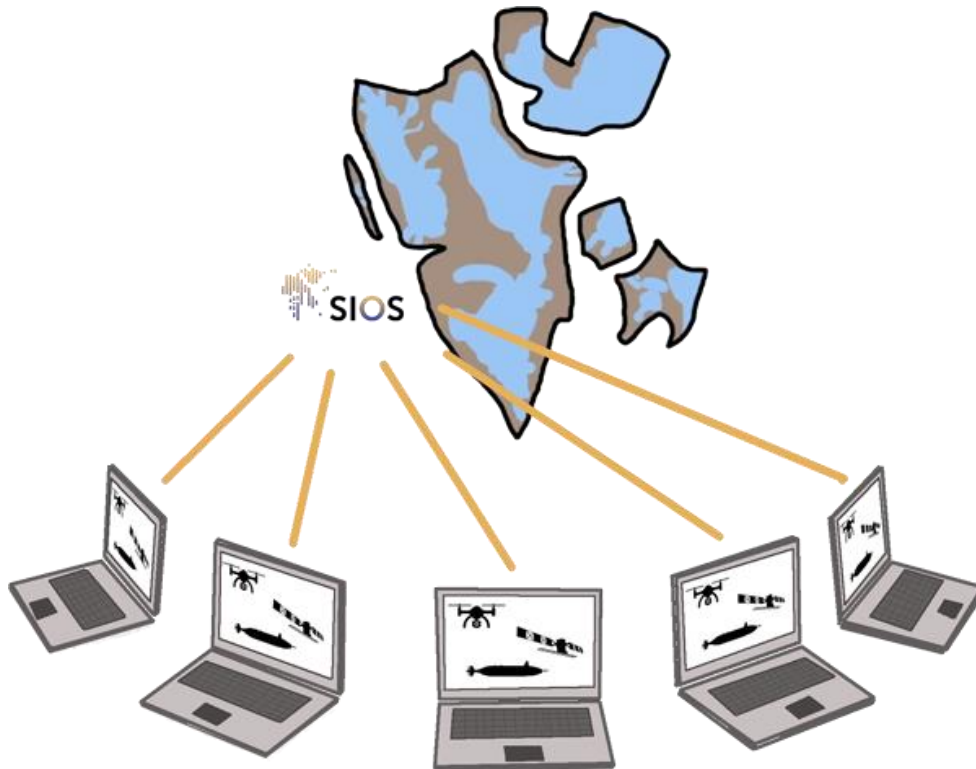


SIOS Online Conference on "Earth Observation (EO) and Remote Sensing (RS) applications in Svalbard"



Date and Time: 12-14 October 2022

12th October: 14:00 Hrs to 18:00 Hrs CEST* time zone

13th October: 14:00 Hrs to 18:00 Hrs CEST* time zone

14th October: 12:00 Hrs to 18:00 Hrs CEST* time zone

*You may use a [time zone converter](#) to find out the session schedule in your time zone.

Location: Zoom Online Platform (www.zoom.us)

Registration: Register [HERE](#) in advance to attend this conference.

After registering, you will receive a confirmation email containing information about joining the conference.

Note: This conference will be fully recorded, and selected presentations will be made available on the [SIOS YouTube](#) channel later.

Programme on 12th October 2022 (Wednesday) (All times in CEST time zone)

14:00 – 14:15: Welcome and introduction

14:00 – 14:10: Welcome address, **Kim Holmén, Chair of the Board of Directors (BoD), SIOS**

14:10 – 14:15: Introduction to the SIOS online conference.

14:15 – 15:45: Keynote talks of the day

Convener: Shridhar Jawak and William Harcourt

14:15 – 14:50: Satellite remote sensing of polar predators. **Peter Fretwell**

14:50 – 15:00: Discussion and/or break

15:00 – 15:35: Year-round sea ice thickness observations from CryoSat-2 and their relevance for seasonal forecasting and scientific studies around Svalbard. **Jack Christopher Landy**

15:35 – 15:45: Discussion and/or break

15:45 – 17:00: Arctic Ocean remote sensing

Convener: Shridhar Jawak and William Harcourt

15:45 – 16:00: Drivers of sea ice decline in the Fram Strait and north of Svalbard. **Agata Grynczel**

16:00 – 16:15: Climate change effect impact on chlorophyll a dynamic around the Svalbard Archipelago in 1998-2020 observed with satellite remote sensing. **Matteo Zucchetta**

16:15 – 16:30: The distribution of pCO₂W and air-sea CO₂ fluxes using FFNN at the continental shelf areas of the Arctic Ocean. **Iwona Wrobel-Niedzwiecka**

16:30 – 16:45: Deciphering Kongsfjorden hydrography from 2011 to 2020. **Divya David T**

16:45 – 17:00: Discussion and/or break

17:00 – 18:00: UAV Remote sensing

Convener: William Harcourt

17:00 – 17:15: UAV-based remote sensing observation products in High Arctic Catchments in SW Spitsbergen. **Abhishek Bamby Alphonse**

17:15 – 17:30: Drone-based mapping of surging Scheelebreen and Vallåkrabreen glaciers in Svalbard
Richard Hann

17:30 – 17:45: Drone-based mapping of Gruvefjellet in Spring and Summer for cornice risk assessment. **Richard Hann**

1745 – 1800: Discussion session, group picture and end of the first day

Programme on 13th October 2022 (Thursday) (All times in CEST time zone)

14:00 – 15:30: Keynote talks of the day

Convener: Shridhar Jawak

14:00 – 14:10: Introduction to Day 2. *Shridhar Jawak*

14:10 – 14:45: Arctic Changes Derived from Satellites and Models. *Johnny A. Johannessen*

1445 – 1500: Discussion and/or break

15:00 – 15:20: Creating a glacier inventory for Svalbard from Sentinel-2 and Landsat 8: Challenges and results. *Frank Paul*

1520 – 1530: Discussion and/or break

15:30 – 17:30: Cross-disciplinary session

Convener: Shridhar Jawak and William Harcourt

15:30 – 15:45: The integrated description of the seasonal snow on the ground using automated systems at Ny-Ålesund. *Roberto Salzano*

15:45 – 16:00: Integrating Copernicus Sentinel data and services with the SIOS catalogue. *Trygve Halsne*

16:00 – 16:15: Gapless digital elevation models in Hornsund, Svalbard based on aerial photogrammetry and terrestrial laser scanning. *Małgorzata Błaszczuk*

16:15 – 16:30: HYPSON-1 CubeSat with hyperspectral imager over Ny-Ålesund, Svalbard. *Marie Bøe Henriksen*

1630 – 1645: Discussion and/or break

16:45 – 17:00: Observing short-term calving variability at Hansbreen (Svalbard) from ground-based 94 GHz radar, TLS and time-lapse camera data. *William Harcourt*

17:00 – 17:15: How precisely we can map the glaciers? *Prashant Pandit*

17:15 – 17:30: The Supraglacial Terrain: Revisiting the fundamentals of image processing for mapping glacier facies. *Sagar F. Wankhede*

17:30 – 18:00: Open RSWG meeting led by Ann Mari Fjæraa (Chair, RSWG)

The agenda of the meeting is appended in Appendix 1.

Programme on 14th October 2022 (Friday) (All times in CEST time zone)

12:00 – 14:00: AI4Svalbard mini-project presentations

Convener: Shridhar Jawak and Sara Aparício

12:00 – 12:05: Introduction

12:05 – 12:13: Benjamin Banaskiewicz

12:13 – 12:21: Abhishek Bamby Alphonse

SIOS Online Conference Programme-2022

12:21 – 12:29: Muhammad Asaduzzaman
12:29 – 12:37: Tiankun Li
12:37 – 12:45: Jon Alvarez Justo
12:45 – 13:05: Sara Liburdi
Eva Bartoletti
Marco Salvatore
13:05 – 13:13: Delia Segato
13:13 – 13:21: Hanna Yevchun
13:21 – 13:29: Hsin-Wen Wu
13:29 – 13:37: Justyna Dudek
13:37 – 13:45: Matthias Henkies
13:45 – 13:53: Matteo Zucchetta

13:53 – 14:00: Discussion and/or break

14:00 – 15:50: Invited talks of the day

Convener: Sara Aparício and Shridhar Jawak

14:00 – 14:10: Introduction to Day 3. **Sara Aparício**

14:10 – 14:25: IcySea: An ice information app for navigation in polar regions. **Jakob Belter**

14:25 – 14:40: Biophysical characterization of summer Arctic sea ice habitats using a ROV-mounted Underwater Hyperspectral Imager. **Benjamin Lange**

14:40 – 14:50: Discussion and/or break

14:50 – 18:00: Cross-disciplinary session

Convener: Sara Aparício and Shridhar Jawak

14:50 – 15:05: Automated terrestrial laser scanning for snow and avalanche monitoring in Svalbard – a feasibility study. **Annelies Voordendag**

15:05 – 15:20: Inter-annual analysis of daily precipitation at Ny Ålesund. **Athulya R**

15:20 – 15:35: Observing relationships between sediment-laden meltwater plumes, glacial melt and a retreating terminus at Blomstrandbreen, Svalbard. **Guy D. Tallentire**

15:35 – 15:50: Terrestrial cover composition (FCover) retrieval in Svalbard Islands with the new generation of hyperspectral satellite sensors. **Serena Sapio**

15:50 – 16:05: Digital models from Svalbox: candidates for SIOS core data? **Kim Senger**

16:05 – 16:20: Understanding the destabilization of Kongsvegen, an Arctic surge-type glacier. **Ugo Nanni**

16:20 – 16:35: Applicability of Satellite and Airborne Hyperspectral Imagery for Classifying Snow and Landcover in Svalbard. **Sagar F. Wankhede**

16:35 – 16:50: A Machine-Learning Approach for Classification of Crevasse Provinces Applied to Study the Surge of Negribreen. **Ute Herzfeld**

1650 – 1700: Discussion and/or break

Appendix 1: Agenda of the Open RSWG meeting:

Date and Time: 13th October: 1730 to 1800

RSWG Chair: Ann Mari Fjæraa

SIOS Online Conference

Feedback from the first two days of the conference. e.g. programme, duration of talks, keynote speakers.

SIOS Monthly Webinar series:

Interested speakers, suggest speakers, suggest topics, panel discussion topics.

Reflections from ECR observer:

How shall we promote ECRs in RSWG?

Citizen science projects in Svalbard

Which research areas in Svalbard would be highly benefitted by citizen science initiatives?
Do we have simple field protocols that can be easily done by citizens or tourists?

Next year's training course requirements from the community

Requirements from participants
Suggest teachers, topics, and virtual activities.

Contact details:

SIOS Remote Sensing Officer <https://sios-svalbard.org/Staff#RemoteSensingOfficer>

Appendix 2: Keynote and invited talks

Peter Fretwell, BAS

Title: Satellite remote sensing of polar predators.

Abstract: An overview of BAS's Wildlife from space project. This project aims to develop methods and programmes to detect, monitor and study polar wildlife using remote sensing. At present we have projects on walrus, beluga whales, baleen whales, albatross, ice seals and penguins. Our focus is to develop automated techniques using spectral analysis, object based analysis and AI to identify and count these large vertebrates in very high resolution and medium resolution satellite imagery. This is often linked to ground calibration using UAVs or aerial imagery. These methods and the ever-increasing spatial and temporal resolution of satellite imagery is becoming a powerful tool to monitor polar wildlife in remote and inhospitable areas.

JC Landy, UiT

Title: Year-round sea ice thickness observations from CryoSat-2 and their relevance for seasonal forecasting and scientific studies around Svalbard

Abstract: Pan-Arctic sea ice thickness has been monitored by the European Space Agency SAR altimeter CryoSat-2 since 2010. However, ice thickness observations have so far been restricted to Arctic winter months (Oct-Apr) because conventional processing techniques fail to work when meltwater ponds accumulate at the ice surface during summer months. In this talk I'll describe new methods, including deep learning waveform classification and numerical modelling of the radar signal, applied to process the CryoSat-2 data in summer and obtain the first valid melt-season ice thickness estimates from space. The CryoSat-2 sea ice thickness data match well to independent observations from airborne campaigns in the Arctic, capturing the regional patterns and timing of sea ice melting rates.

Previous studies with sea ice models have demonstrated that weekly-monthly forecasts of future ice conditions can be improved by starting the forecasts with real sea ice thickness data. I will show here that new CryoSat-2 summer sea ice thickness data are strongly correlated with the pan-Arctic ice extent in September, at the end of summer, potentially enabling skillful forecasts of the ice extent at lead times >3 months. Improved sea ice forecasts would be valuable for human activities in the region around Svalbard. The year-round sea ice thickness data will also be combined with in situ observations from the SIOS-InfraNor and Nansen Legacy moorings to study ice-ocean interactions in the Barents Sea as part of a new NFR project: INTERAAC.

Johnny A. Johannessen, NERSC

Title: Arctic Changes Derived from Satellites and Models

Abstract: During the last 3 decades there has been a dramatic decline in Arctic sea ice extent, age and volume. This decline is assumed to be connected to global warming and the corresponding regional Arctic Amplification response triggering multidisciplinary coupled atmosphere, ocean and sea-ice interactive processes and mutual feedback. However, although we have gained good qualitative understanding of these processes and feedback mechanisms we still lack proper quantitative insight across a broad range of spatial and temporal scales. This is predominantly due to the limitation of the existing observing system to routinely collect collocated and multidisciplinary in-situ and satellite-based measurements. To advance the knowledge gap it is therefore necessary to design and implement a multi-modal data-driven analysis framework whereby one benefit from the synergy of satellite sensor measurements complemented with improved in-situ measurement capabilities and advanced tools including models, data assimilation and artificial intelligence. This will be highlighted in this presentation. The results are derived from the Arktalas project funded by ESA and led by NERSC with French partners from Ifremer, OceanDataLab and Novelities.

Frank Paul, University of Zurich (frank.paul@geo.uzh.ch)

This presentation is about creating a glacier inventory for Svalbard from optical satellite data, in particular the challenges related to long-lasting seasonal snow, frequent clouds, polluted ice, rock glaciers and debris-covered dead ice remaining from past glacier surges. The new inventory is compiled from datasets acquired at 2 days in 2017 and 1 day in 2016 (Nordaustlandet), facilitating assessment of climate change impacts compared to the temporarily more heterogeneous previous glacier inventory referring to 2000-2010.

Jakob Belter, Drift Noise

Title: IcySea: An ice information app for navigation in polar regions

Abstract: IcySea is a map-based application designed to display and deliver ice relevant information for operational purposes in the polar regions. It is addressed to national and local authorities, as well as to commercial and non-commercial users (for example: tourism, fisheries, research, offshore, and surveying vessels). The IcySea-backend structure merges high resolution satellite imagery and optimized bias corrected ice drift modeled data in an automated fashion. Data transmission to the IcySea-frontend client software occurs in near real time and is optimized for low bandwidth connections (tested and proven with an Iridium connection). The graphical user interface is designed to smoothly integrate with the work processes on board a ship and to enable quick navigational decision making. IcySea enables the user in the ice to capture the present and future dynamics of sea-ice whilst using high resolution Sentinel-1 radar satellite images for routing decisions. The service is available Arctic and Antarctic wide.

Benjamin Lange, NPI

Title: Biophysical characterization of summer Arctic sea ice habitats using a ROV-mounted Underwater Hyperspectral Imager

Abstract: The impact of a rapidly shifting sea ice cover on climate, ecosystem processes and biophysical habitat properties is not yet fully understood, particularly in the central Arctic Ocean, due to a lack of spatially representative observations. During leg 4 of the year-long Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC, June to August 2022) in the transpolar drift we deployed an underwater hyperspectral imager (UHI) mounted on a remotely operated vehicle (ROV) to characterize the biophysical properties of different sea ice habitats. We conducted UHI surveys along two transects: i) under level first-year sea ice (FYI), which had a mean sea ice draft of 1.4 m and was composed of primarily level FYI but also had a relatively thin ridge (keel depth ~2.6 m); and ii) under the flank of a ridge, Jaridge, with a mean ice draft of 1.7 m and was a mix of level ice and thicker ridge blocks with over 3 m draft. We present a new unsupervised bio-optical classification algorithm for hyperspectral surveys, the relative ice algal biomass index (RBI), using spectral mixture analysis (SMA). We compare this method to the supervised machine learning habitat classification algorithm, Support Vector Machine (SVM). The RBI showed good agreement to literature-based normalized difference indices (NDI) and PCA analyses, which further confirm the use of the RBI as reliable unsupervised index for ice algal

biomass. Our preliminary biophysical characterization of the two surveyed regions showed an association of sea ice algal biomass with sea ice ridge features. Our surveys also indicate that ice algal spatial distribution may be influenced by ice melt rates, and the formation of an under ice meltwater layer and false bottom ice. With high spatial coverage (> 100 m) at microscale resolution (~ cm) we documented large spatial variability of summer Arctic sea ice algae biomass and different patterns between adjacent but different coverage of ice habitats. Our results further demonstrate the need for improved understanding of sea ice algal spatial variability as a complementary tool for sea ice biogeochemical sampling using ice core.