

Kvarken Space Economy

INFO DAY WITH ESA BIC FINLAND &
ESA BIC SWEDEN
18.1.2022 Online webinar

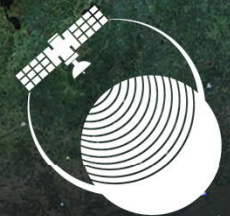
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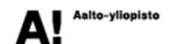
UMEÅ

VAASA

ESPOO



Kvarken Space Center



Project consortium members

Ten project partners

University of Vaasa (Lead partner)

Novia University of Applied Sciences

Umeå University

Luleå University of Technology

MUOVA at Vaasa University of Applied Sciences

Åbo Akademi University

Hanken School of Economics

Swedish Institute of Space Physics

Swedish University of Agricultural Sciences

Aalto University



Agenda

Schedule:
EET/CET

10:00/09:00	Welcome & opening words	Heidi Kuusniemi (UVA)
10:15/09:15	ESA BIC Finland	Kimmo Isbjörnssund (ESA BIC Finland)
10:20/09:20	ESA BIC Sweden	Jens Lundström (ESA BIC Sweden)
10:25/09:25	ESA BIC Breakout Rooms	Kimmo Isbjörnssund Jens Lundström
11:00/10:00	Coffee break: Networking & KvarkenSat video	KSE Team
11:15/10:15	Discussion about the Kvarken New Space ecosystem	Jari Ratilainen (VAMK)
11:45/10:45	Q&A & Close-up	Heidi Kuusniemi (UVA)
12:00/11:00	Event closes	

UVA University of Vaasa
ESA European Space Agency
BIC Business Incubation Center
KSE Kvarken Space Economy
VAMK Vaasa University of Applied Sciences

Welcome & opening words

Heidi
Kuusniemi

Professor, Director

University of
Vaasa



Vaasan yliopisto
UNIVERSITY OF VAASA

Kvarken Space Economy introduction: Finnish-Swedish cooperation in space economy

Kvarken Space Economy Info Day
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Botnia-Atlantica region and Kvarken/Merenkurkku



The Kvarken Space Center

promotes satellite technologies, data and applications in various forms and highlights their essential role in the digital infrastructure of today with focus on benefits for the Kvarken region



Kvarken

the Kvark (old Swedish: neck/throat) is the narrow region in the Gulf of Bothnia separating the Bothnian Bay from the Bothnian Sea. The Kvark also separates Finland's Österbotten from Sweden's Västerbotten.

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Kvarken Space Center goals

1

Foster long-term space-based data utilisation in the Kvarken area

3

Provide initial and long-term industry support

2

Develop local expertise and co-operation networks **locally and internationally**

4

Demonstrate capability

- Data portal of portals
- The KvarkenSat CubeSat mission
- The KvarkenSat ground station in Vaasa (Finland)

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KvarkenSpaceEco business opportunities & Finnish-Swedish cooperation

- The region has a history of utilizing space data - downstream development
- KvarkenSat – is a possibility to do both upstream and downstream development
- KvarkenSat is an excellent example of what could be achieved with a small budget
- Collaboration in the region to develop opportunities and access to space, space technology, data application, and utilization – Innovation ecosystem for New-Space
- The project facilitates collaboration by inviting industry to engage in different activities

Business development activities

- Innovation Challenge event
- Business development workshops
- NASA's International Space Apps Challenge hackathons

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KvarkenSpaceEco business opportunities & Finnish-Swedish cooperation

Innovation Challenge 2022 on Sustainable Forestry -
Space-based data helping to combat climate change

A Finnish-Swedish cooperation on forest and forestry looking at possibilities and developments of space data

Four themes:

- The need for more timely estimations of soil moisture
- Changes in species habitats: prevent damage caused by spruce bark beetles
- How to reduce damage to forest ground caused by forest machines
- New digital concepts for forestry value chain

Challenge is open to students, startups and researchers to apply as a team of 3-5 persons.

Save the date:
18–20 March
2022

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Professor, Director

University of
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CubeSats and New Space: KvarkenSat's utilisation

Nanosatellites provide unprecedented growth and opportunities to new Space Economy. KvarkenSat follows the trend and provides latest developments in this topic.

The KvarkenSat mission is developed around four miniature payloads. The cutting edge payloads aim to more efficient utilization of future nanosatellite form-factor in Earth Observation, navigation and space sustainability. The payloads are

- Hyperspectral Camera (VTT, Novia UAS)
- Maritime AIS ship beacon receiver (Aalto University)
- Propulsion Device (Aurora Propulsion Technologies)
- Advanced Navigation Signal Receiver (University of Vaasa, GOMSpace)

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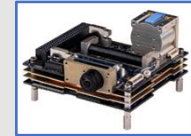
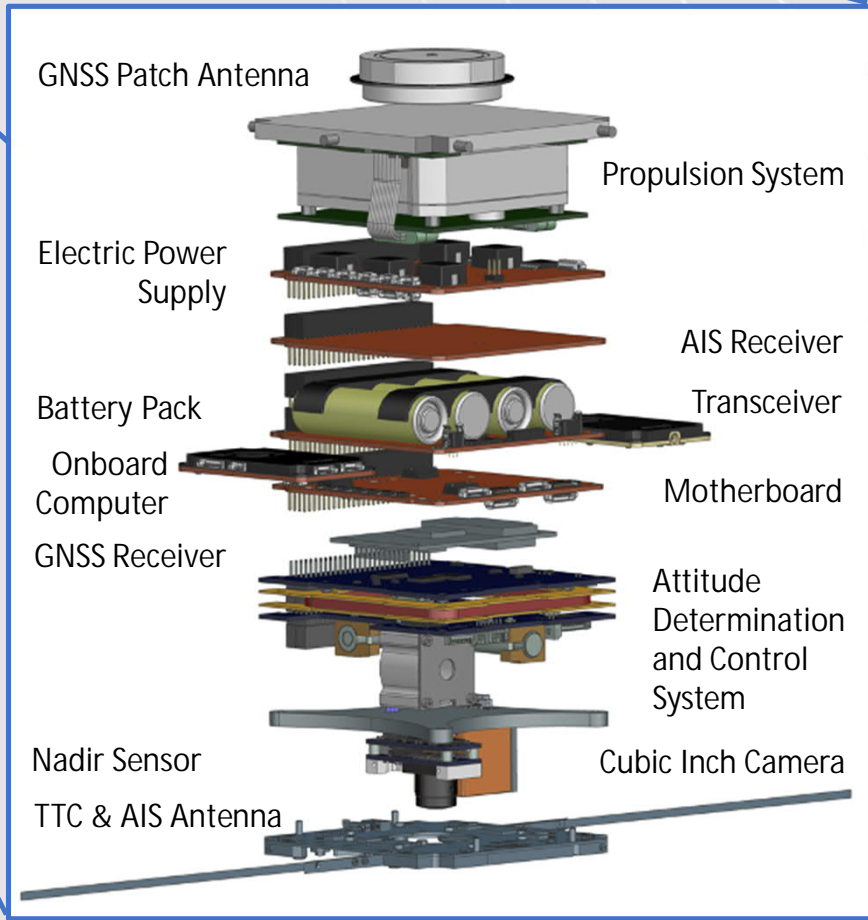
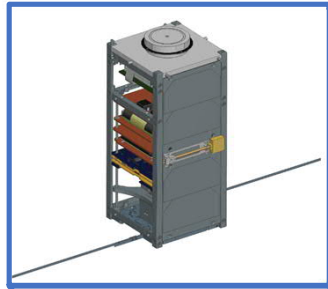
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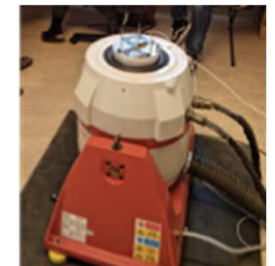
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KvarkenSat Development and Testing Process



Thermal Vacuum Chamber



Shaker

KvarkenSat Ground Station & Space Portal

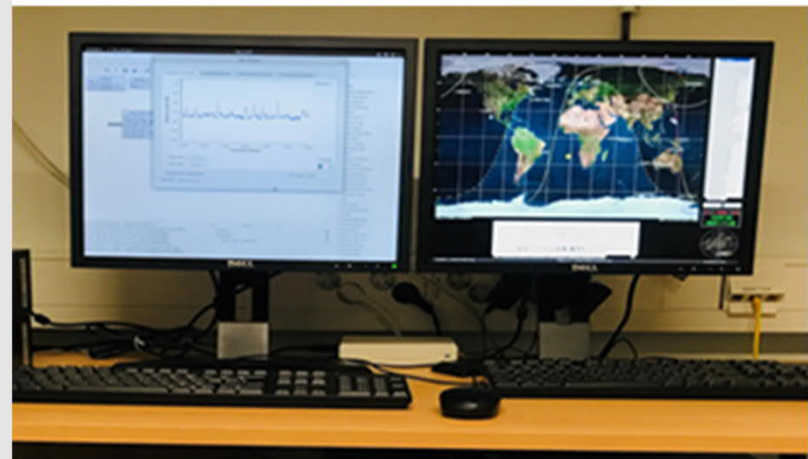
Ground station (GS) to communicate with KvarkenSat.

Need to downlink and uplink information to/from KvarkenSat. Uses radio frequency (RF) communications technologies.

GS located in Vaasa, Finland's second university cube satellite communications/control site. Requires RF frequency allocation, use permits and operator certification.

Initial ground station operated in "downlink only" mode for approximately a year. Univ of Vaasa master's thesis.

Operational KvarkenSat ground station will include "directional antenna" which is mechanically pointed towards KvarkenSat as it overpasses. Automated processes to monitor health of satellite and downlink data.



	Tutorials and education	Data	Computing & Platforms
Forestry	4	4	1
Fishing	2	1	
Land classification	5	7	2
Agriculture	11	20	5
Climate & Atmosphere	11	20	5
Urban	2	3	1
Water & Ice	6	10	3
Pollution	2	4	1

SATELLITE DATA SPECIFIC WEBINAR Use of Solar Induced Fluorescence and LIDAR to Assess Vegetation Change and Vulnerability. This introductory webinar series covers the fundamentals of Solar Induced Fluorescence (SIF) and LIDAR, their applications, and an overview of different satellite data sources that are openly available. In addition, it also includes a step-by-step guide on how to access, open, and interpret SIF and LIDAR data.

Tags: [ice](#), [sentinel-5p](#), [jupyter](#), [solar induced fluorescence \(SIF\)](#), [carbon cycle](#), [julia](#), [scripting](#), [OCO-2](#), [chlorophyll fluorescence](#), [LIDAR](#), [fluorometry](#), [photosynthesis](#), [R](#), [python](#), [vegetation health](#), [pluto](#), [ICESat-2](#)

Formats: [Webinar](#), [Workshop](#) Regions: [Global](#)

[License](#)

Constellation	Revisit	Sensor	Sensor type	Spectral area	Spatial resolution	Data source	Kvarken retrieval guide
Sentinel-5 Precursor	16 days	Tropospheric Monitoring Instrument (TROPOMI), 2600 channels	Optical	270nm-495nm, 710nm-775nm, 2305nm-2385nm	7km x 7km	Copernicus 5P hub	Retrieving Local Sentinel-5P data
<small>ESA's Sentinel-5 Precursor represents the first atmospheric composition mission in the frame of the European Earth Observation programme Copernicus. It provides routine observations of atmospheric trace gases and aerosols products serving air quality, climate and stratospheric ozone applications</small>							
ICESAT-2	30 days (subcycle) 91 day exact	Advanced Topographic Laser Altimeter System (ATLAS)	LIDAR	532 nm	6.6 km x 2.5 km	Natinal Snow & Ice Data Center	Retrieving Areally relevant ATLAS data
<small>The Ice, Cloud, and Land Elevation Satellite-2, or ICESat-2, measures the height of a changing Earth, one laser pulse at a time, 10,000 laser pulses a second. Launched September 15, 2018, ICESat-2 carries a photon-counting laser altimeter that allows scientists to measure the elevation of ice sheets, glaciers, sea ice and more - all in unprecedented detail.</small>							
OCO-2	16 days	OCO-2	Optical	765nm, 1610 nm and 2060 nm	2.25km x 1.29 km	GES DISC	Retrieval of areally relevant OCO-2 data
<small>Orbiting Carbon Observatory 2, OCO-2, is NASA's first dedicated Earth remote sensing satellite to study atmospheric carbon dioxide from space. OCO-2 is an exploratory science mission designed to collect space-based global measurements of atmospheric CO2 with the precision, resolution, and coverage needed to characterize sources and sinks (fluxes) on regional scales (≥1000km). OCO-2 is also able to quantify CO2 variability over the seasonal cycles year after year. This mission will also validate a space-based measurement approach and analysis concept that could be used for future systematic CO2 monitoring missions.</small>							

KvarkenSat Ground Station & Space Portal

A web portal has been developed to give easy access to remote sensing types of data and tutorials for our region and beyond. The data collected by KvarkenSat will be added.

Highly interactive with several user interfaces. Features data and tutorials to use data.

Presently contains access to ESA, NASA and commercial satellite based data sites.

KvarkenSat GNSS, hyperspectral data and AIS data will be accessible by anyone from this portal.

West Coast Startup is the joint Business Incubator of VAMK Vaasa University of Applied Sciences and the University of Vaasa and is operated by Design Centre MUOVA.

We run an incubation program geared to support innovation in New-Space and utilization of Space-Based Data for startup establishment. Examples of new companies from our incubator include:

 **Automaton**

 **iLu Space**

WEST COAST STARTUP





Thank you!
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