



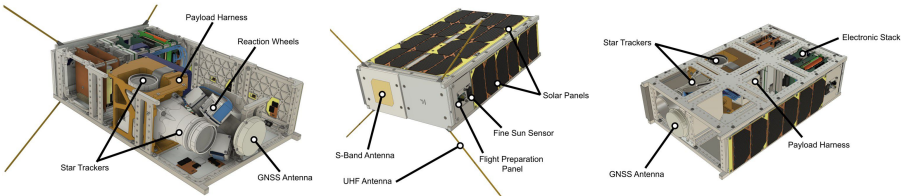
uPGRADE - Miniaturized Prototype for Gravity field Assessment using Distributed Earth-orbiting assets

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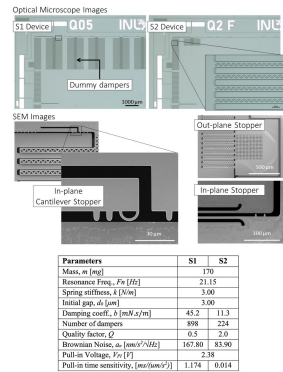
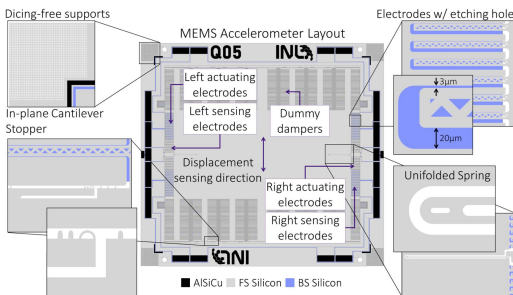
Introduction and Platform

Space gravimetry provides large-scale unbiased estimates of mass transport processes at the global scale. The **uPGRADE CubeSat** aims at contributing to the monitoring of the movement of water in the Earth's near surface, by sensing the minute changes in our planet's gravity from its 500km orbit.

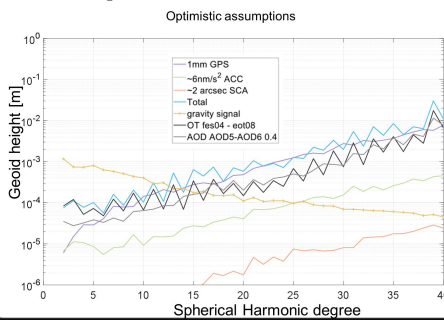


Space-Earth Interactions

High sensitivity MEMS accelerometers



Gravity retrieval simulations



Component	Mass [grams]	Subsystem	Mass [grams]
Magnetometer + Magneto torquer	196		
Gyroscope	42		
Reaction Wheels	240	ADCS	648
Reaction Wheel Mounting Structure	135		
Fine Sun Sensors	35		
OBC	150	Avionics	550
Cabling	300		
Flight Preparation Hardware	100		
S-Band Transmitter	180		
UHF Transceiver	95	Communications	549
S-band Antenna	64		
UHF Antenna	210		
GNSS Antenna	70		
GNSS Receiver	31		
Accelerometer	170		
Star Tracker Cameras	580	Payload	2401
Star Tracker Processing Board	125		
Payload Structure	425		
High Resolution Camera	1000		
Solar Panels	792	Power	1162
EPS	100		
Battery	270		
Chassis (main structure)	1026	Structure	1241
Electronics Stack	215		
Ballast (CoG calibration)	2886	Ballast	2886

Motivation

uPGRADE is the first geodetic CubeSat to demonstrate the capabilities of small satellites to contribute to the monitoring of the on-going climatic changes. The lower mass and cost will make it possible to have numerous observations platform assist dedicated gravimetric missions, such as Gravity Recovery and Climate Experiment Follow-On (GRACE-FO). This capability will allow for the first time to observe the gravity changes associated with rapid mass transport processes, such as weather systems.

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