

Luxembourg's Ice Cap Earth Observation by Reflectometry (LICEOR)



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Introduction

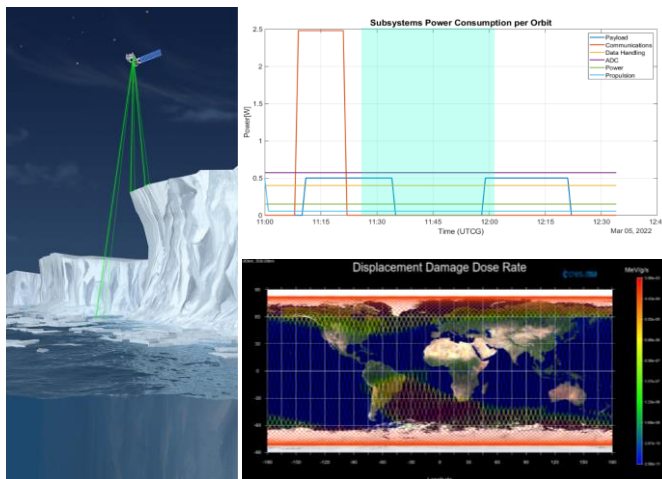
GNSS-Reflectometry is a satellite remote sensing technique, which uses surface-reflected GNSS signals to infer information about the Earth's surface. LICEOR is a three-year mission that applies Delay Doppler Maps (DDM) to map the Arctic and Antarctic ice surface, with the goal of detecting and monitoring ice Poles.

Mission Requirements

- Mapping of ice surface north of 70 degree and south of -70 degrees latitude.
- Continuous mapping with a mission duration of three years.
- One full map is created each month.
- Data latency is less than four weeks.

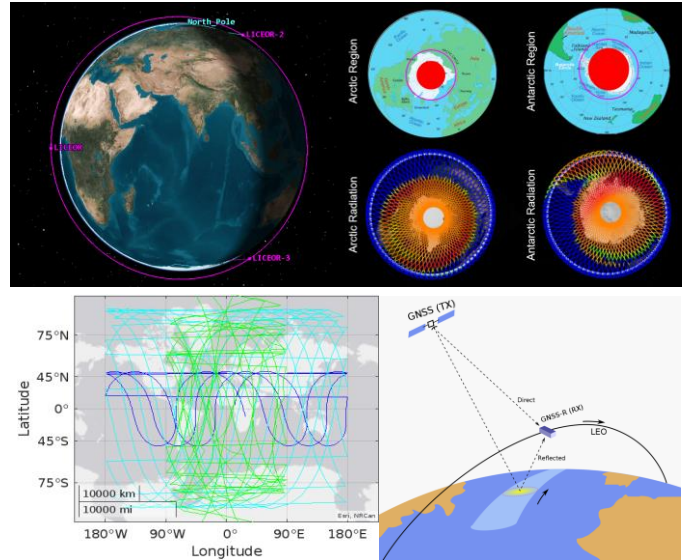
Mission Design

LICEOR is a formation of three 2U Cubesat at a circular Low Earth Orbit (LEO) with an altitude of ~500 km. The mission and spacecraft was designed by students of the Interdisciplinary Space Master, class 2023. LICEOR will operate continuously for three years, in which it will fully map the polar ice caps every month and the data will be downloaded at Luxembourg and Kiruna ground stations.



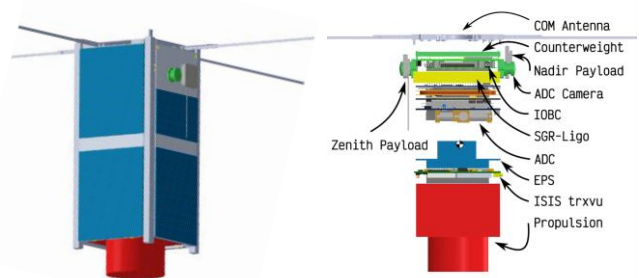
Acknowledgments

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Cubesat Design

LICEOR is composed of seven subsystems: mechanical system, astrodynamics and command control, payload and data handling, thermal and radiation analysis, communication, power, and attitude control.



This mission is designed with ground stations located in Luxembourg and Kiruna. The communication between satellites and Earth are made through VHF and UHF bands.

The CubeSat supporting structure material is Aluminum-6061, having Stainless steel 304 spacers, screws, nuts and counterweight.

At Low Earth Orbit the highest points of radiation are at the poles where LICEOR mission take place, and during its trajectory through the South Atlantic Anomaly (SAA). Therefore, 1.4 mm Al shielding is used to protect the spacecraft from radiation occurring at 500 km.