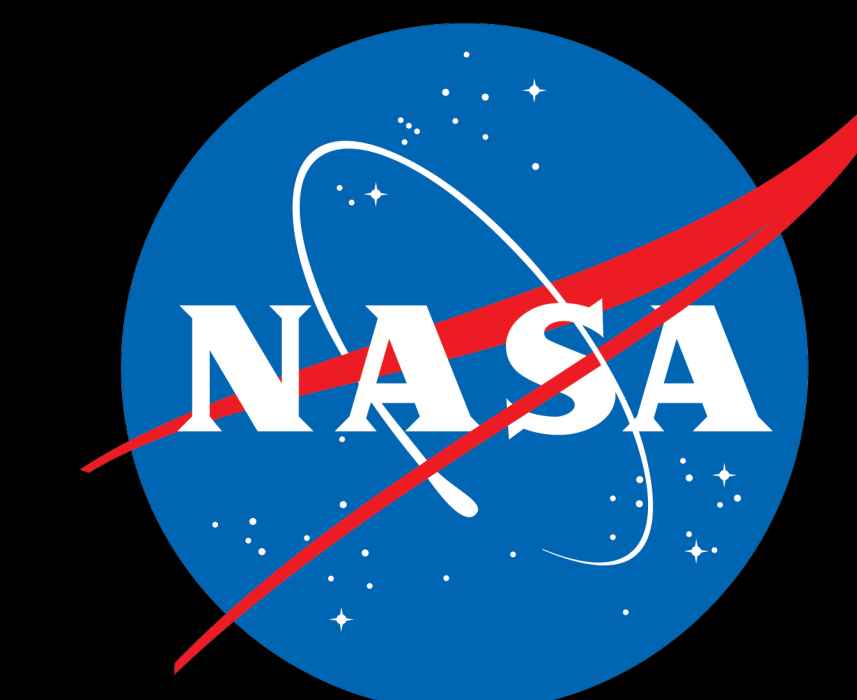


Microwave Structure Construction Capability for the Moon

National Aeronautics and
Space Administration



Michael Effinger

Paving & Brick Making Approaches

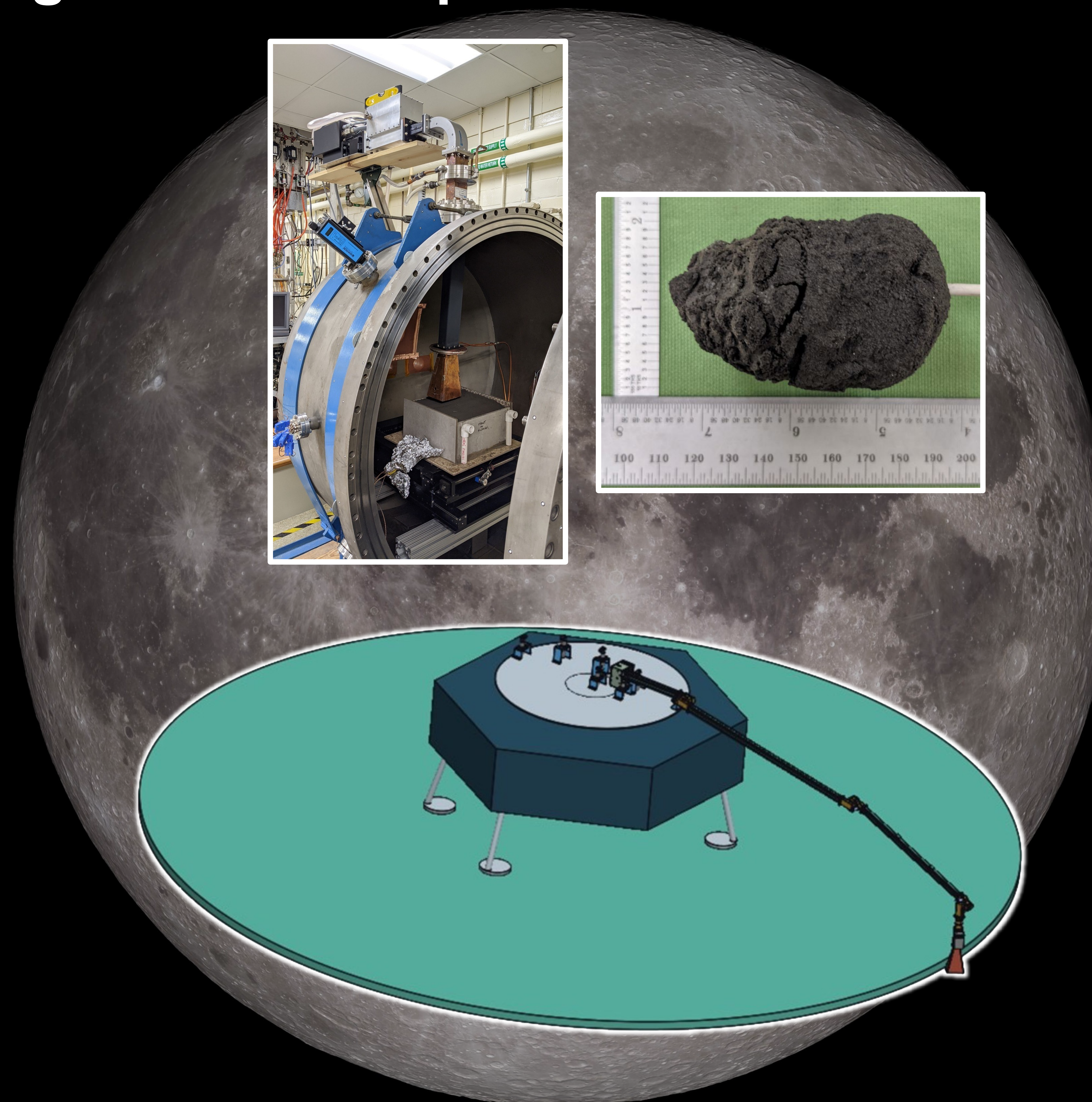
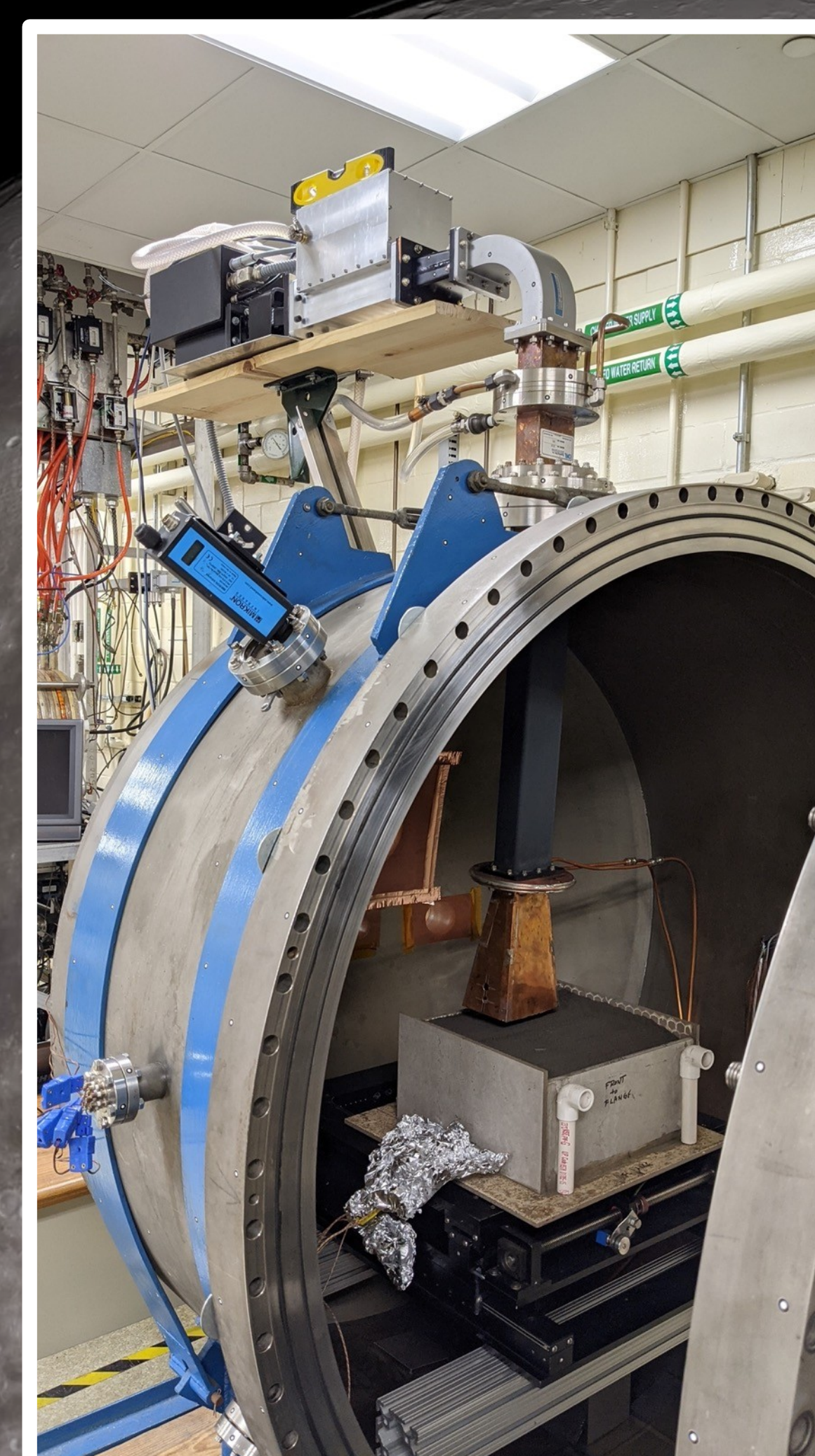
ConOps

- Characterize Regolith
- Site Preparation
- Regolith Preparation
- Microwave Sintering & Process Monitoring
- Product Verification

Testing

DTA, TGA in vacuum and inert, particle size, particle shape, surface area, microscopy, mass spectrometry with respect to temperature in vacuum and inert, chemical analysis, computed tomography, mechanical properties, etc.

Development Overview



Hardware Evaluation

- Magnetron & Solid-state Microwave Energy Sources
- Horns, Leaky Wave Guide, Array, Near Field, etc. Applicators

Microwave Sintering

- Small Scale at NASA Jet Propulsion Lab
- Large Scale at Alfred University & NASA Marshall Space Flight Center (MSFC)
- Full Scale at NASA MSFC

Simulants

- High-temperature Bakeout
- Highlands Composition with Glass

References

- [1] R.G. Clinton, et al. ASCEND 2021.
- [2] M.R. Effinger, et. al. Lunar Surface Innovation Consortium Fall Meeting, November 4, 2021.
- [3] Doug Rickman, Holly Shulman, Matthew Creedon, & Mike Effinger. 53rd Lunar and Planetary Science Conference, March 7–11, 2022.