


**LUNAR TRAILBLAZER: A PIONEERING SMALLSAT FOR LUNAR WATER AND LUNAR GEOLOGY: UPDATE ON MISSION STATUS.** B.L. Ehlmann<sup>1</sup>, R.L. Klima<sup>3</sup>, C. L. Bennett<sup>4</sup>, D. Blaney<sup>2</sup>, N. Bowles<sup>5</sup>, S. Calcutt<sup>5</sup>, J. Dickson<sup>1</sup>, K. Donaldson Hanna<sup>6</sup>, C.S. Edwards<sup>7</sup>, R. Green<sup>2</sup>, M.A. House<sup>8</sup>, A. Klesh<sup>2</sup>, T.C. McCaa<sup>9</sup>, J. Miura<sup>1</sup>, C. Pieters<sup>10</sup>, C. Seybold<sup>2</sup>, D. Thompson<sup>2</sup>, W. Williamson<sup>2</sup>. <sup>1</sup>Div. Geological & Planetary Sciences, Caltech, Pasadena, CA, <sup>2</sup>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, <sup>3</sup>JHU Applied Physics Lab, Laurel, MD, <sup>4</sup>IPAC, Caltech, Pasadena, CA <sup>5</sup>Univ. of Oxford, United Kingdom, <sup>6</sup>Univ. of Central Florida, Orlando, FL <sup>7</sup>Northern Arizona Univ., Flagstaff, AZ <sup>8</sup>Pasadena City College, Pasadena, CA, <sup>9</sup>Lockheed Martin Space, Littleton, CO, <sup>10</sup>Brown Univ., Providence, RI

Lunar Trailblazer is a NASA SIM-PLEx small satellite orbiter mission for understanding the Moon’s water and water cycle, managed by PSD and funded by ESSIO [1]. Confirmed in November 2020, Lunar Trailblazer passed its System Integration Review in May 2022, and the Lunar Trailblazer spacecraft will be delivered for launch in 2023 as an ESPA Grande rideshare. NASA has moved forward Lunar Trailblazer’s baseline plan-to-launch date to 2023.

Lunar Trailblazer simultaneously measures composition, temperature, and thermophysical properties at high spatial and spectral resolution with Table 1. Current best estimate Lunar Trailblazer ob-

serving parameters from 100±30 km orbit

Figure 1. Illustrations of the Lunar Trailblazer spacecraft and its launch configuration.



HVM³	
Spatial Sampl.	50-90 m/pixel
Swath Width	30-55 km
Spectral Range	0.6 – 3.6 µm
Spectral Sampl.	10 nm
SNR	>100 at reference
Uniformity	>90% cross track
# Data Cubes*	≥1000
LTM	
Spatial Sampl.	40-70 m/pixel
Spatial Width	14-27 km
Thermal	4 broad bands, 6-100 µm, for 110-400K (±2 K)
Composition	11 channels, 7-10 µm w/ <0.5 µm resolution
# Data Cubes*	≥1000

cases, Lunar Trailblazer simultaneously (4) measures surface temperature to quantify local gradients and search for small cold traps. While achieving its objectives, Trailblazer will also provide the best-available spatial and spectral resolution data for mapping of lunar rock type, mineralogy, and thermophysical properties. The sub-100-m/pixel data will be the state-of-the art for determining the surface distribution, composition, and abundance of water ice and any impurities

Over Trailblazer’s ≥1-year primary science mission, each instrument will acquire ≥1000 targeted >100 km² images of at the Moon, selected by the science team to meet the 4 objectives above. In October 2021, we held a workshop soliciting community targets and welcome new targets (to sign-up: [t.co/H4OBIzcbuY](https://t.co/H4OBIzcbuY)).

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Figure 2. Schematic Lunar Trailblazer data cube and data types

