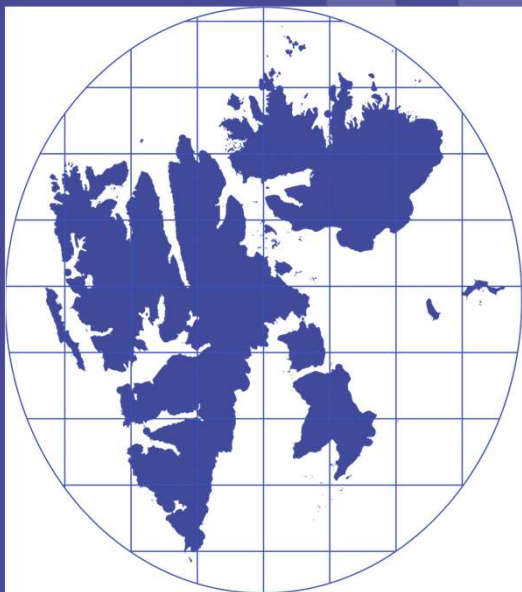


Svalbard Integrated Arctic Earth Observing System

A cooperative international research infrastructure for Arctic Earth System Science (ESS)



Shridhar D. Jawak

Remote Sensing Officer



ESA Arktalas Hoava Workshop-2022



Svalbard Integrated Arctic Earth Observing System

An international research infrastructure for Arctic Earth System Science (ESS)

Vision

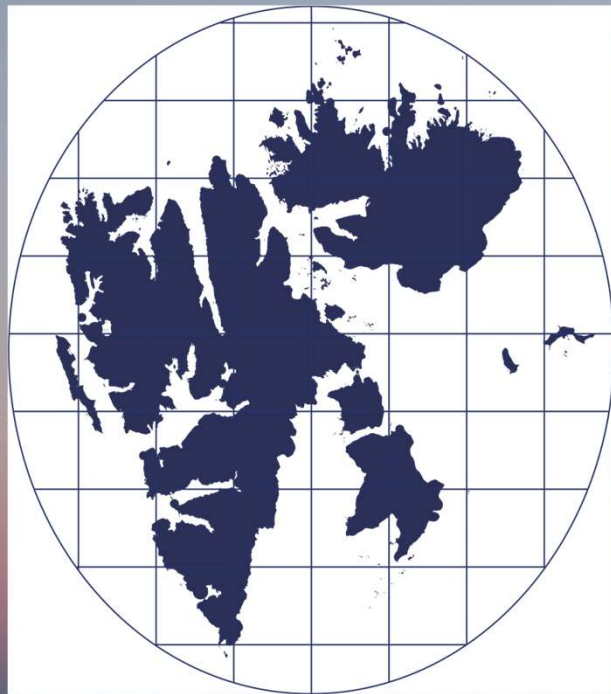
We will be the leading long-term observing system in the Arctic to serve Earth system science and society



Mission

An international partnership of researchers studying the environment and climate in and around Svalbard to

- Develop an efficient observing system
- Share technology, experience and data
- Close knowledge gaps
- Decrease the environmental footprint of science



SIOS – a Norwegian initiated international collaboration to create a regional observing system

The Observing System

- A cooperating international research infrastructure for improved knowledge of environmental and climate change in the Arctic
- Focus to answer Earth System Science questions
- Systematic long term observations – stable over time, yet dynamic as new questions from society arise
- Minimizing environmental footprint, optimizing measurements and resources, new technologies, remote sensing, integration of data
- Open, free and harmonized data
- **Improving research conditions** for scientists working in ESS

The regional scope

- The Norwegian archipelago Svalbard and surrounding waters



The Svalbard Integrated Arctic Earth Observing System

- A consortium of institutions with research infrastructure in & around Svalbard

Independent organisation
28 institutions from 10 countries



- An observing system for Earth System Science (ESS)

Focus on processes,
eg. environmental and climate change

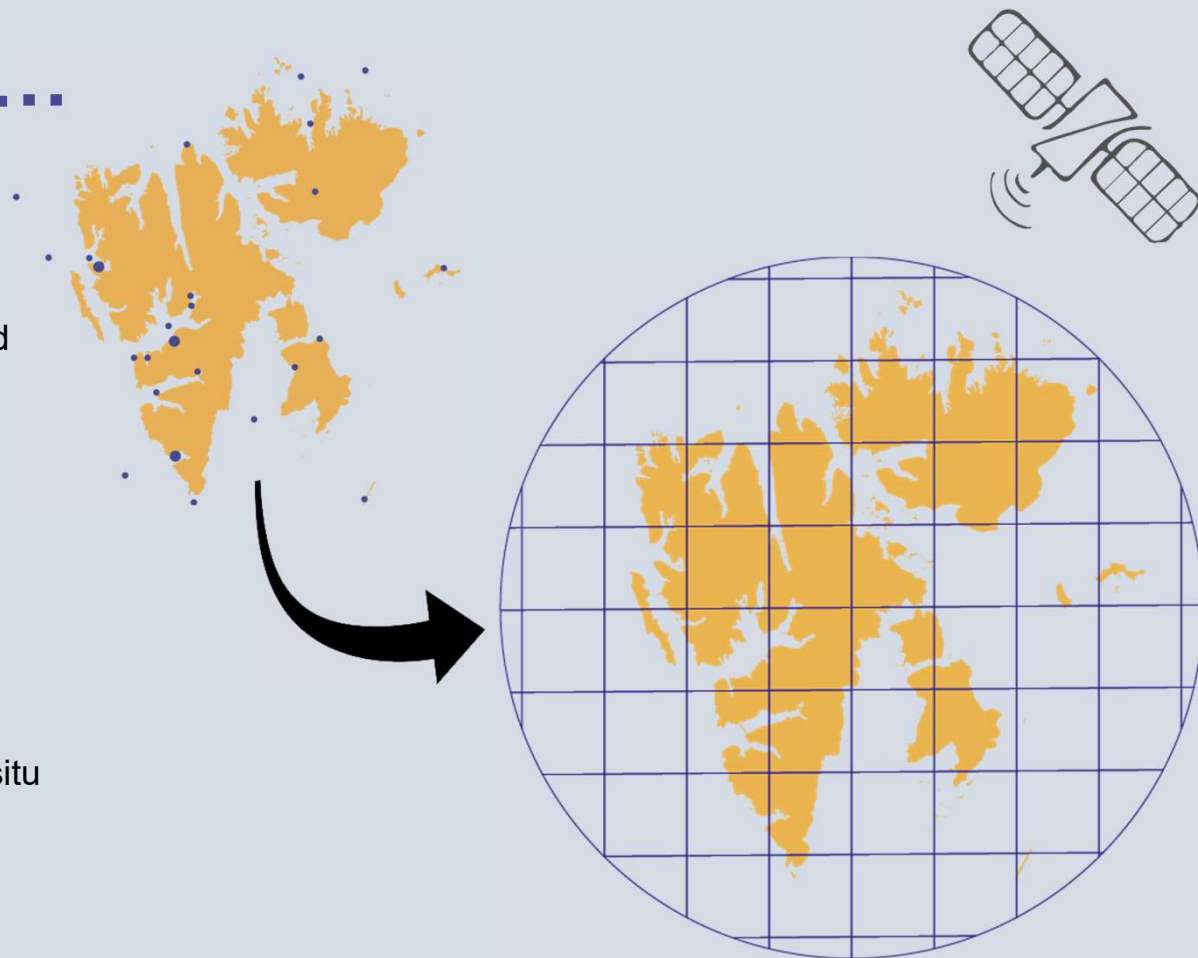


Cooperation of international institutions



SIOS works towards ...

- **Integration** of new & existing infrastructure and data
- A network of **systematic observations**
- **Better temporal and spatial coverage** of key observational data
- Reliable access to **long-term** monitoring data
- **Improved integration** of space-based and in-situ observations
- **Improving research conditions** for scientists working in ESS



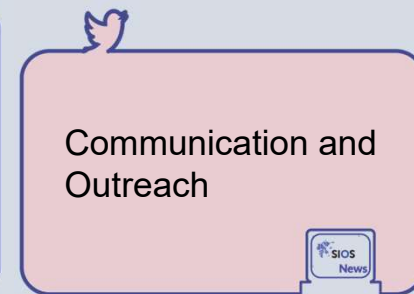
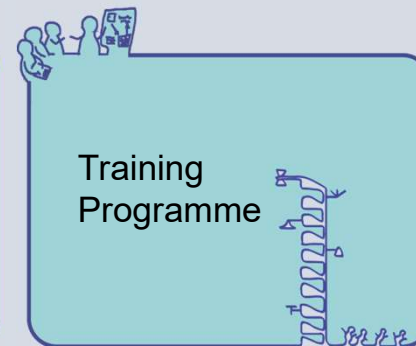
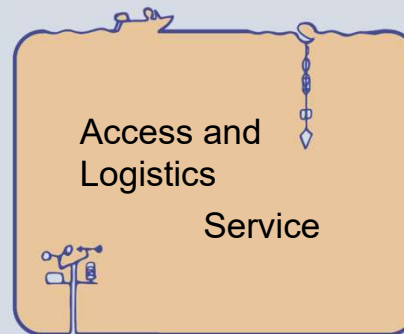
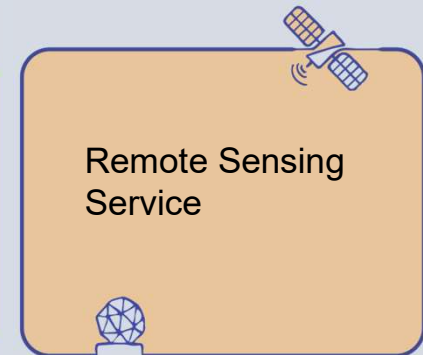
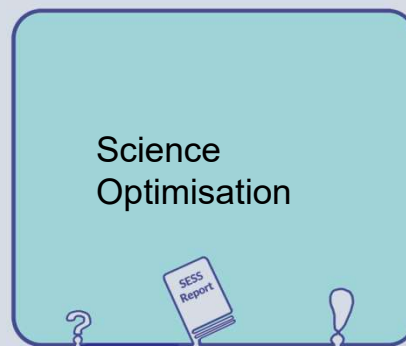
SIOS plays an **active role** in the landscape of European environmental research infrastructures and EU Polar Cluster activities


The graphic contains the following elements:

- ENVRI community logo:** Five colored circles (blue, dark blue, green, orange, globe) above the text "ENVRI community".
- EU Polar Cluster logo:** A circular logo with a stylized path and the text "EU Polar Cluster".
- Environmental Domains Diagram:** A central circular image of a coastal landscape with a boat, surrounded by four icons and labels: "Life" (leaf), "Air" (cloud), "Land" (cube), and "Water" (waves).
- Project Structure:** Three blue hexagons labeled "Arctic Projects", "Antarctic Projects", and "Polar Projects". The "Arctic Projects" hexagon contains the SIOS logo (Sustainable Integrated Arctic Earth-Observing System). The "Polar Projects" hexagon contains the European Polar Base logo.
- Partner Logos:** A horizontal row of logos for various research infrastructures including Airo-EU, ARISE, BCCZ, DLR, ECHO, ELNOR, ELTER, EMERG, EMPHASIS, emmo, ERIC, EPOS, EUPAR, FARESCO, Eurofleets, EuroSDIS, IAGOS, ICOS, INTERACT, JERICO, LUMINO, and SIOS.

SIOS Knowledge Centre (SIOS-KC)

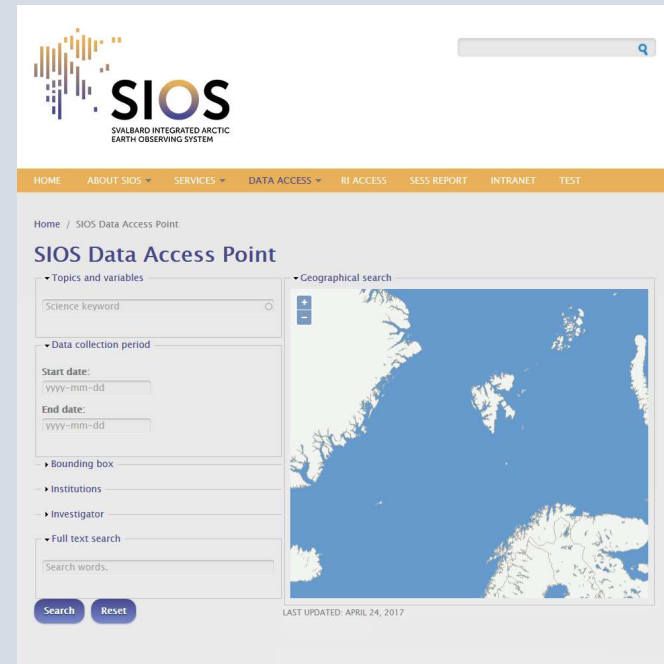
- The hub of SIOS
- Maintains and coordinates all services
- Administrates working groups
- Located in Longyearbyen
- Staff of 6 + associated members
- Reports to the SIOS consortium
- Funded through 2025 by the Research Council of Norway





Data Management Service

- **Main principles**
 - Open and free data sharing (FAIR* data!)
 - Distributed data centres
 - International standards
- **Harmonisation** of the data
- **Cross-disciplinary combinations** of data and products



www.sios-svalbard.org/metadata_search

- Discovery
- Retrieval
- Visualisation
- Transformation

Access and Logistics

Service

- Regular **calls** connected to the strategic goals of SIOS
- **Observation facilities catalogue**
- **Coordination** of logistical activities and sharing of resources
- **Special offers** for SIOS members
- Logistics **Sharing Notice Board**





- Target groups: **Scientists, research technicians** and students
- **Portfolio of courses** - related to infrastructure within the SIOS observatory
 - Data management
 - Annual Remote Sensing training courses
 - Others, e.g. metrology






Communication and Outreach



#SIOS

- SIOS web portal www.sios-svalbard.org
- Social media
- Information and outreach material



The screenshot shows the SIOS website homepage. At the top, there is a navigation bar with links for Home, About SIOS, Services, Data, Research Infrastructure (RI), and Intranet. The main content area features the SIOS logo and a description: "Svalbard Integrated Arctic Earth Observing System. An international observing system for long-term measurements in and around the Norwegian archipelago of Svalbard addressing Earth System Science questions." Below this, there are six featured articles with images and titles: "Data", "Svalbard Observing System", "The SESS report", "Events", "Logistics", and "Jobs, calls &". On the right side, there is a search bar, a newsletter subscription form, and a "Latest News" section with a link to "Corona information for Svalbard".



@SIOS_KC



SIOSKnowledgeCentre



Company/sios-svalbard

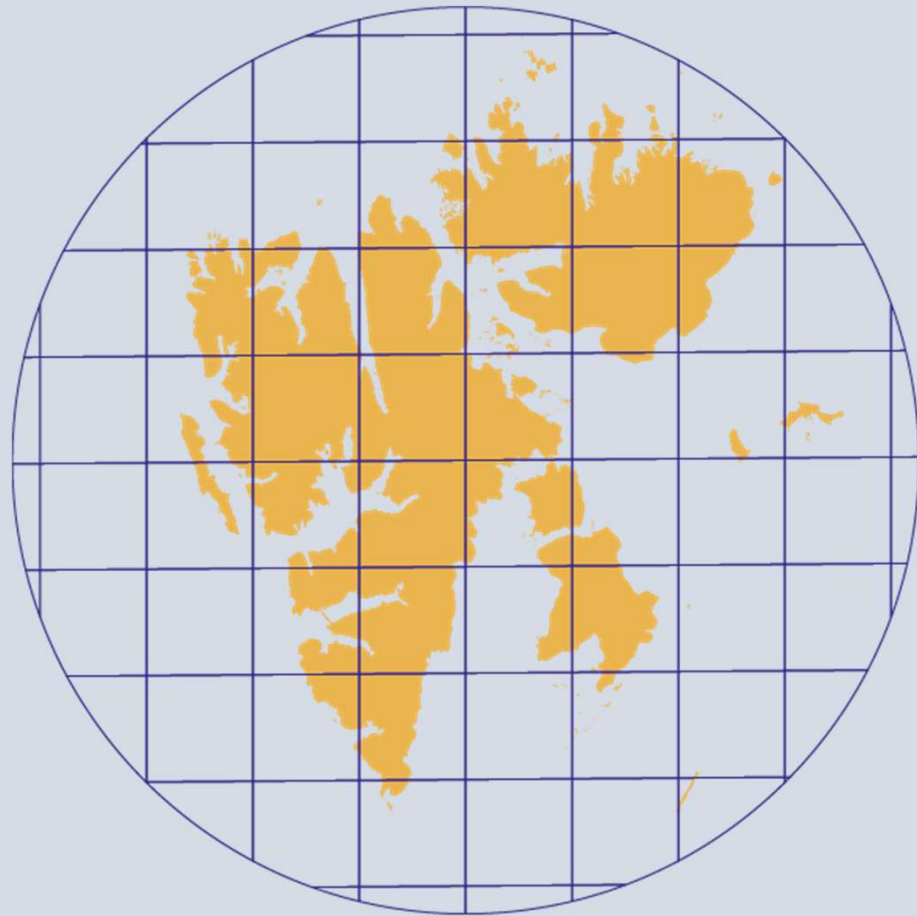


www.sios-svalbard.org

Science Optimisation



- Common goals – **core data**
- **Optimisation report**
- **Polar Night Week**
- **The SESS report**



Annual State of Environmental Science in Svalbard report

The concept

- **Integrating datasets** over entire Svalbard and connecting measured parameters across several spheres
- Highlighting **research needs** and **recommendations** on how to address them
- Open sharing of **ideas!**



new datasets



new research
infrastructure



increased international
cooperation





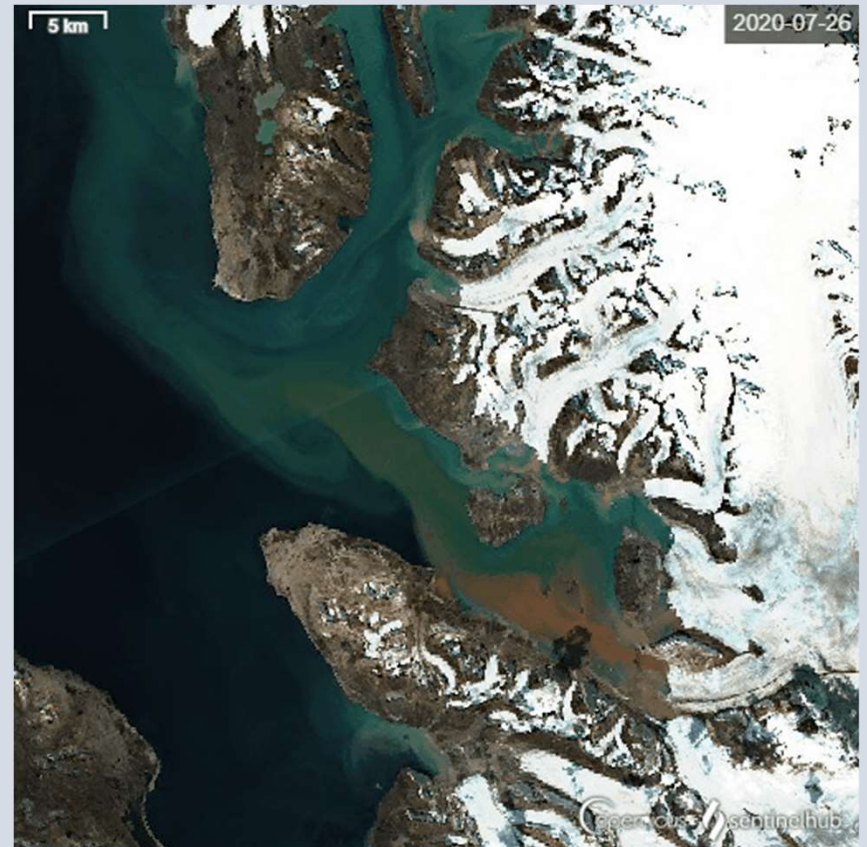
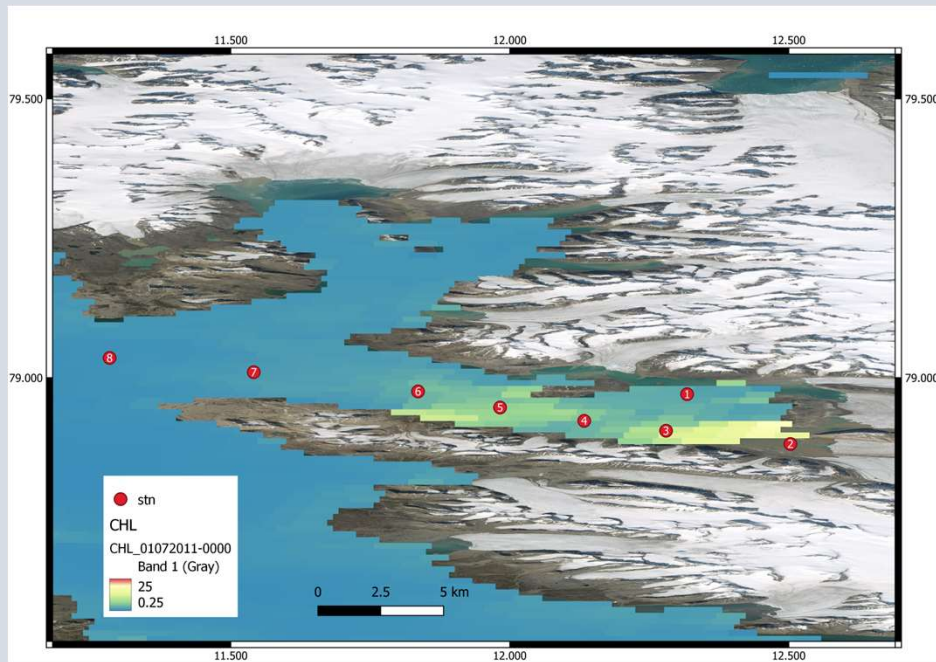
Remote Sensing Service



- **Single point of contact** for satellite information for Svalbard
- Information about **opportunities** and on **how to use** satellite data
- Streamlined **access to EC Copernicus** programme satellite data for Svalbard
- Working together with product users and providers **to improve the usability** of satellite data
- Providing **tools** for satellite data users
- Prioritized **geospatial product** generation



Integration and Cal/Val



Airborne Remote Sensing Campaigns



Sensors

- RGB camera and hyperspectral imager installed on Dornier aircraft stationed in Longyearbyen
- High resolution georeferenced images

Opportunities

- First call in 2020 resulted in 25 flight hours for 10 projects
- Second call in 2021 resulted in 25 flight hours for 11 projects

Data will be available eventually through SIOS Data Access Point



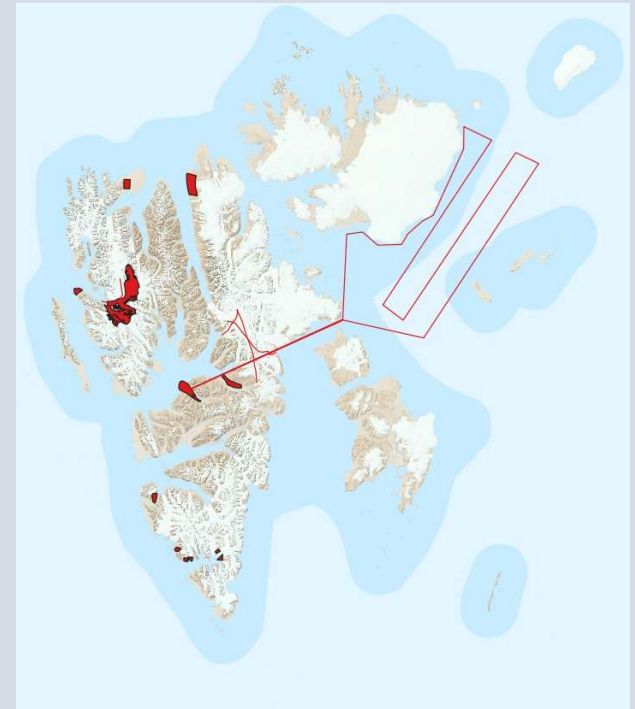
Airborne Remote Sensing Campaigns in Svalbard

Campaigns 2020



10 projects, 25 flight hours

Campaigns 2021



11 projects, 25 flight hours



SIOS Training courses



2017: Training workshop on Copernicus Satellite

2018: ESA Advanced Cryosphere Training

2019: Marine Remote Sensing Training Course

2020: Terrestrial Remote Sensing Training Course

2021: Hyperspectral Remote Sensing Training Course



The northernmost Copernicus Relay on the planet



- Earth Observation (EO) & Geoinformation (GI)
- Copernicus User Uptake
- One-stop Copernicus Information Point
- To promote Copernicus EO and GI
- Sustainable source of full, free, open and reliable information
- Benefits of EO data for domains not directly linked to space

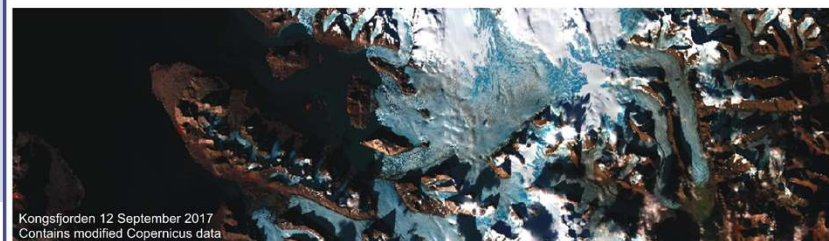
The Svalbard Integrated Arctic Earth Observing System (SIOS) is a distributed international research infrastructure for Arctic Earth System Science, coordinating a regional observing system for long-term measurements in and around Svalbard. SIOS became a Copernicus Relay in 2016. As a member of this network, SIOS is a bridge between Copernicus and the end-users of the programme.



Austfonna ice cap - Sentinel 1B's first data captured at 03:07 GMT on 28 April 2016. Photo: ESA-EC Copernicus.



- Map opportunities and needs for Satellite data
- Ensure streamlined access to EC Copernicus programme satellite data for Svalbard
- Encourage user uptake of satellite data through training activities
- Manage tailored-processing of satellite data by consortium partners
- Establish links to satellite owners and promote Svalbard as a Cal/Val site



Kongsfjorden 12 September 2017
Contains modified Copernicus data

Contact us for your query on Copernicus products: remotesensing@sios-svalbard.org

www.sios-svalbard.org

SIOS Hyperspectral Remote Sensing Training Course -2021

15 teachers

80 applications

35 selected participants

17 PhD Students

04 Masters/Bachelors Students

06 Researchers

06 Postdocs

01 Educator

01 Industry

25 institutions from 11 nations

292 lecture series participants

10 mini projects



Manuscript: Potential of hyperspectral sensors in Svalbard (under prep)

#AI4Svalbard



The banner features a black silhouette of the Svalbard archipelago on the left. On the right, there is a white background with an orange wave-like shape at the top. The SIOS logo is in the top right corner. The main text reads 'SIOS Training Course AI4Svalbard ARTIFICIAL INTELLIGENCE IN SVALBARD'. Below this, there is a location pin icon for '5-9 September 2022 Longyearbyen, Svalbard' and a cursor icon for 'sios-svalbard.org'. A satellite and brain icon are also present.

SIOS

SIOS Training Course
AI4Svalbard
ARTIFICIAL INTELLIGENCE
IN SVALBARD

5-9 September 2022
Longyearbyen, Svalbard

sios-svalbard.org



SIOS Webinar series

An anchor point to a drifting world!



Why?

Cancelled field campaigns

Cancelled conferences

To provide a social experience to the Svalbard research community in difficult times

13 Webinars

2 Online conferences

2 Online training courses

4 Panel discussions



First SIOS Online Conference

Earth Observation, Remote Sensing and Geoinformation applications in Svalbard

4-5 June 2020

Why?

- to promote the PhD students, postdocs, researchers, and academicians to contribute in the **SIOS's special issue on EO/RS/GI**.
- to review the state-of-the-art EO/RS/GI applications in Svalbard and;
- to provide social experience to the Svalbard scientific community

Awards for Early Career Researchers:

Top 5 papers presented by ECRs (Masters, PhD, postdocs, within 7 years after PhD)

Quick facts

- More than 350 registered participants
- 37 submitted abstracts
- More than 50 talks
- Presenters from \approx 24 institutions in 12 countries



More information: https://sios-svalbard.org/SIOS_RS_OnlineConference2020

www.sios-svalbard.org

Second SIOS Online Conference

Earth Observation, Remote Sensing and Geoinformation applications in Svalbard

08-10 June 2021

- 39 submitted abstracts
- Around 50 talks

Keynotes and invited talks

7 keynote talks

SIOS sessions

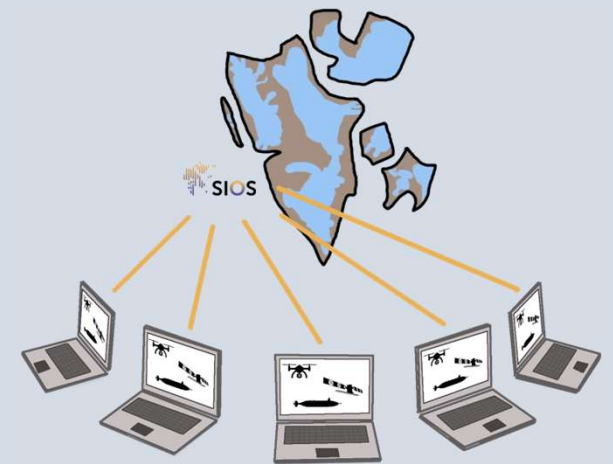
- SESS and InfraNor
- airborne campaigns in Svalbard
- Hack the Arctic Winners

Online Networking events

9th June: Zoom Quiz

10th June: Gathertown

with EGU Cryosphere Division, EGU Atmospheric Sciences Division and EGU Ocean Sciences Division.



Remote Sensing tools





SIOS Remote Sensing Tools



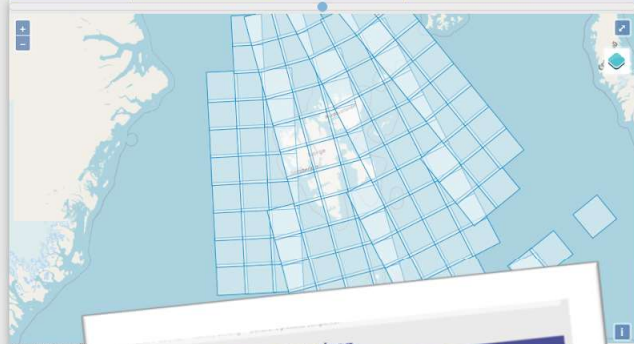
S2 comparison tool

[HOME](#) [ABOUT SIOS](#) [SERVICES](#) [ACCESS](#) [OPTIMISATION](#) [INTRANET](#)

Home / Services / Remote Sensing / Sentinel-2 products comparison

Sentinel-2 products comparison

Title	Date - Time	Composites
None	YYYY/MM/DD - TH:MM:SS	True Color Vegetation
	YYYY/MM/DD - TH:MM:SS	True Color Vegetation



This tool will compare:

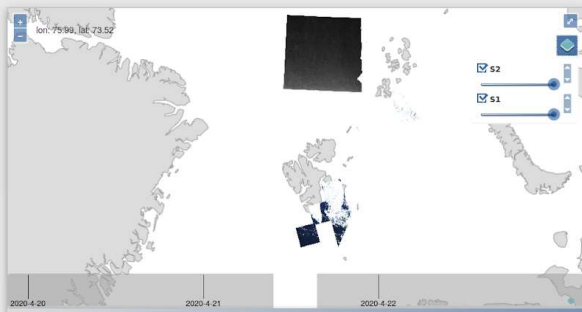
- Select a tile
- Select the date

Sentinel mosaic

[HOME](#) [ABOUT SIOS](#) [SERVICES](#) [ACCESS](#) [OPTIMISATION](#) [INTRANET](#)

Home / Services / Remote Sensing / Mosaic tool

Mosaic tool



lon: 75.99, lat: 73.52

2020-4-20 2020-4-21 2020-4-22

Acquisition Starts: Tue Apr 21 2020 09:38:48 GMT+0200 (Central European Summer Time)

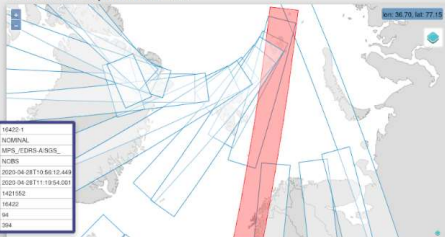
Acquisition Ends: Tue Apr 21 2020 15:36:38 GMT+0200 (Central European Summer Time)

Acquisition plans

[HOME](#) [ABOUT SIOS](#) [SERVICES](#) [ACCESS](#) [OPTIMISATION](#) [INTRANET](#)

Home / Services / Remote Sensing / Sentinel Acquisition Plan

Sentinel Acquisition Plan



ID	16420-1
Footprint	NCERNA
Station	MPS_EDRS-A/US
Mode	NCRS
ObservationTimeStart	2020-04-28T19:58:12.448
ObservationTimeEnd	2020-04-28T11:19:54.081
ObservationDuration	1421.582
Dist/Baseline	16420
Dist/Relative	94
Source	394

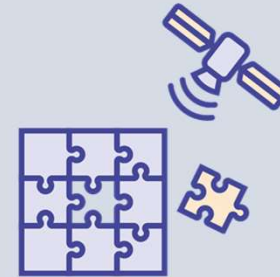
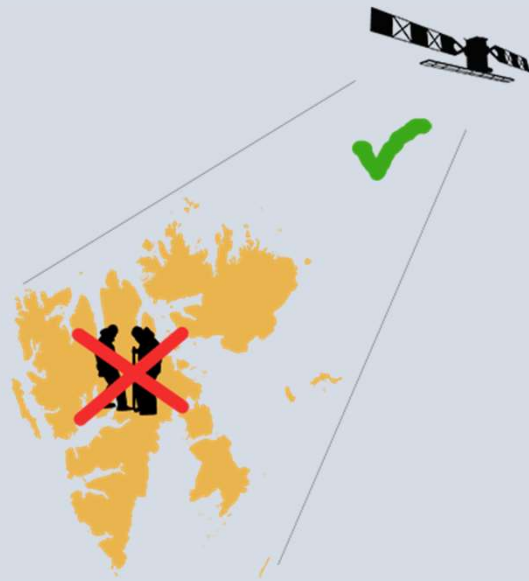
Acquisition Start: Mon Apr 27 2020 06:36:34 GMT+0200 (Central European Summer Time)

Acquisition End: Tue Apr 28 2020 22:12:21 GMT+0200 (Central European Summer Time)

LAST UPDATED: FEBRUARY 27, 2019
The KML files available on this page are retrieved from the ESA website and filtered to provide detailed information about the planned Sentinel-2 acquisitions within the SIOS area of interest. Each KML file usually covers a period of 10-15 days. To select the time period please the **Start** and **End** buttons below the map.
To know more about the satellite acquisition (i.e. ID, Mode, Observation Time, etc...) click on the passage strip. When passing with the mouse on the



Patch up your field data gaps with remote sensing



Most of our members had to cancel planned field campaigns to Svalbard since March 2020 leading to further gaps in observations.

Some of these data gaps can be filled with remote sensing observations.

Mapping the needs of researchers and evaluate the possibilities to provide remote sensing observations in the absence of field campaigns in Svalbard.



Fill application here: https://sios-svalbard.org/RS_patches-FirstSurvey www.sios-svalbard.org

SIOS Earth observation and Remote Sensing user requirement survey

We need your feedback!

This survey aims to collect information on Earth Observation and Remote Sensing based data, geospatial products, information, and training requirements by the diverse Arctic science community.



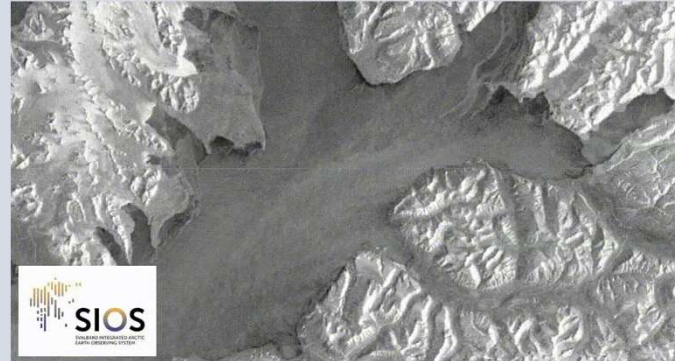
Encourage your colleagues to respond!



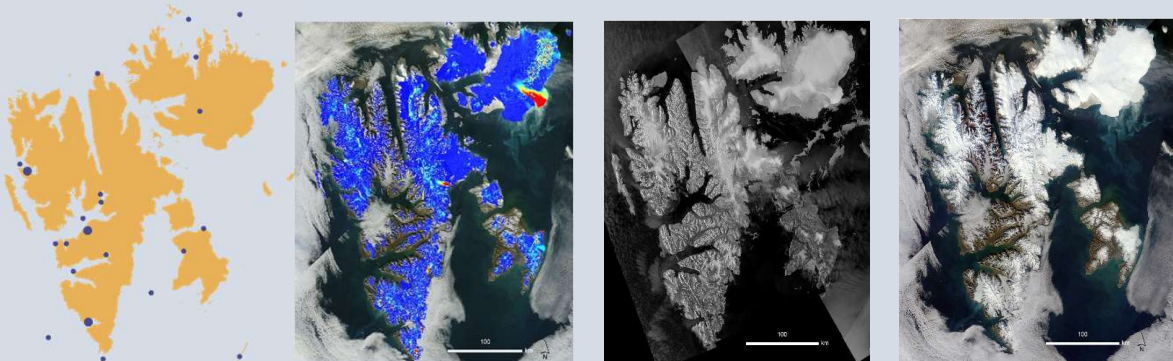
Participate here



RSWG Outreach: Image of the week!



SIOS Special Issue



Special Discount on Article Processing Charge (APC)

50% discount for manuscripts

o from SIOS activities, e.g. [InfraNor](#), [SESS report](#), and [SIOS Access Projects](#).

19 submissions

14 published

05 rejected

Hard deadline: 30th June 2022



remote sensing



SIOS's special issue on
Earth Observation (EO), Remote Sensing (RS) and Geoinformation (GI)
applications in Svalbard

Open for submission!
1 March 2020 - 31 December 2021

Up to 50% discount for
SIOS related manuscripts!



Check our website for details:
www.sios-svalbard.org/SpecialIssueRemoteSensing

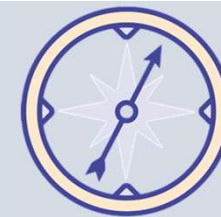


SI Website: www.mdpi.com/si/42749

Contact: shridhar.jawak@sios-svalbard.org

Timeline: 01 March 2020 - 30 June 2022

First ECR observer in the SIOS working group



University of
St Andrews

William D. Harcourt

 @will_harcourt

 www.williamharcourt.co.uk

Funders



Engineering and
Physical Sciences
Research Council



**ECR Observer to
the Remote
Sensing Working
Group (RSWG) of
SIOS**

Develop a unified platform
for satellite data availability
across Svalbard

Encouraging the
participation of ECRs in
SIOS activities

Meet the Early Career
researchers active in



**PhD Student,
University of
St Andrews**

“The application of
millimetre-wave radar to the
study of the cryosphere”

**SIOS Access
Project**

Radar Monitoring of
Calving at Hansbreen
(RaMoCH)



www.sios-experiment.org

Second ECR observer in the SIOS working group



Sara Aparício



@_SaraAparicio_



saraaparicio/

ECR Observer to the Remote Sensing Working Group (RSWG) of SIOS

Support to outreach activities of SIOS
Support to course development

Earth observation data scientist, Solenix for ESA

Support ESA on EO and AI-related activities

PhD Student, NOVA University

“Multi sensor and AI-based approach to sea ice climate change retrievals”

Meet the Early Career researchers active in



You can be the next ECR observer in the SIOS working group



**ECR Observer to
the Remote
Sensing Working
Group (RSWG) of
SIOS**



Opportunities for Svalbard researchers

- Annual RS Training course
- Annual RS ECR observer
- Use of Dornier and drones: regular calls and data
- SIOS RS tools: open to use for everyone
- SIOS Online conference: ECR awards
- SIOS webinar series: welcome to participate
- Patch up your field data with RS



An international partnership of researchers studying the environment and climate in and around Svalbard to

- Develop an efficient observing system
- Share technology, experience and data
- Close knowledge gaps
- Decrease the environmental footprint of science