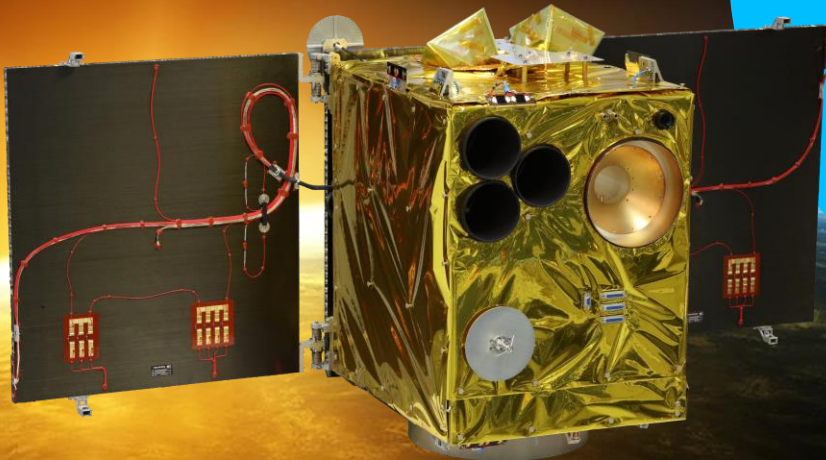University of Stuttgart
Institute of Space Systems

Stuttgart University small satellite mission capacities built up along with its Flying Laptop project.

14th Nov. 2018

**Prof. Dr.-Ing. Sabine Klinkner**

Flying Laptop

Mission goals:

- Technology demonstration
- Earth observation
- Installation of infrastructure
- Education

Key characteristics:

Mass	110 kg
Dimensions	60 x 70 x 87 cm³
Power	max. 270 W
Orbit	600 km sun-synchronous, LTAN 11:30
Lifetime	> 2 years, Launch 14th of July 2017

Industrial design approach:

- Usual Design and Analysis tools
- Communication using professional approach
- Qualifications procedures based on ECSS
- System verification according to industrial approach
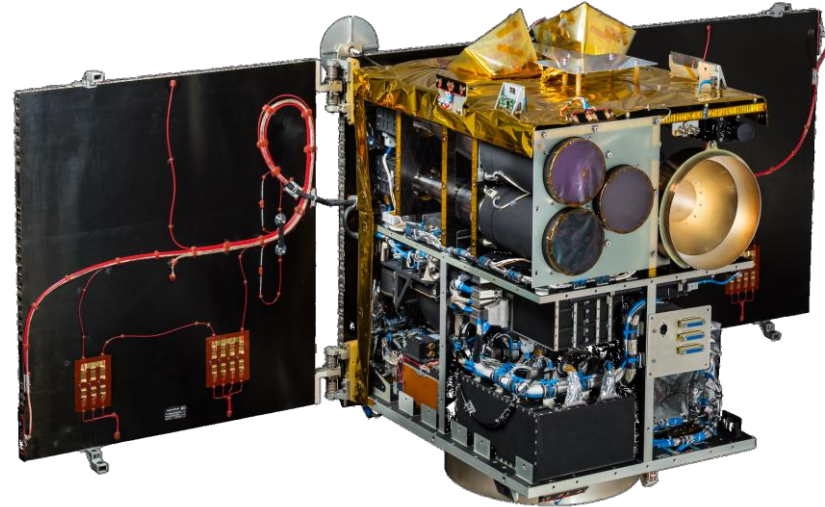
Gefördert durch:

Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages

Infrastructure developed at the University for the Flying Laptop mission
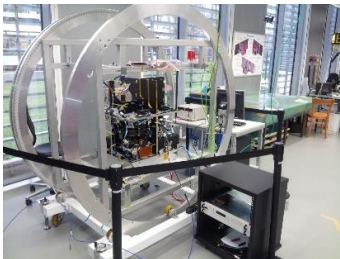
- Infrastructure for development, integration, qualification and operation of satellites

- Ground station network / Ground control software
- Automation of satellite operation

Ground station

Control room

Clean room – ISO8

TV chamber

Simulation environment

International Launch campaign

- Main payload: Kanopus-VI-K
- Flying Laptop (Universität Stuttgart)
- TechnoSat (TU-Berlin)
- WNISAT-1R (Japan)
- Norsat 1+2 (Norway/Canada)
- 48 Planet Labs Cubesats
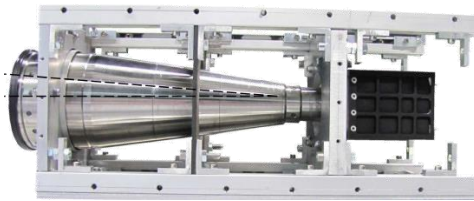- 19 further Cubesats

Flying Laptop Operations Team

Major payloads and technologies on Flying Laptop

FPGA-based
Payload computer
(PLOC)

Multi-spectral
camera system
(MICS)

AIS receiver
- DLR Cooperation -

S-Band downlink system
- Tesat Cooperation -
(DDS)

Panoramic camera
(PAMCAM)

De-Orbit Mechanism
- Tohoku University
Cooperation -
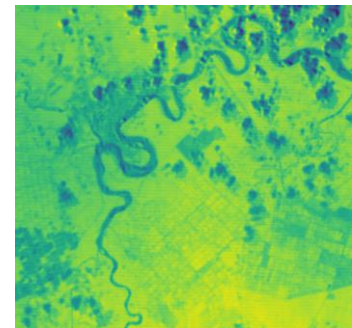(DOM)

Star sensor:
Space Debris
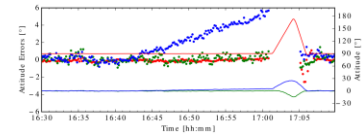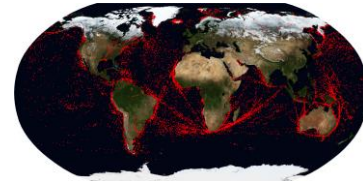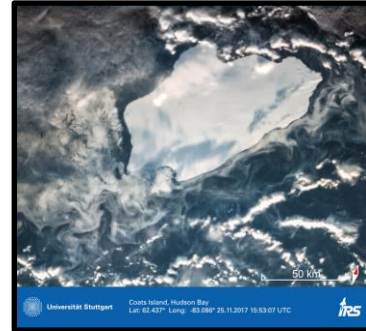Near Earth
Objects

Laserlink
- DLR Cooperation -
(OSIRIS)

GPS-based
Attitude determination
- DLR Cooperation -
(GENIUS)

Status of our satellite

- All satellite components tested and fully operational
- Satellite system is fully stable
- Ground station in Stuttgart is used for nominal operation
  - Genius experiment (Attitude determination with GPS)
  - Encryption and compression algorithm
  - Analyses on Radiation tolerance of components

  - Multispectral Imaging of Malaysia
  - AIS data combined with Camera pictures
  - Observation of Space Debris

  - Active support of satellite operation by undergraduate students
  - Operations lecture, Payload practical training

Thank you!

Prof. Dr.-Ing. Sabine Klinkner

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