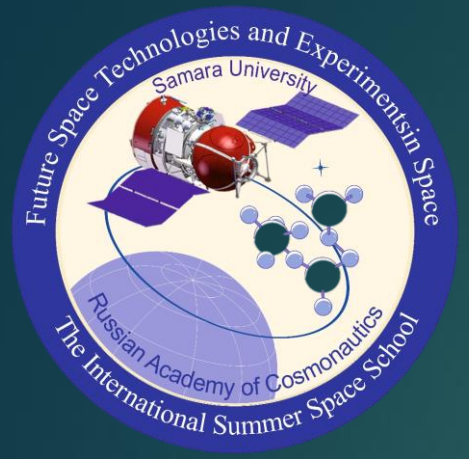
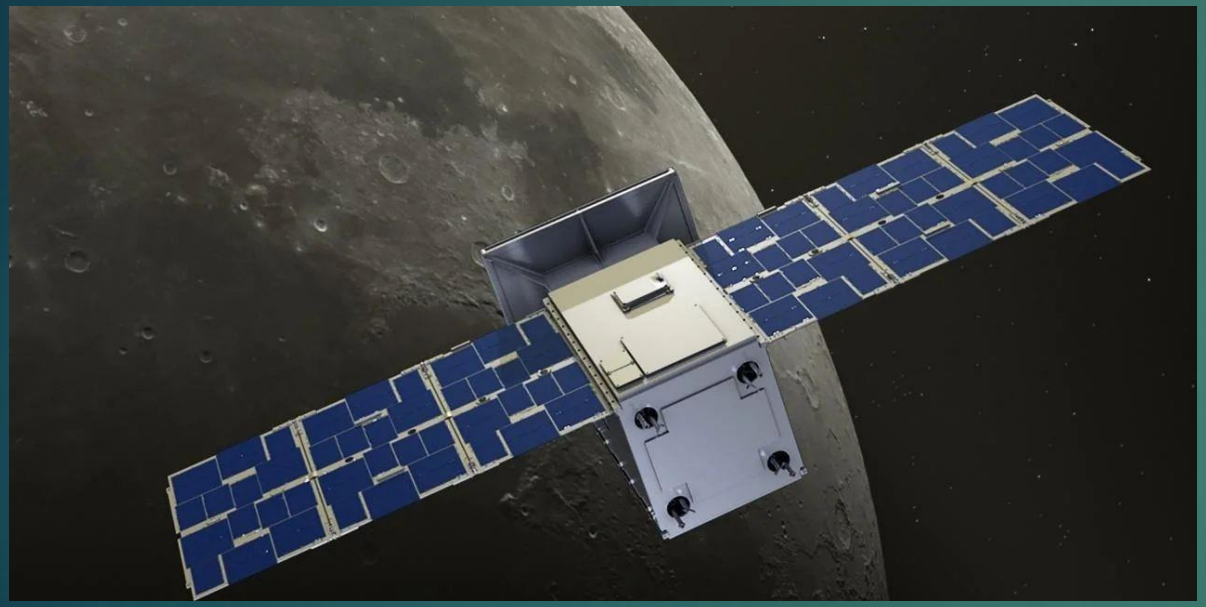
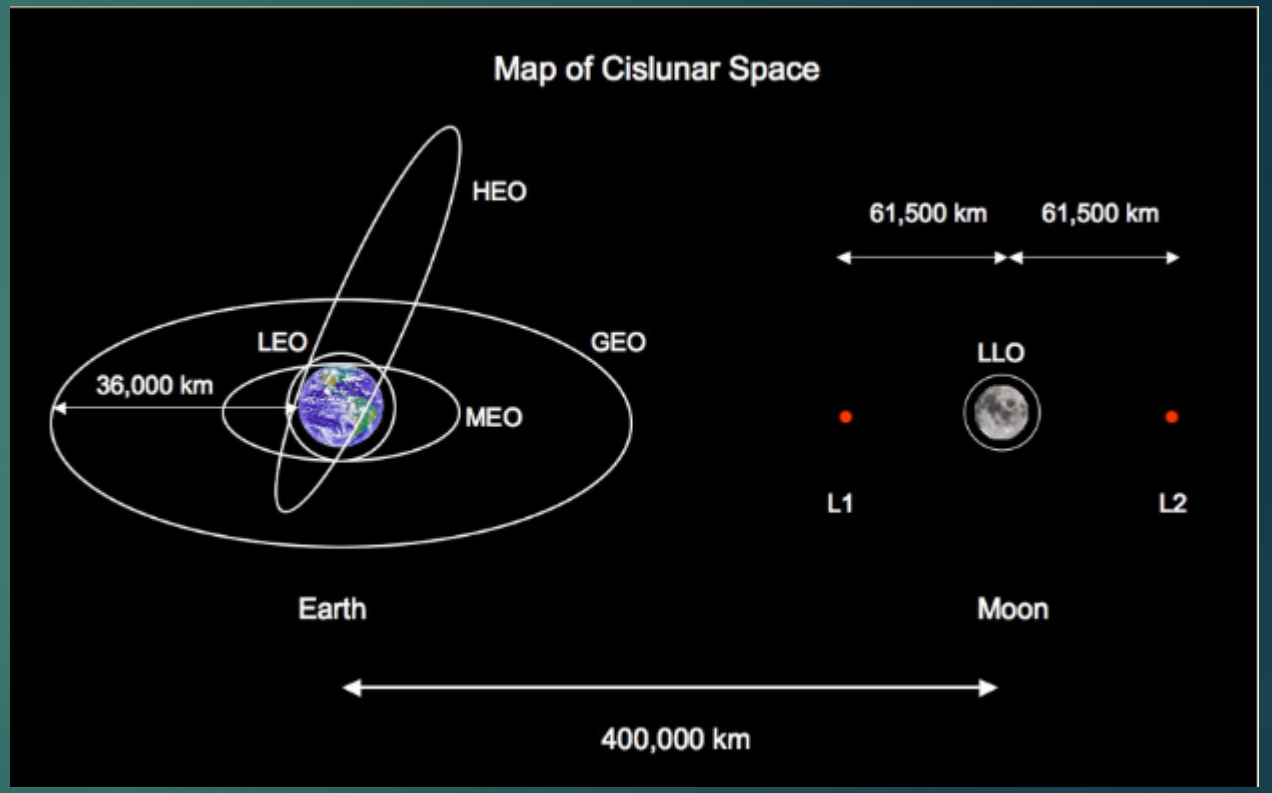


SAMARA UNIVERSITY

Projects

Nanosatellite for exploration of the cislunar space





Potential mission goals:

🛰️ **1. Space Environment Characterization**

- **Radiation monitoring:** Measure the radiation environment in the cislunar region (important for astronaut safety and long-duration missions).
- **Plasma studies:** Investigate solar wind and its interaction with the Moon's surface and magnetic anomalies.
- **Magnetic field mapping:** Study local magnetic fields in lunar orbit.

📡 **2. Technology Demonstration & Communications**

- **Navigation testing:** Demonstrate autonomous navigation in cislunar space using celestial or GNSS techniques.
- **Deep space communications:** Test miniaturized high-gain antennas or laser communication systems for lunar distances.

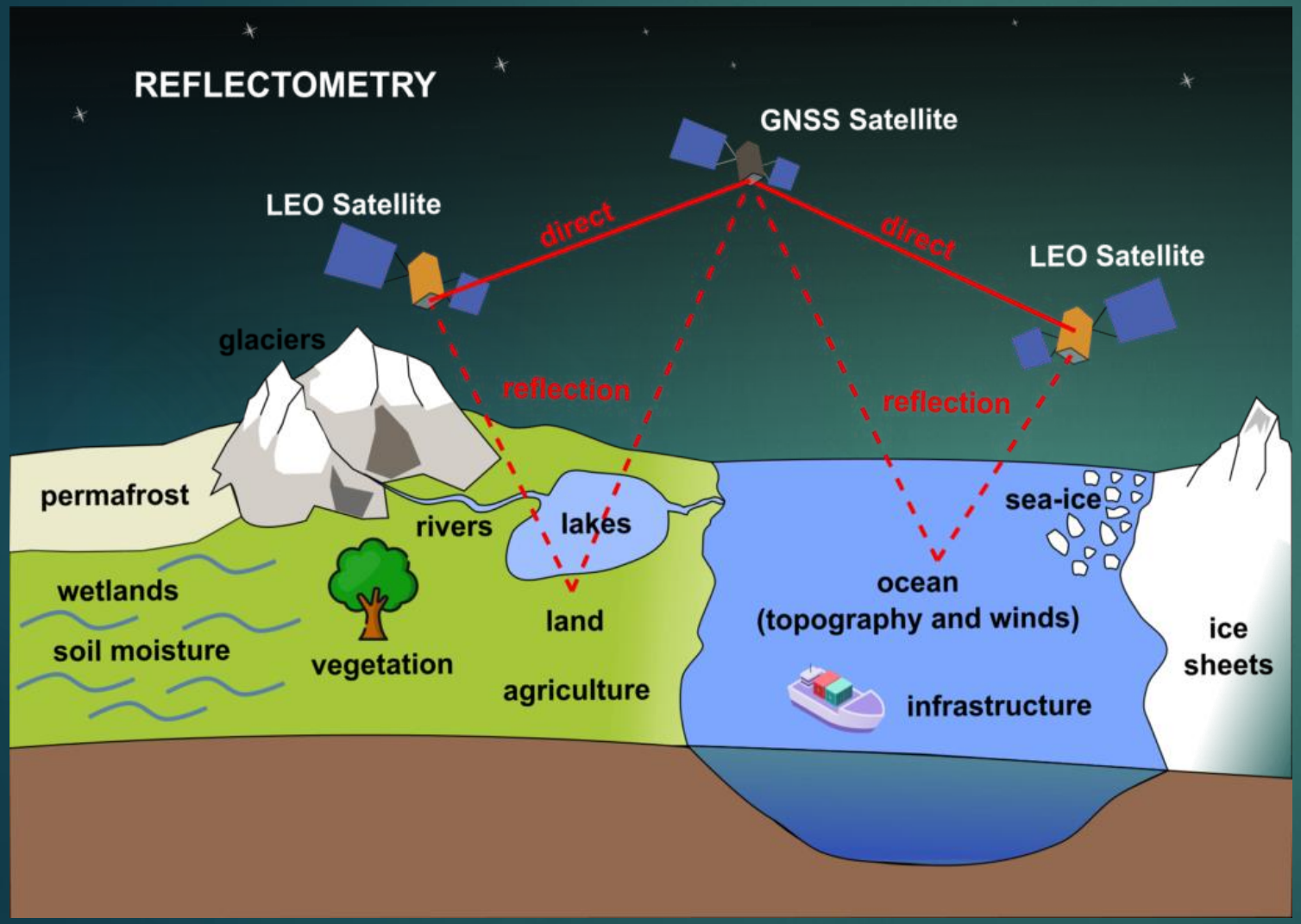
🌍 **3. Earth-Moon System Science**

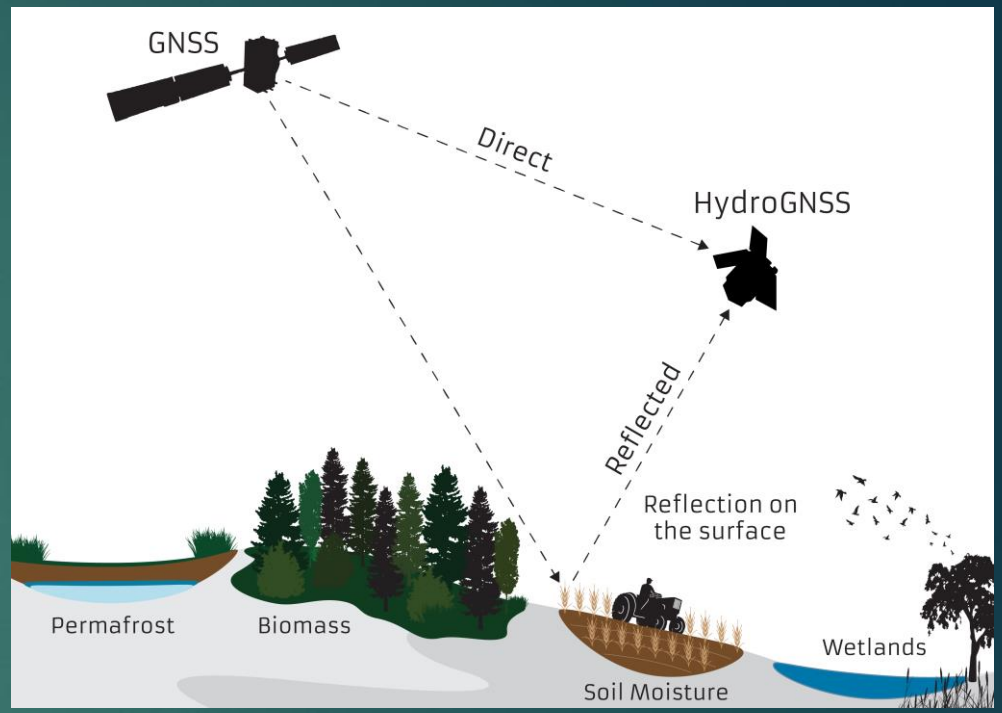
- **Gravitational mapping:** Contribute to refining models of the Moon's gravity field using Doppler tracking.
- **Tidal effects monitoring:** Study how Earth and Moon interact gravitationally over time.
- **Earth observation from afar:** Collect global-scale data (e.g., cloud cover, climate patterns) from a unique vantage point.

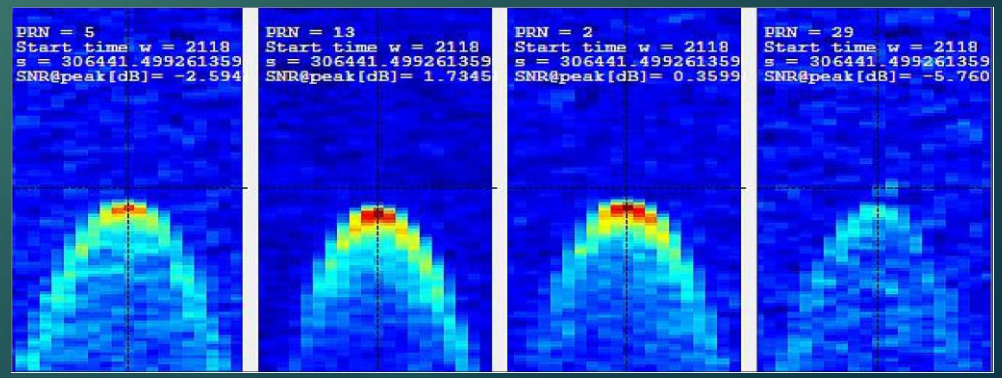
🔭 **4. Astronomy & Observations**

- **Radio astronomy:** Conduct low-frequency radio observations shielded from Earth's radio noise (especially from the lunar far side).
- **UV or X-ray observations:** Use CubeSats to observe transient astrophysical events with fast response times.

Nanosatellite for Arctic and Antarctic exploration







Delay Doppler Maps collected by DoT-1 satellite

Mission features:

- GNSS antenna array
- Altitude control for precise pointing
- Deployable solar panels
- Hight speed communication
- Orbit selection
- Constellation for real time monitoring

HydroGNSS Satellite

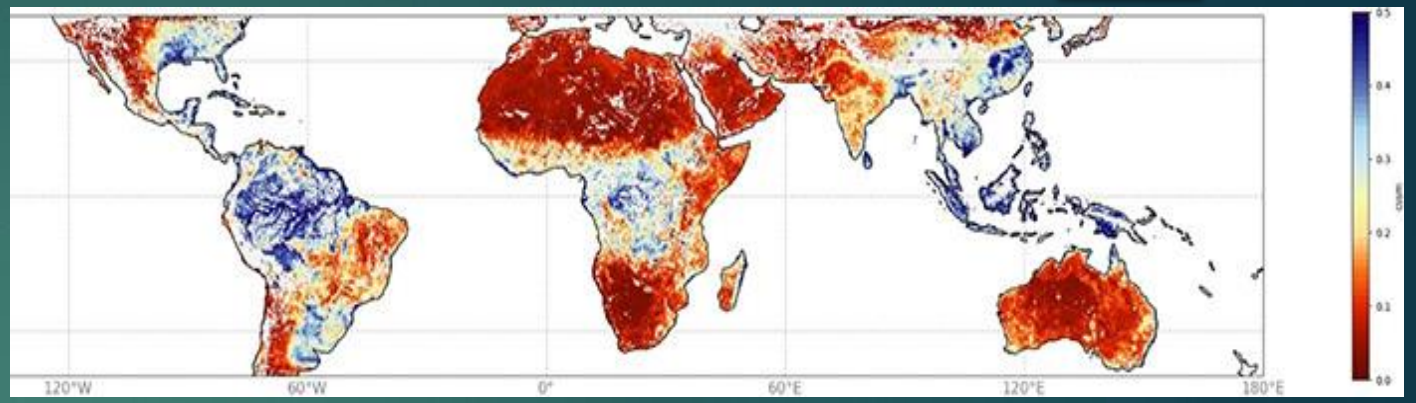
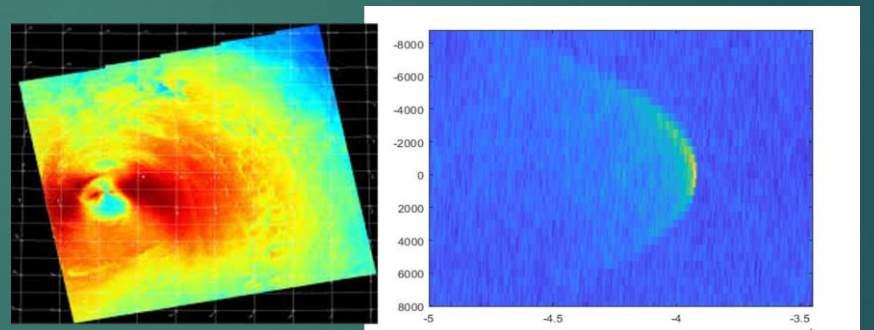
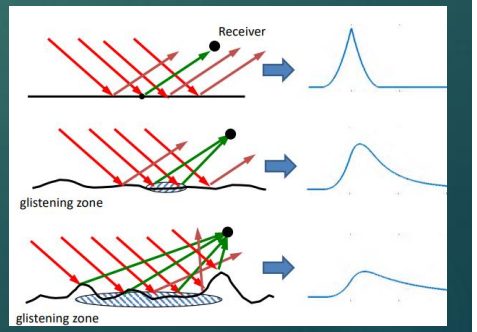
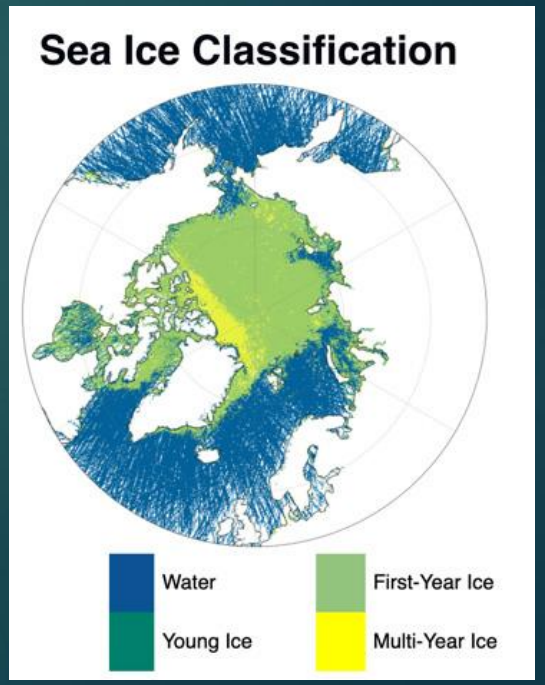


Illustration of accumulated Soil Moisture

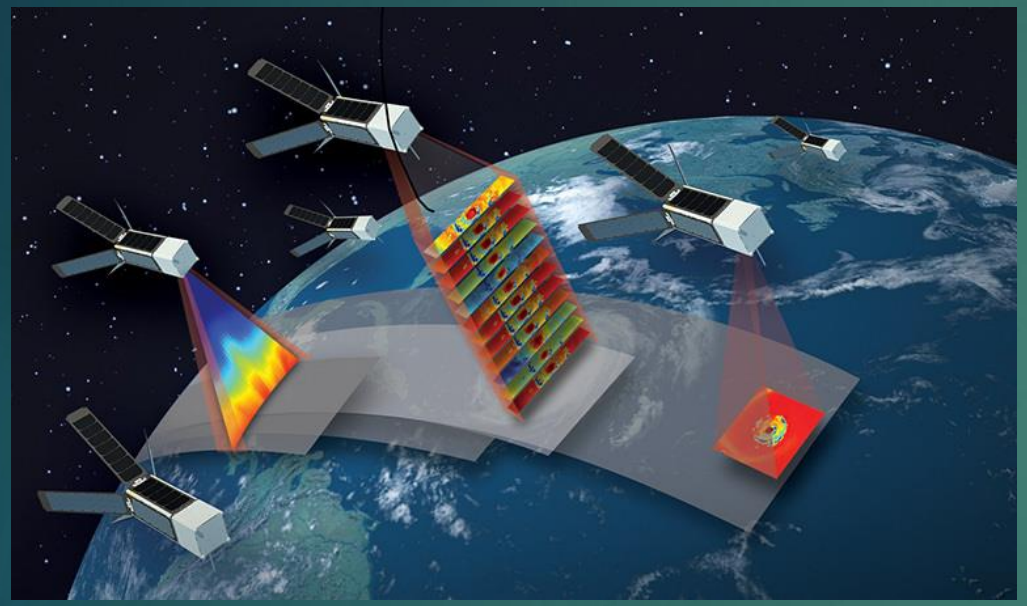


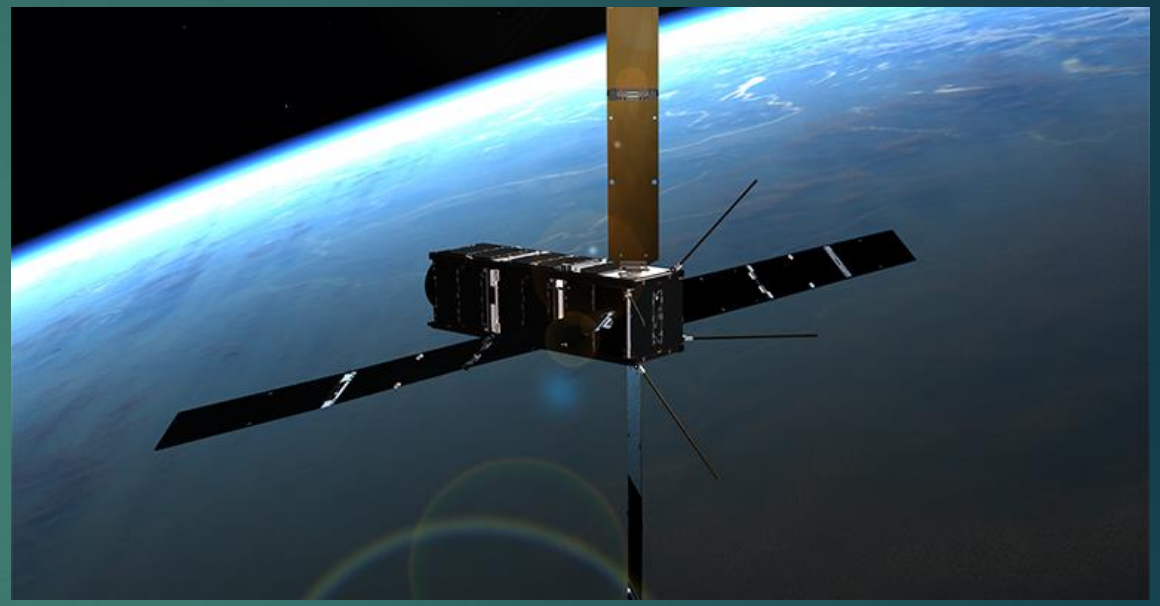
Sea waves and wind speed measuring, Cyclone detection





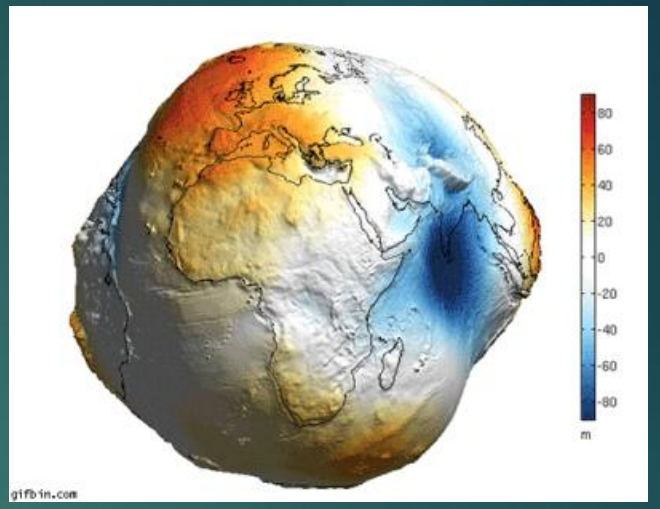
Nanosatellite for very low Earth orbit (VLEO) exploration





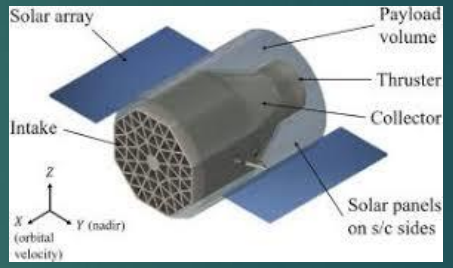
🛰️ 1. High-Resolution Earth Observation

Achieve sharper imagery with smaller optics due to the lower altitude.
Applications:
- Urban development and infrastructure monitoring
- Precision agriculture
- Environmental monitoring (e.g., deforestation, ice melt)
- Disaster response (floods, wildfires, earthquakes)



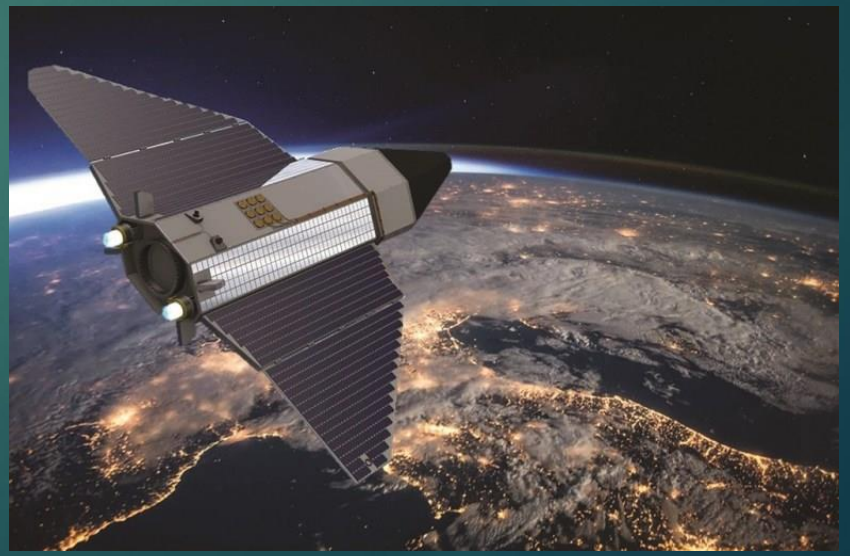
🌫️ 2. Atmospheric Science & Aeronomy

Study the upper atmosphere and ionosphere in greater detail.
- Thermospheric density variations
- Atomic oxygen concentration (important for spacecraft material erosion)
- Drag modeling and atmospheric drag coefficients



🛰️ 4. VLEO Technology Demonstrations

Tech demos might include:
- Drag-compensation propulsion (e.g., ion thrusters, Hall-effect thrusters)
- Aerodynamically stable satellite shapes



🌍 7. GNSS and Geodesy

Conduct precise orbit determination or Earth gravity field studies at low altitudes.
- Calibration of geodetic models
- Validation of atmospheric drag models

🔄 8. Reentry Observation / Controlled Reentry Tests

Study the physics of atmospheric reentry and test thermal protection systems (TPS).
- Deploy small probes or capsules for reentry
- Study ablation, fragmentation, and heat flux