Aalto University

Remote Sensing groups

Aalto University

Optical remote sensing team

Miina Rautiainen
prof. (remote sensing)
Head of geoinformatics unit

Funded by:

SUOMEN AKATEMIA

European Research Council
Established by the European Commission

@ AALTO's School of Engineering

- Team est. 2015, currently 8 members

Focus on remote sensing of forests

- Spectral measurement techniques for vegetation
- Radiative transfer modeling for forests
- Linking forest albedo with forest management practices
- Forest biophysical variables from satellite data

Small satellites and microwave remote sensing team

Jaan Praks, assistant professor

Group: 4 PhD (full time) students, 2 post-doc researchers, numerous graduate students, dedicated lab for small sat development

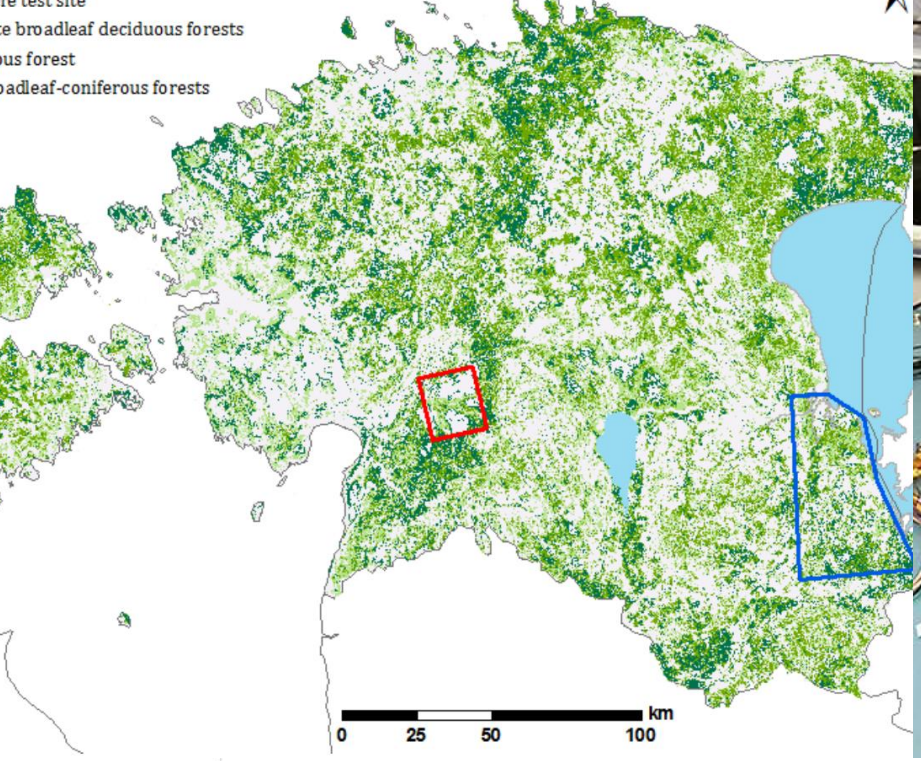
- PI of Aalto-1, Aalto-2, Aalto-3, missions
- PI of Foresail-1, Foresail-2 platforms
- Strong background in microwave EO, PolSAR, InSAR, PolInSAR

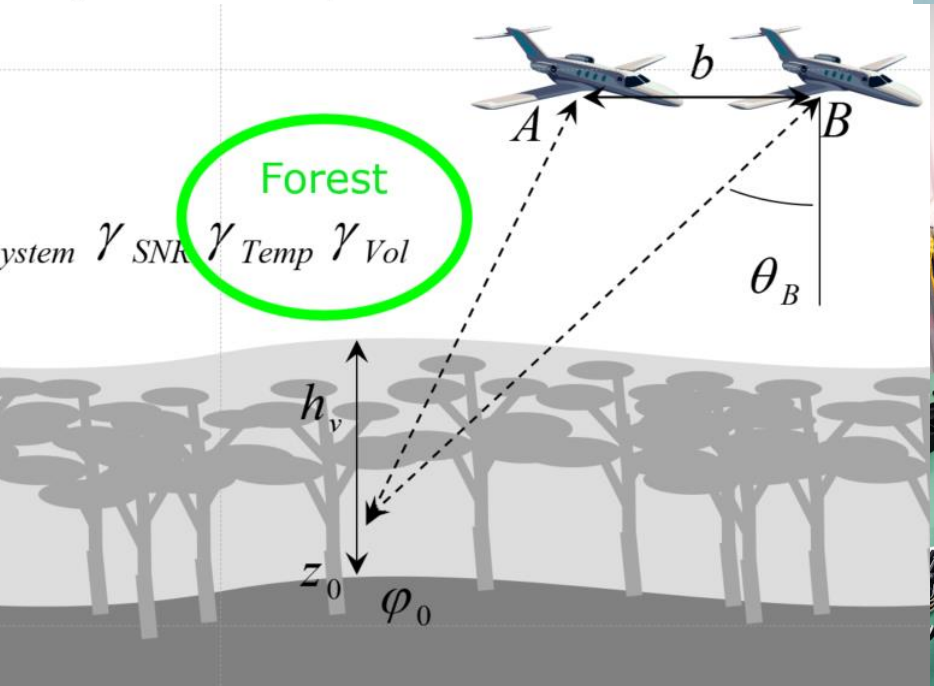
Oleg Antropov, post-doctoral researcher

- SAR image analysis, PolSAR, InSAR, PolInSAR
- Signal processing

Alexandre Bosser, post-doctoral researcher

- Space electronics specialist
- Radiation effect in electronics


e broadleaf deciduous forests
us forest
adleaf-coniferous forests
km
0
25
50
100


b
A
B
Forest
ystem
γ_{SNR}
γ_{Temp}
γ_{Vol}
θ_B
h_v
z_0
φ_0


Aalto-1
The Finnish Student Satellite

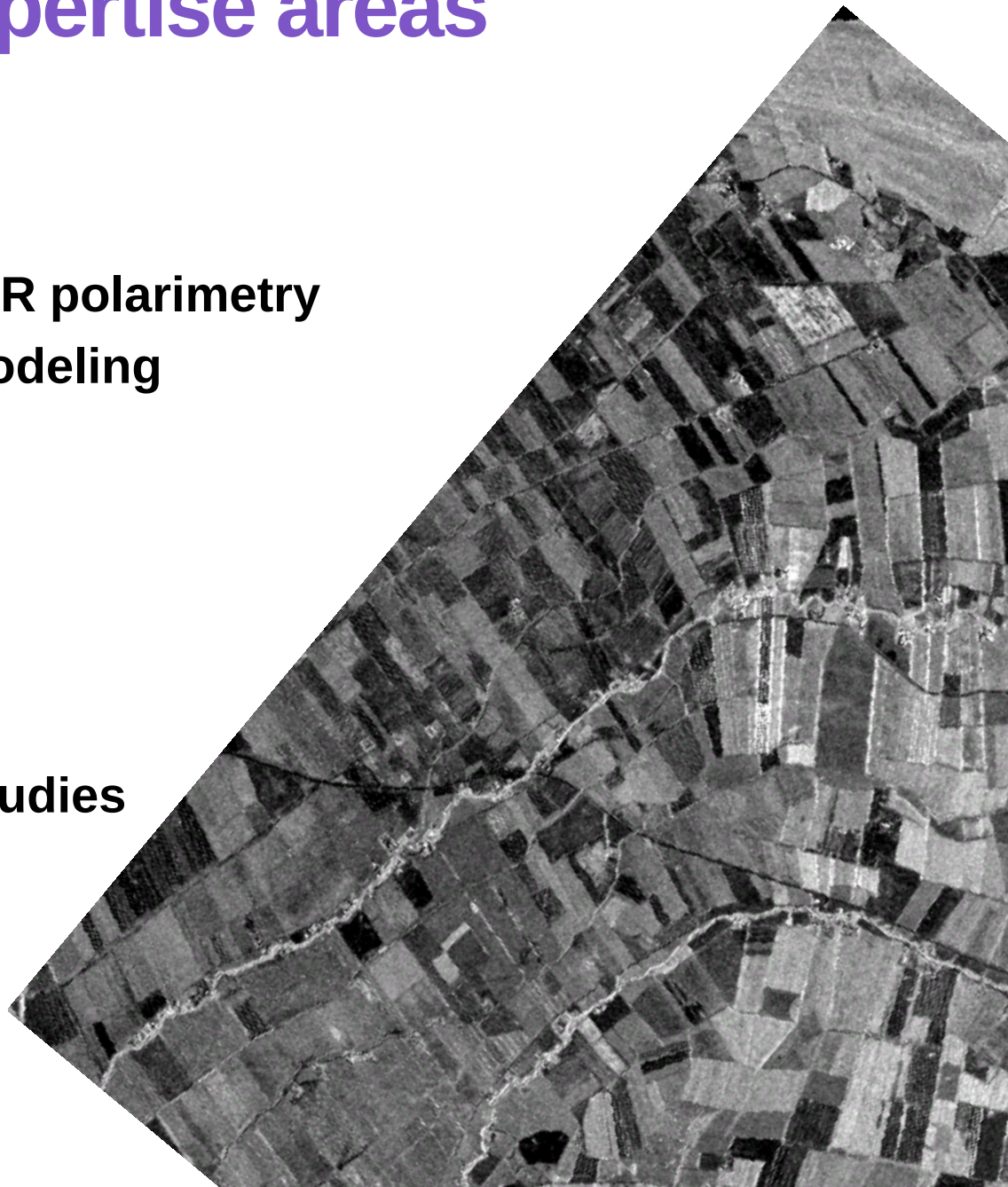
Remote sensing expertise areas

Expertise

- **SAR, SAR interferometry, SAR polarimetry**
- **Scattering and coherence modeling**

Subjects

- **Forest height**
- **Land use classification**
- **Ice and snow**
- **Small EO satellite mission studies**
- **Fast temporal changes**



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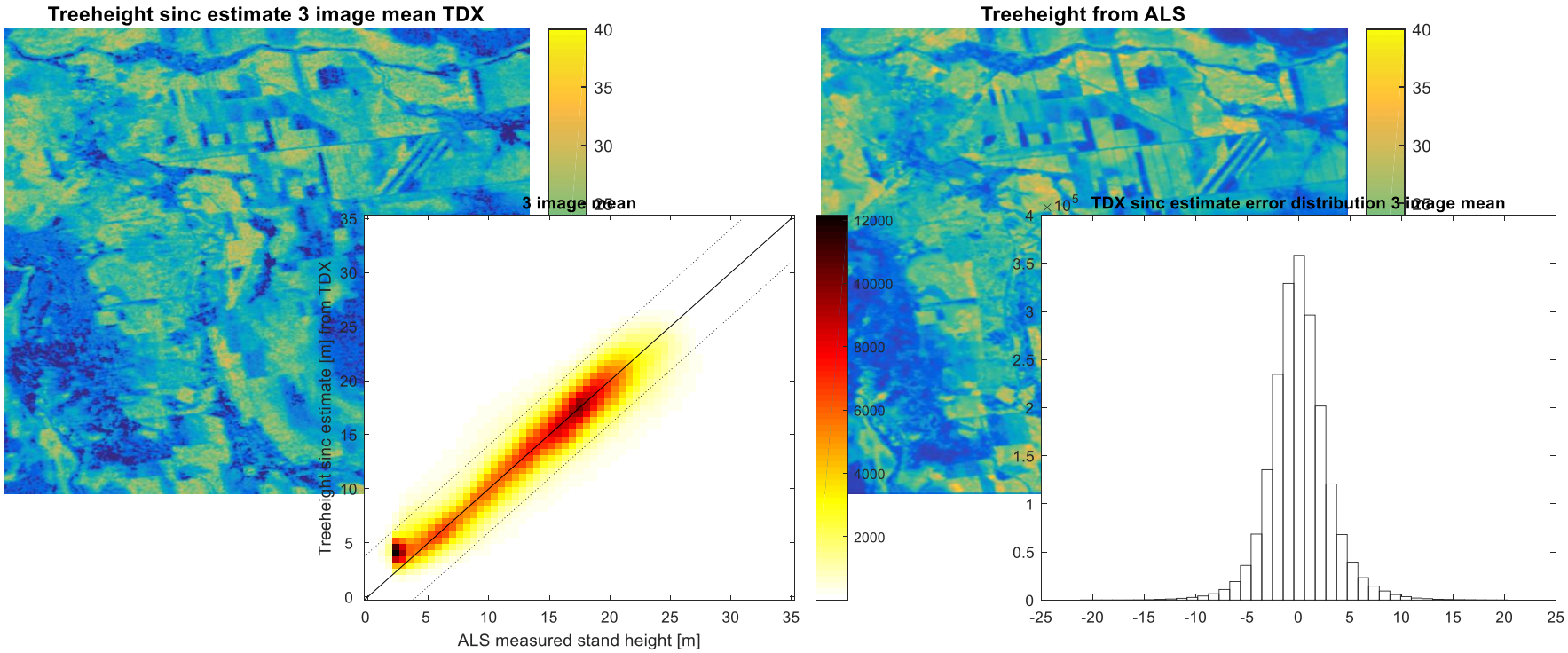
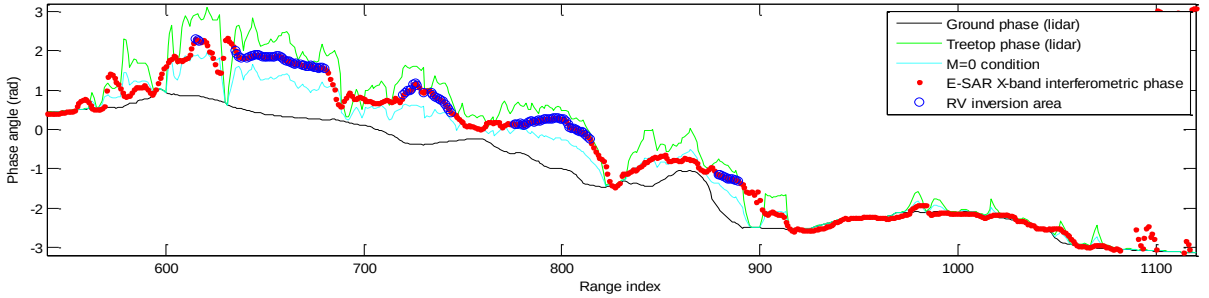
Forest height from SAR interferometry





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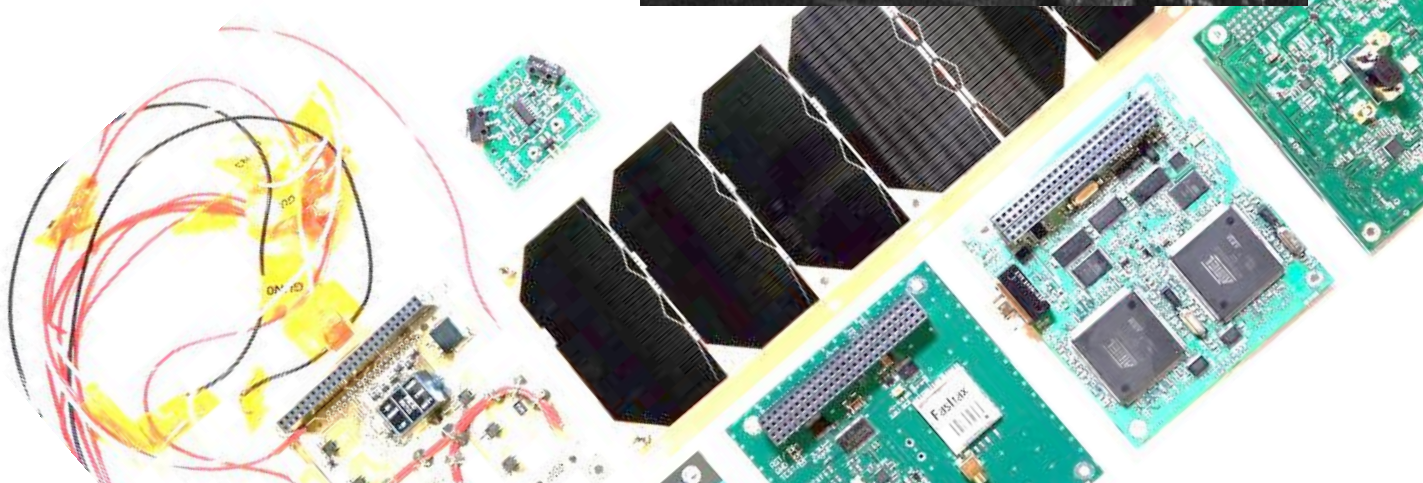
Forest snow damage from SAR

- In a collobration with Bitcomp Erkki Tomppo

- Objective: to test the usability of Sentinel-1 observations in forest damage localization and severity assessment
  - Test site, Kainuu, Finland
  - Finnish Forest Centre
  - Background, serious snow damages late December 2107
  - Challenges:
    - The severity varies continuously
    - Imaging conditions, the temperature, snow, moisture, vary and affect backscattering

Infrastructure

- EO satellite
- Airborne radiometers
- Small radar
- Corner reflectors
- Small satellite lab



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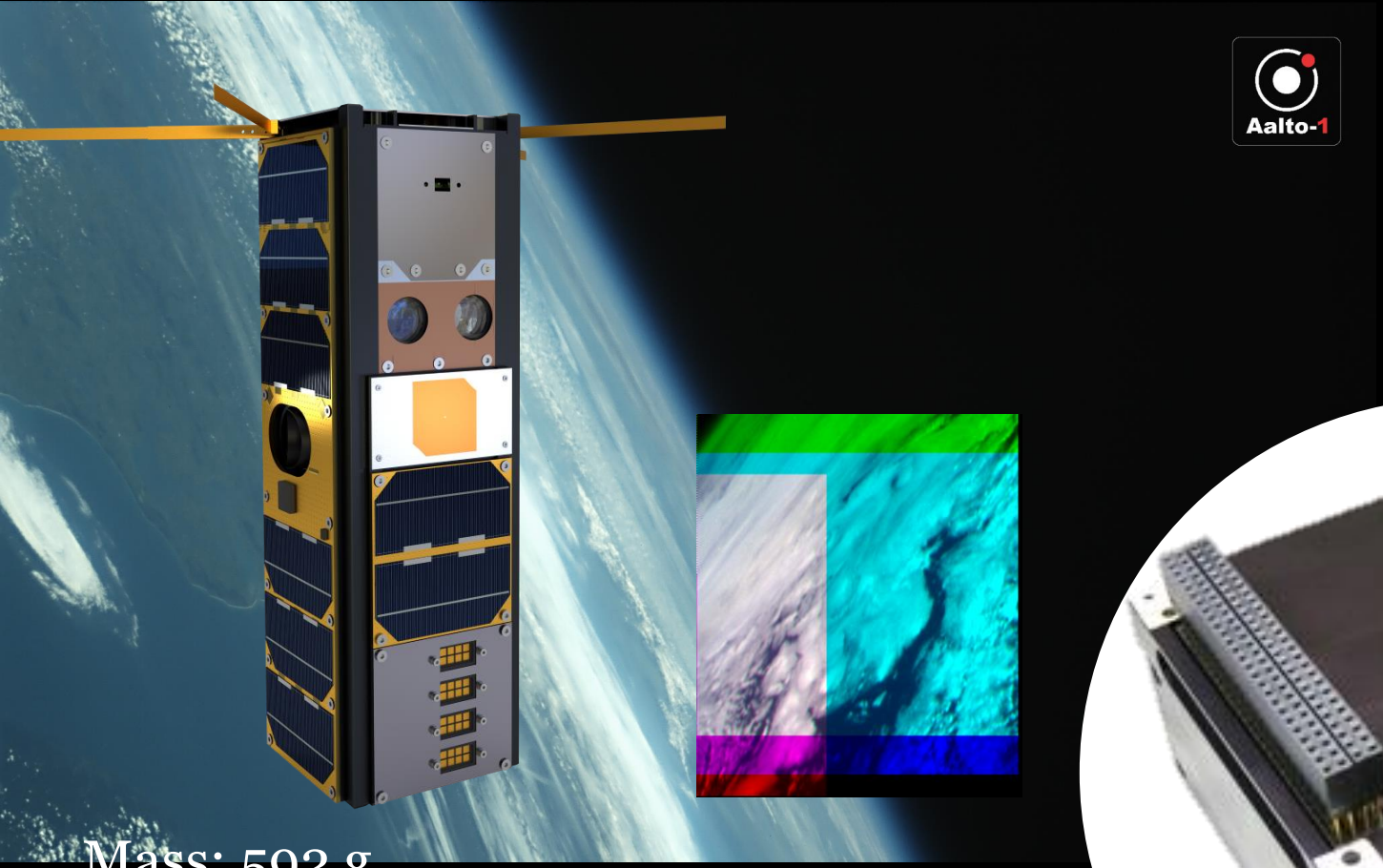
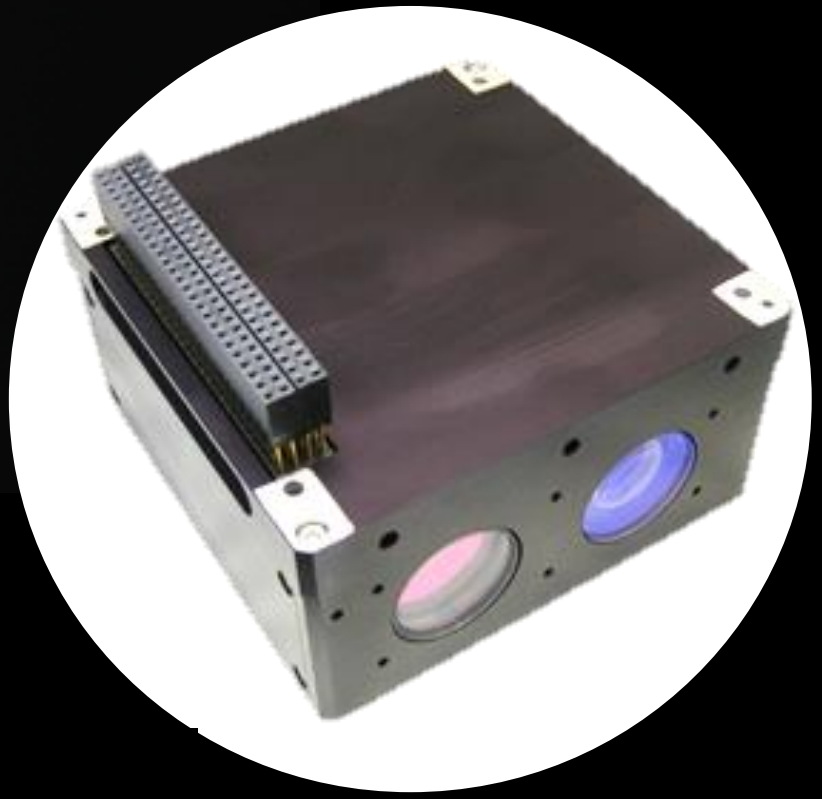


AaSI

VTT, Finland



Mass: 592 g
Power: max 2.5 W
500-900 nm
Configurable ~20 nm spectral lines

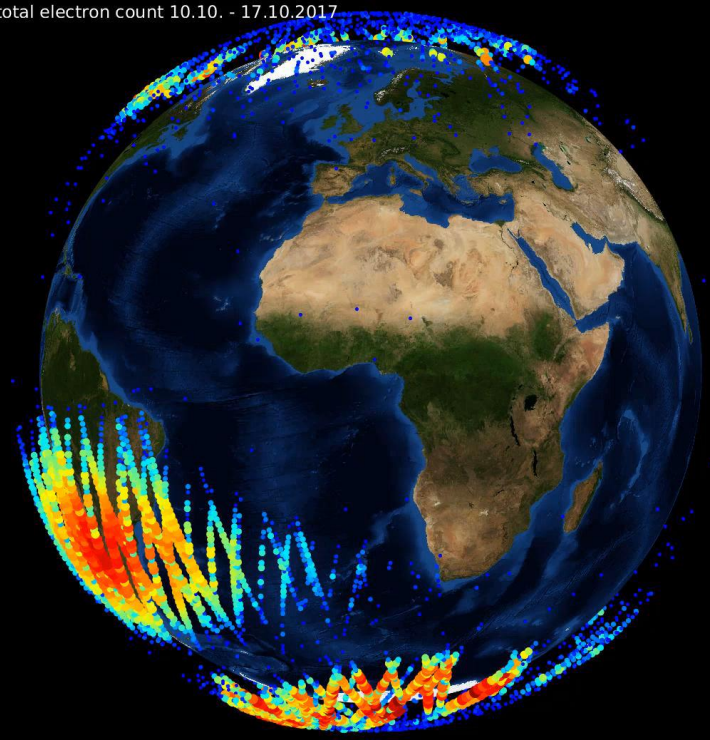
esa

VTT

Aalto-1
The Finnish Student Satellite

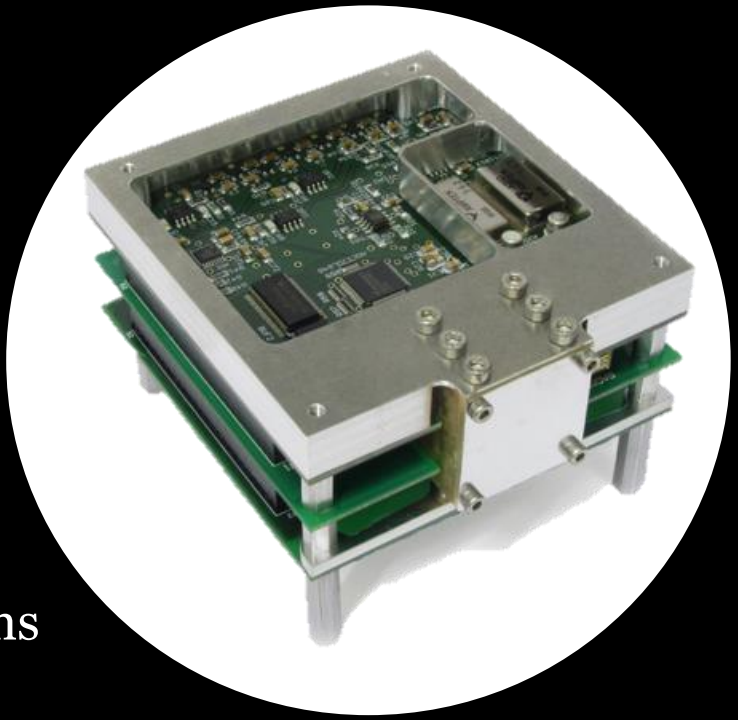

Aalto-1
First image
516 km over Northern Norway
VIS camera
05.07.2017 09:43 UTC

RADMON in-orbit total electron count 10.10. - 17.10.2017



RADMON

University of Turku, University of Helsinki



Particle detector measuring the flux of
>700 keV electrons and >10 MeV protons
Mass: 354 g
Power consumption: 1 W

University of Helsinki

Turun yliopisto
University of Turku

Aalto-1
The Finnish Student Satellite

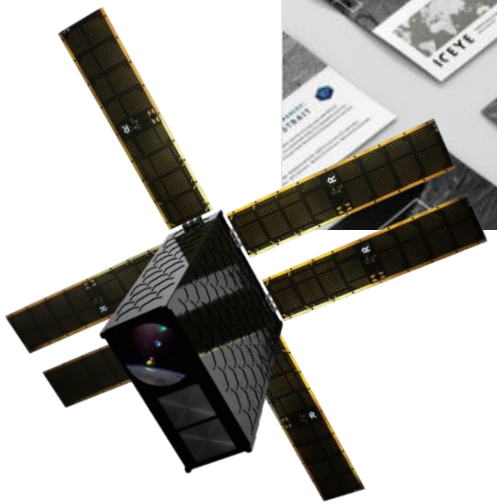
Working in ecosystem with our startups

Iceye Oy

image quality analysis, application development

Reaktor Space Lab

CubeSat platform development, radiation tolerance, payload verification



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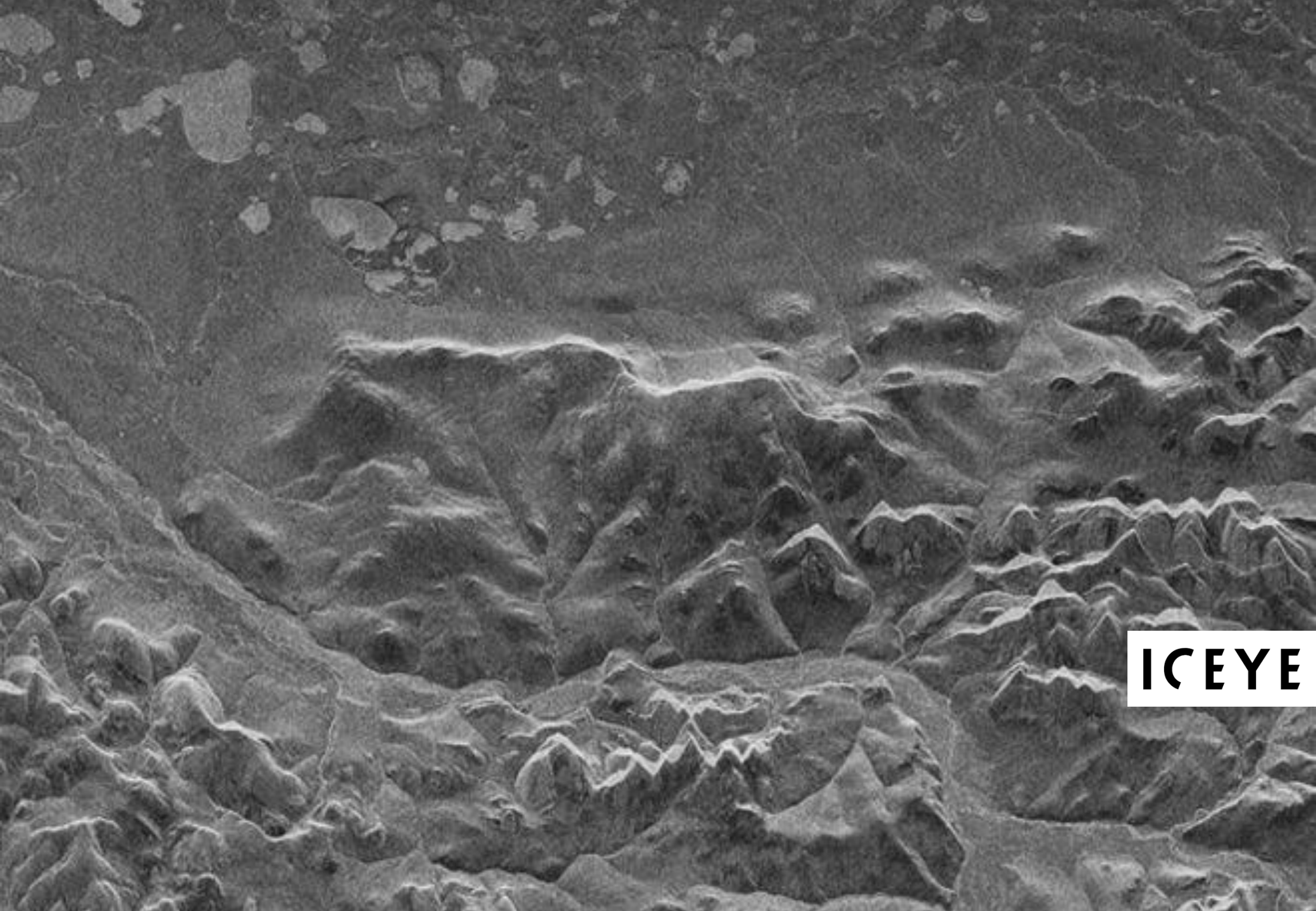
ICEYE

Teaching

GIS-E3050 - Advanced Remote Sensing

ELEC-E4230 - Microwave Earth Observation Instrumentation

ELEC-E4510 - Earth observation

GIS-E1040 - Photogrammetry, Laser Scanning and Remote Sensing

+ Special assignments and seminars

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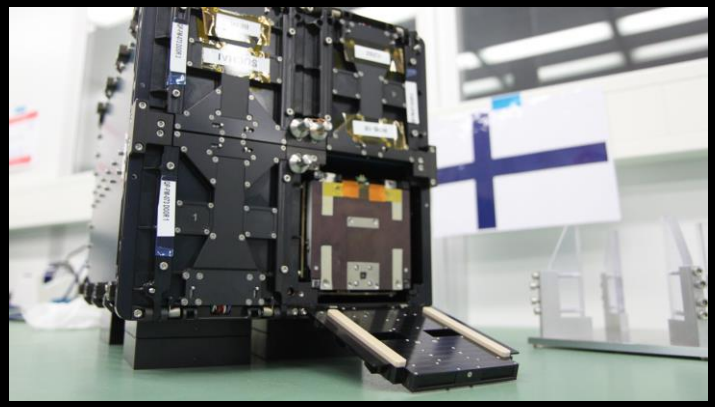
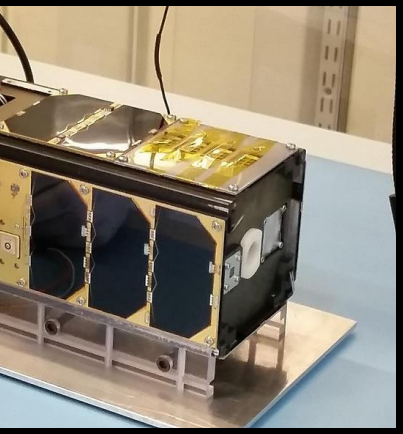
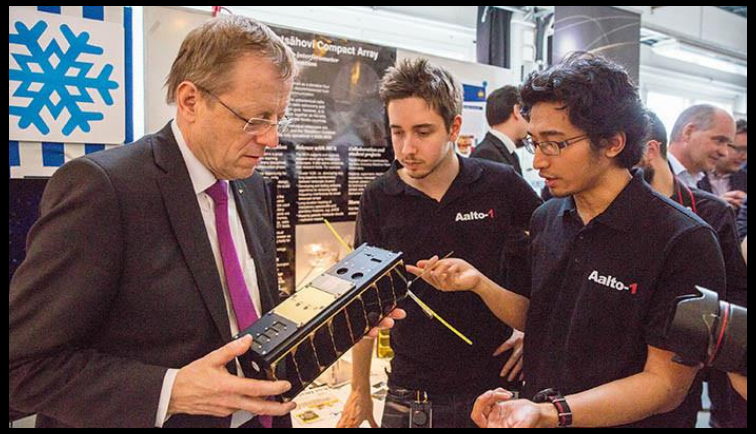
Nordic Master (N5T)

Three specialised study tracks that give you a unique understanding of working as an engineer in the Arctic.

Read more >







Thank you for your attention!

http://spacecraft.aalto.fi/

Aalto-1