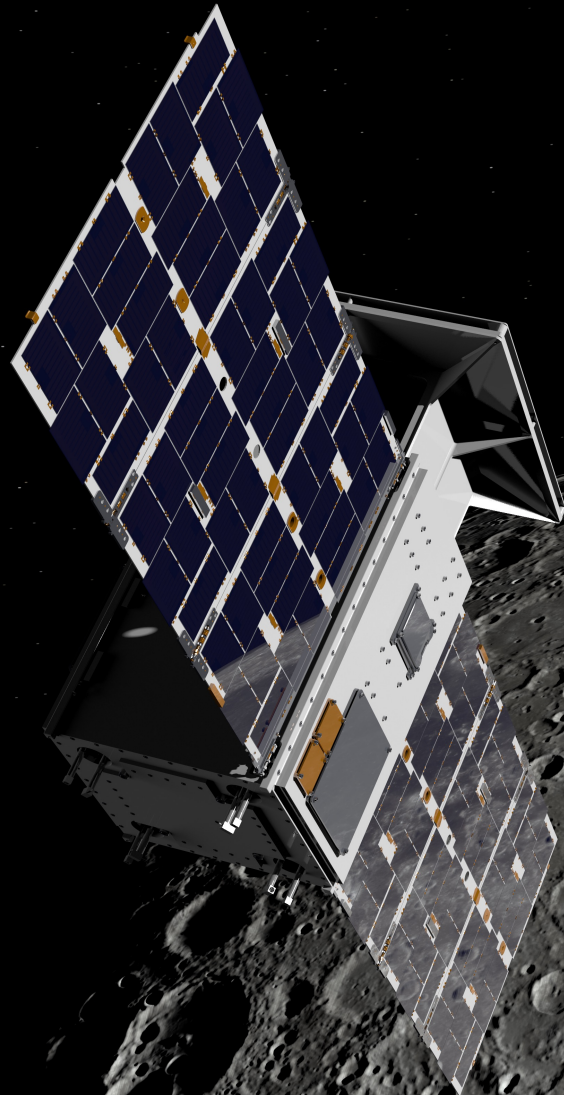


National Aeronautics and  
Space Administration

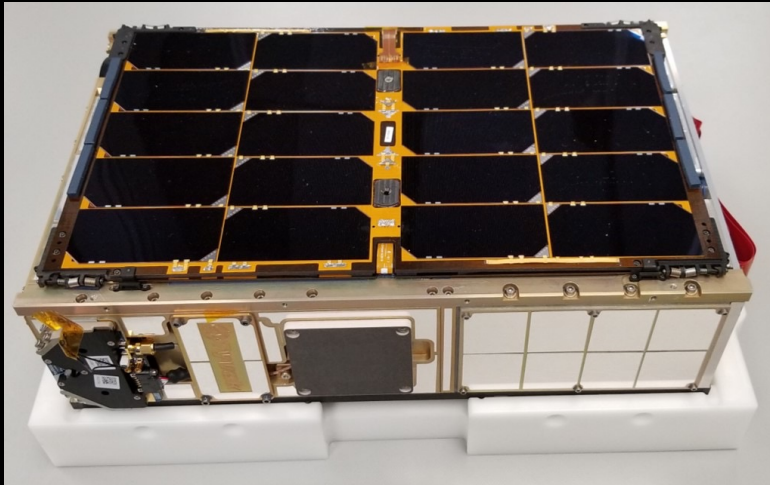


# SMALL SPACECRAFT TECHNOLOGY PROGRAM

ROGER HUNTER  
PROGRAM MANAGER



# Recently Completed and On-going U-Class Technology Demonstration Missions



**Pathfinder Technology Demonstrator -1**  
Launched January 24, 2021

Demonstrated the Hydros-C propulsion system with a water-based propellant developed through a public-private partnership with Tethers Unlimited, Inc. (TUI)

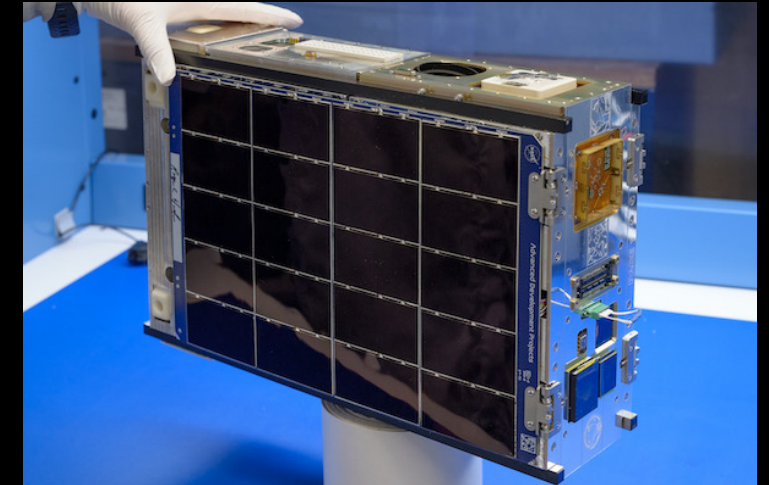
*Status: TUI Hydros-C demonstration is complete. Results to be announced. Tyvak bus is in extended operations.*



**V-R3x**  
Launched January 24, 2021

Demonstrated low-power, low-cost spacecraft ranging, topology recovery, and coordinated measurement technology demonstration utilizing three 1U spacecraft for future spacecraft swarm systems

*Status: Mission is complete. Results to be announced.*

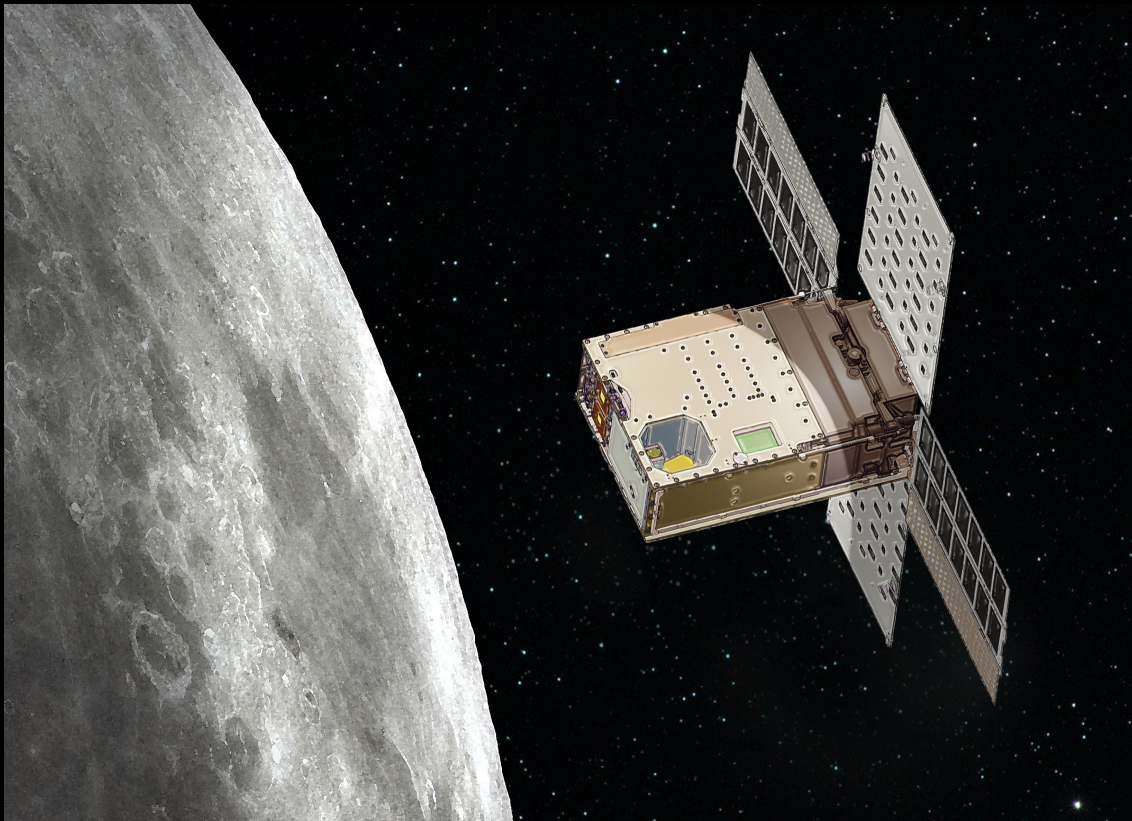


**PACE-1**  
Launched June 30, 2021

Demonstrate avionics system platform (ADP) technologies; demonstrate a switching capability that allows multiple GPS and radio communications systems to “take turns” receiving signals

*Status: On-going. Results to be announced.*

# Upcoming U-Class Exploration Precursor Missions



**Lunar Flashlight**  
**Manifested on Artemis-1**

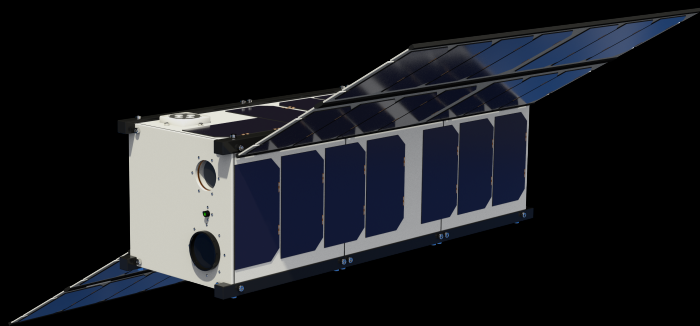
Characterize lunar *in-situ* resource utilization potential. Measure quantity and distribution of surface ice deposits in lunar South Pole cold traps with a compact laser spectrometer.



**CAPSTONE**  
**Launch Timeframe: Late 2021**

Demonstrate how to enter and function in a near rectilinear halo orbit around the Moon and demonstrate spacecraft-to-spacecraft navigation.

# Upcoming U-Class Technology Demonstration Missions – 2021 & 2022



**CubeSat Laser Intersatellite Crosslink  
(CLICK-A)  
Launch: Late 2021**

**CubeSat Proximity Operations  
Demonstration (CPOD)  
Launch: Late 2021**

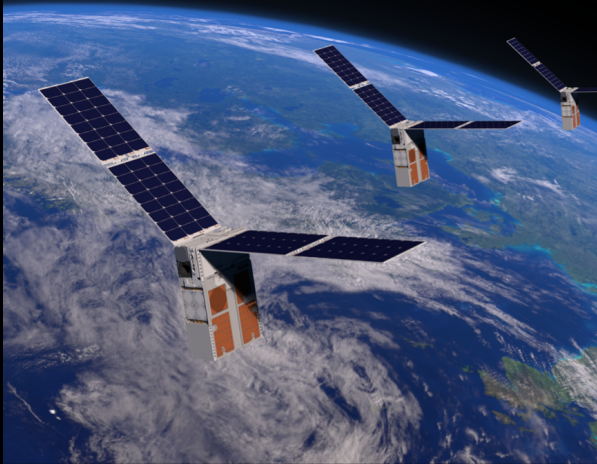
**PACE-2  
Launch: Early 2022**

Risk reduction mission that will test elements of the optical communications system via communication between a single 3U spacecraft and a portable ground station telescope

Demonstrate rendezvous, proximity operations and docking using two 3U CubeSats

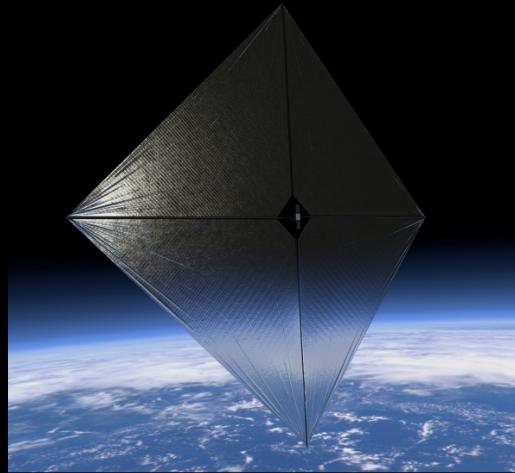
Demonstrate upgrades to the PACE avionics system as well as a camera and image processing payload

# Upcoming U-Class Technology Demonstration Missions – 2022



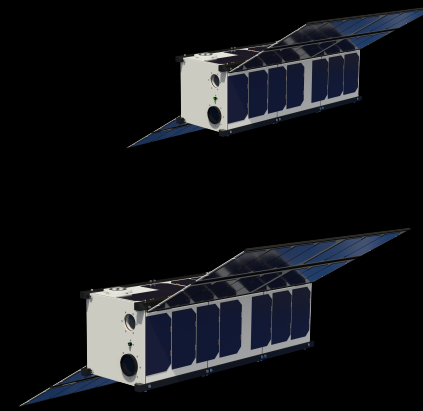
**Starling Distributed Spacecraft Mission**  
Launch: Mid-2022

Demonstrate swarm maneuver planning and execution, communications networking, relative navigation, and autonomous coordination between four 6U CubeSats.



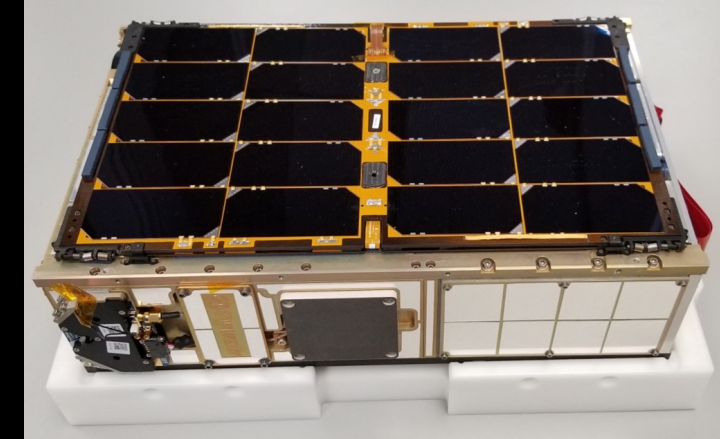
**Advanced Composite Solar Sail System (ACS3)**  
Launch: Second half of 2022

Demonstrate deployment of the composite boom solar sail in low-Earth orbit. The unfurled solar sail will measure approximately 81 m<sup>2</sup>



**CubeSat Laser Infrared Crosslink (CLICK B/C)**  
Launch: Late-2022

Demonstrate optical crosslink and precision ranging between two 3U CubeSats at a data rate of 20 Mbps and range up to 580 km.



**Pathfinder Technology Demonstrator PTD-2, PTD-3, and PTD-4**  
Launch: 2022

PTD-2: Demonstrate the Hyper-XACT attitude control system (BCT).

PTD-3: Demonstrate TBIRD, technologies for high-bandwidth laser communications (MIT/Lincoln Lab & NASA SCaN funding).

PTD-4: Demonstrate LISA-T, a high-power, low-volume deployable solar array with an integrated antenna (NASA MSFC).