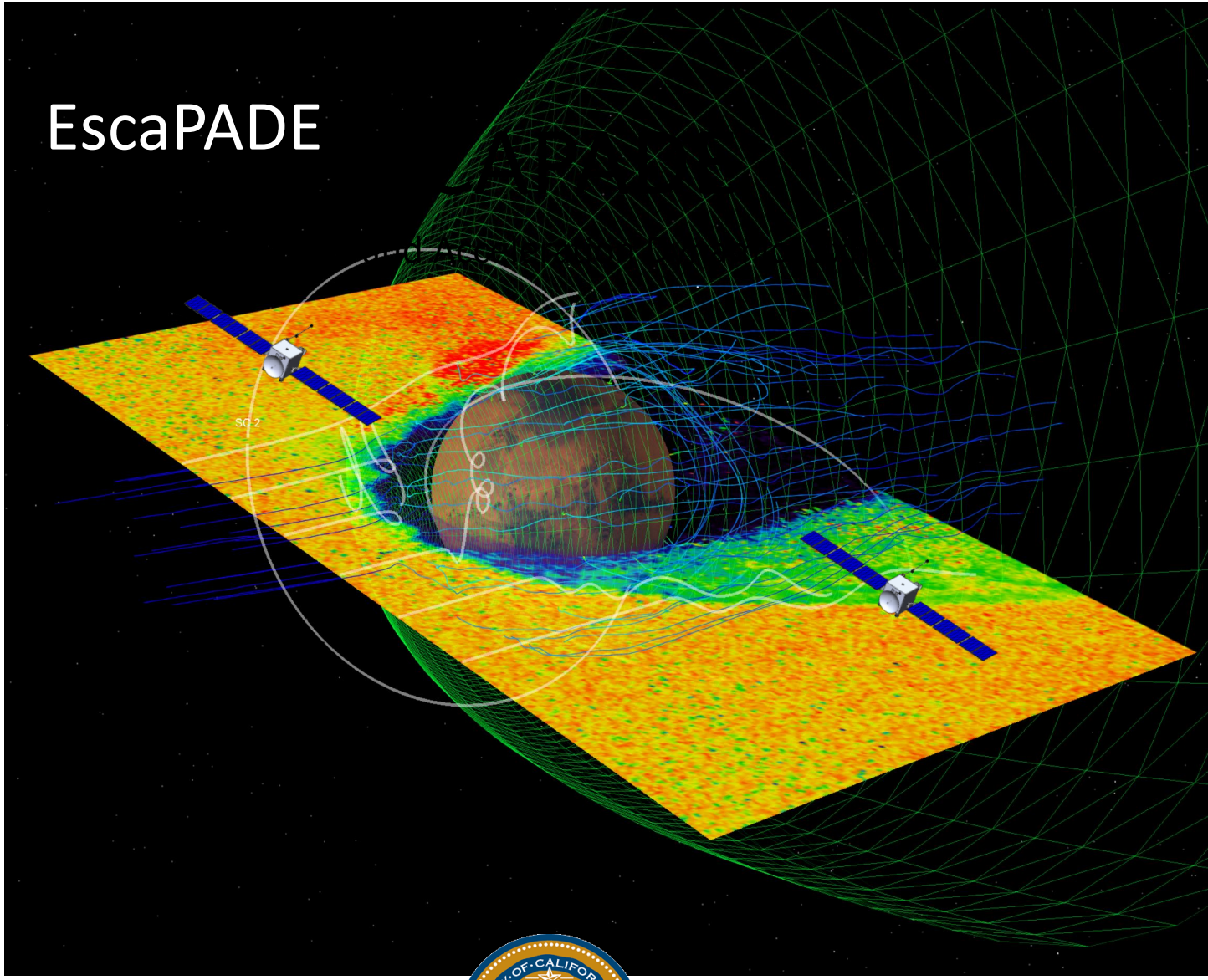
Lunar Trailblazer will directly detect and map water on the lunar surface to determine how its form, abundance, and location relate to geology.

Key Team Members:

Bethany Ehlmann, PI, Caltech
Rachel Klima, DPI, APL
Calina Seybold, PM, JPL



EscaPADE:
Escape, Plasma, and Acceleration Dynamics Explorers



This mission's objective is to characterize (on multiple scales) the acceleration processes driving escape from Mars' atmosphere, as well as how the atmosphere responds to the constant outflow of the solar wind flowing off the Sun.

Key Team Members:

Robert Lillis, PI, University of California, Berkeley
Janet Luhmann, DPI, UC, Berkeley
Shannon Curry, PS, UC, Berkeley
David Curtis, PM, UC, Berkeley

SIMPLEX (ONGOING)

- Very excited about making 3 selections!
- More proposals….
  - SIMPLEx is an open call - Proposals may be submitted at any time
  - The next “Gathering” will be no earlier than October 2019
- This is a new way of doing things!
  - Incorporate lessons-learned as we go