

Investigation on the Suitability of Optical Inter-Satellite Communication for VLEO Satellite Operations

The Collaborative Research Centre 1667 “Advancing Technologies of Very Low-Altitude Satellites (ATLAS)” at the University of Stuttgart, funded by the German Research Foundation DFG, addresses the fundamental scientific and engineering challenges of rendering Very Low Earth Orbit (VLEO, about 200 km to 450 km altitude) accessible and extending satellite lifetime by an order of magnitude. These orbits are particularly beneficial for indispensable satellite services of our modern knowledge, information and communication society. Additionally, access to VLEO offers the opportunity to operate satellites without exposure or contribution to the increasing contamination of traditional orbits with space debris. As part of this research project, the fundamentals of VLEO satellite operations are being investigated by also using the expertise gained during the satellite operations of the University of Stuttgart’s LEO satellite missions, *Flying Laptop* and *EIVE*.

The aim of this bachelor thesis is to investigate the suitability of optical inter-satellite communication methods for VLEO satellite operations. Due to the lower orbital altitude in this regime the pass durations over ground stations are relatively short, hindering the downlink of data and the commanding of the satellite. With optical data transmission via e.g. geostationary satellites the reduced pass times might be offset by their higher data rates - often in the Gbit/s range. To understand the operational implications, boundary conditions and potential mission scenarios for this communication approach need to be analyzed and evaluated. The investigation should consider the technical and operational feasibility of establishing and maintaining optical inter-satellite links considering the higher drag environment and the more difficult attitude and orbit control.

Your tasks

- Research on optical communication methods and mission scenarios
- Analysis of potential mission scenarios
- Analysis of boundary conditions
- Simulation of satellite visibility and transferred data volume
- Operational evaluation of optical inter-satellite communication
- Documentation

Contact:

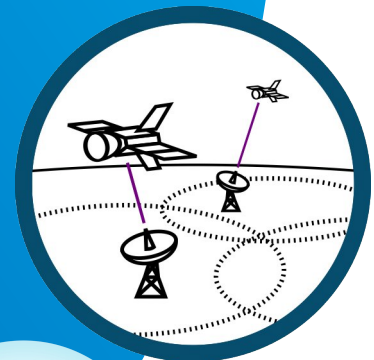
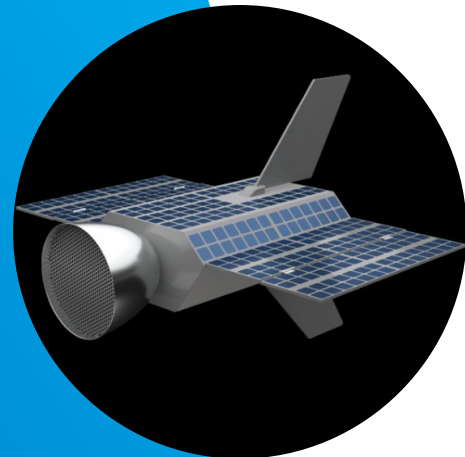
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