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UAK 2020:
Research School in the Barents Sea with KV Svalbard

In support to
Useful Arctic Knowledge

Integrated Arctic Observation System

INTAROS

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Content.

Useful Arctic Knowledge.

The project **Useful Arctic Knowledge: partnership for research and education (UAK) is** funded by the INTPART programme 2018-2021 (International partnerships for excellent education, research and innovation) under the Research Council of Norway and the *Norwegian* Agency for *International Cooperation* and Quality Enhancement in Higher *Education (Diku).* The project, which includes partners from Norway, USA and Canada, brings together leading researchers, educators and young scientists working on selected Arctic science topics. The research school was also supported by the H2020 project INTAROS – Integrated Arctic Observation System, (http://intaros.eu, http://intaros.nersc.no).

The UAK researcher school aimed to address the different steps in the data delivery chain from development of data management plan, collection of data and securing meta data, processing and formatting data, and ingestion into a data system providing DOI. To address these topics the school included 3 sections. Prior to the cruise an introduction to Storfjorden environment, data management and preparation for cruise was given online the 18th of June (due to the CoVid 19).

The UAK research school on board KV Svalbard was held from 20-30 June. The goal of the cruise was to give master students' hands-on field work experience through participation in a scientific cruise. The students learned how to collect measurement and metadata within oceanography, underwater acoustic, and marine optics as well as recovery of Ocean Bottom Seismometers (OBS). During the cruise the participants were introduced to pre-processing and first glance of data and how to prepare data management plan. As part of the school practical introduction to collection and filtering of water samples were given. Water samples were collected for use in a Post Doc program at NPI within the 'Legacy of Nansen'.

The study area was in Storfjorden see map in Fig 1. This area was chosen because the collected oceanography data can be compared to previous data within oceanography. The Storfjorden oceanography and topics are described in the UAK Cruise plan. In total 27 CTD casts, 11 optical stations, and four acoustic experiments were carried out. Two out of three ocean bottom seismometers (OBS) were recovered.

In the fall 2020 the students participated in online workshops where they processed, formatted, and quality controlled the data before it was submitted to the Norwegian Marine Data Center together with required meta data.

Due to the CoVid19 situation the participants went through 10-day home quarantine prior to the cruise, and all workshops were held online.

In total 10 students at master level, and 7 lecturers/instructors participated. Students were selected from three departments of University of Bergen and Western Norway University of Natural Sciences.

Overview of the UAK 2020 cruise

UAK 2020 cruise started from Tromsø 20 June at 16:00 and end in Tromsø 08:00.

Daily schedule
07:30-08:15 Breakfast
08:00-08:30 Planning meeting at the Bridge (Hanne)
08:15 Meet at the agreed station.
09:00: Operation starts and ends 20:00 (see below)
15:45: Daily Brief – KV Svalbard (Hanne)
16:00: Leader meeting onboard (Hanne)
19:00: Plan meeting for next day with KV Svalbard (Nilsen, Espen, Hanne)
20:15: Sum up meeting (All)

The participants were divided into two teams.

Team A: Torunn (GFI), Frida (HVL), Julie (GEO), Håvard (IFT), Nil (GEO)
Team B: Astrid (GFI), Emilia (HVL), Malin (GEO), Matisas (IFT) Kristoffer (GEO).

First two measurements days Team A worked with oceanography and marine optics, and the Team B worked with underwater acoustics. Then the teams switched for two days.
The fifth day the students were divided into two groups for collecting and secure meta data. The oceanography and optic group consisted of Emilie, Torunn, Astrid, Malin, and Nil. The acoustic group consisted of Frida, Emilia, Håvard, Kristoffer, Mathias.

Instructors:
Acoustics: Espen Storheim (NERSC), Kjell Eivind Frøysa (HVL).
CTD measurements: Håkon Sandven, Espen Storheim, and Hanne Sagen
Optic measurements: Håkon Sandven
Water Samples: Tristan Petit
OBS operations: Zeinab Jeddi and Felix Halpaap.

Table 1. Time schedule. Times are given in local time.

Date	Location	Activity
18 June	**Bergen**	Online cruise meeting and webinars: Hanne Sagen: Presentation of the research school Eva Falck: Storfjorden Oceanography Peter Pulsifer: Data management (all participants)
20 June	**Tromsø (12:00-18:00)**	Lecturers and students arrived KV Svalbard 14:00-14:30. Safety briefing was given before we left harbor of Tromsø at 18:30.
21 June	**Transit to Storfjorden**	During the two days of transit. 13:00 -16:00 Lectures in optics given by Håkon and Tristan. Meeting with the ship leadership to plan the operations 20:15 – 21:30: Presentations about birds and fish given by Strøm /NPI) and Berg
22 June	**Transit and Calibration station**	09:00 – 13:00 Lectures in natural Hazard by Felix and Zeinab 13:00 – 16:00 Underwater acoustics 14:30 Brief – Officers, 18:15: Brief recruits (Hanne) CTD Calibration station: 74:50.187 N 17:56.066 E (22:00 (ish) local time) Transfer of 12 scientists from NPI and NTNU to Bjørnøya.
23 June	**Storfjorden**	At location 09:00. CTD Station 501-504. Spent time to show optic and oceanographic instrument's. Two stations with optic and water samples. Acoustic experiments with two boats 2.5 hours from 13:00. OBS-3 recovered.
24 June	**Storfjorden**	CTD Station 505-508, two of them with bottles (Felix) and optic instruments (Håkon). OBS 2 – localized in the morning, but after one hour not yet released. Acoustic experiments with two boats 2.5 hours from 13:00. (Foggy)
25 June	**Storfjorden**	CTD Station 509-513, three with bottles and optics. OBS 1 - recovered in the morning. Acoustic experiments with two boats approx. 2.5 hours from 13:00. (Foggy)
26 June	**Storfjorden**	CTD Station 530- 537 and Station UAK01-UAK05. Listen to OBS 2 – confirmed that it was there. Acoustic experiments with two boats approx. 2.5 hours 09-12. Acoustic experiment along and in vicinity of the CTD section. Nice weather, but relatively long waves causing movement of the instruments.
27 June	**Hornsund**	Hornsund for operation. Organizing and securing Meta data, and start work with the preprocessing.
28 June	**Transit and Bjørnøya**	Excursion to Bjørnøya. Complete the cruise report. Prepare and train for the presentations for the recruits.
29 June	**Transit**	9:00- 11:30: Presentations and explain the instruments to the recruits. 13:00- 17:00: Pack and clean the areas we have been using.
28-30 June	**Transit**	Transit back to Tromsø. We arrive at 08:00 and we move out of the ship. All rooms (cabins and lab area) should be properly cleaned before we leave.

Task 1. Oceanography

Authors: Astrid Stallemo, Torunn Sagen and Julie Knutsen.
Instructors: Espen Storheim, Håkon Sandven and Hanne Sagen.

During the cruise, we made 27 CTD cast at 26 stations in Storfjorden. They were obtained between June 23 – 26. The stations were based on a map of CTD station which UNIS use when they collect data from Storfjorden. We repeated 21 of the UNIS stations and added 5 extra stations, named UAK01-UAK05. The selected stations made two sections in Storfjorden. The stations ranging from 501 - 513 created an along-fjord section from the mouth towards the head of the fjord. The remaining stations, 530 – 537 and UAK01-05, created a cross-section in Storfjorden, along its sill. The stations UAK01-05 was added in order to expand UNISs' original cross-section westwards. From bathymetry, we saw a trench located in the western part of Storfjorden. The original cross-section has a low coverage of this area, and we wanted to cover this area as well. The expansion of the cross section might lead to new information about Storfjorden.

Two CTD instruments and six Niskin flasks were mounted on the frame. We used a Seabird (SBE 19*plus* V2) and a SAIV (model SD204). Both instruments were lowered to the same depth at all stations. The SAIV instrument was calibrated and would be used to calibrate the Seabird instrument. We wanted to use the data from the Seabird, as it is more accurate. See table for description of the instruments.

Table 2. Selected information about the CTD instruments used during the cruise.

	Temp (C°) accuracy	Temp (C°) resolution	Temp (C°) range	Conductivity accuracy	Conductivity resolution	Conductivity range
SBE 19*plus* V2	+/- 0.005	0.0001	-5 to +35	+/- 0.0005 S/m	0.00005 S/m	0 – 9 S/m
SAIV model SD204	+/- 0.01	0.001	-2 to +40	+/- 0.02 mS/cm	0.01 mS/cm	0 – 7 mS/cm

Figure 2. CTD casts.

At each station, we flushed the CTD before we started to record the measured data. In order to do that, we lowered the CTD to 20 m and brought it up to just below sea surface (ca 2 m). Then we started to record the data. We lowered the CTD to a target depth, which was 10 m above the echo depth measured by the ship. A "Bottom contact" sensor was installed as an extra safety step to avoid letting the CTD hit the ground. The "Bottom contact" sensor would be trigged when the 9 m long rope hanging underneath the CTD frame was exposed to a change in stress. This resulted in the target depth being approximately 10 meters shallower than the echo depth. The rope was a security to avoid crashing the CTD in the bottom. However, the stress in the rope could be changed due to different factors. Resulting in the "Bottom contact" sensor being trigged without truly hitting the bottom, or not being triggered even if the rope hit the bottom.

The CTD information was collected during the downcast, while all the water samples were collected with the Niskin flasks on the way up to the surface. The first Niskin flask was fired at the bottom. Then, the following Niskin flasks was fired at approximately 50, 20, 10 and 5 meters. The water samples from the Niskin flasks would be used to optical analysis. At some stations, we sampled water with the Niskin flasks in order to practice operating the CTD from the Control Room/Lab, but the water samples were not used for further optic analysis. Out of the total 26 stations, we sampled water at 15 stations.

The maximum speed to lower the CTD is about 1 m/s. This limit is in order to have a good resolution of the water column. We aimed to lower the CTD with a speed of about 0.5-0.8 m/s. Where the bottom was shallow, we lowered it slower to avoid hitting the bottom with a high speed.

The raw-data from the Seabird were converted into CNV-files with SBE Data Processing. The instruments were not connected to a GPS, so time, latitude and longitude were manually added to the CNV-data-file from every station. We used an old CNV-file as a template to see how these variables were written in the data-file. After these were added, we were able to visualize the data, such as temperature and salinity vs depth, in the Ocean Data View. We observed spikes in the plots, but this can be improved by aligning temperature and conductivity with pressure (not completed).

The SAIV SD204 - SN 829 instrument was attached to the rosette to provide data to "calibrate" the Seabird instrument. This instrument provides *.sd2 files. The files were not processed during the cruise. The steps are to extract the text files with the samples from the CTD. Then we compute the salinity from conductivity, and add time and position. This is stored in a text file. At the end, we select the part of the cast we want, which is the down-cast.

Task 2. Marine Optics measurements.

Authors: Malin Lunde and Nil Eryilmaz,
Instructors: Håkon Sandven, Tristan Petit

Marine optics are investigations of light properties in the ocean by satellites or in-situ measurements. Active in-situ measurements are done by an instrument that has a source and a detector. In optics, a source sends out light towards a detector. On the path, the light is absorbed and scattered by organisms and other particles in the water. We can therefore use the information from such measurements on the UAK cruise 2020 to get information about the properties of the particles in the Barents Sea and Storfjorden.

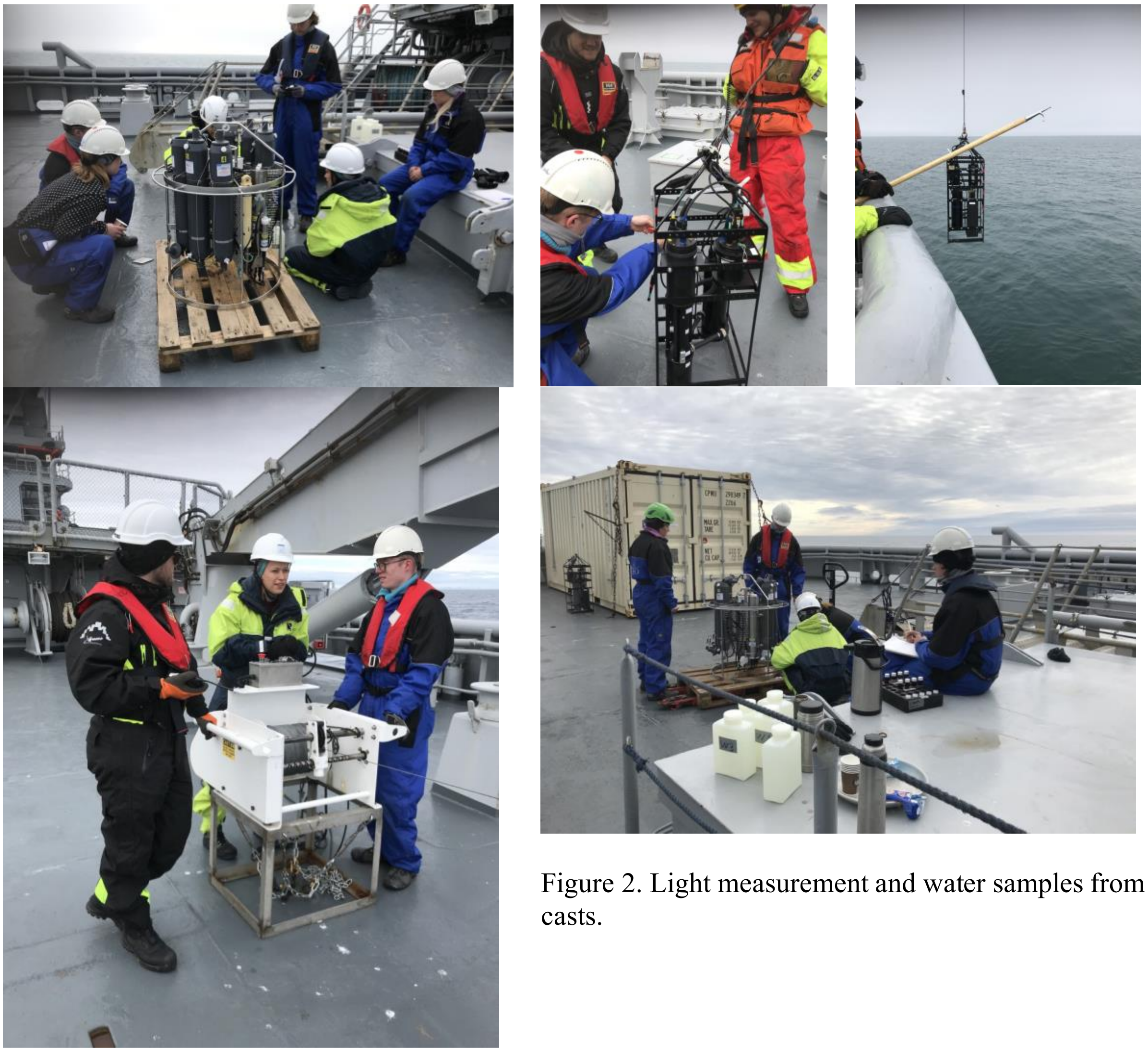


Figure 2. Light measurement and water samples from CTD casts.

AC-S instrument:

This instrument measures attenuation (c) and absorption (a) by sending out light from two sources towards detectors. The pathway for the light is 25cm and the wavelength is 400 to 750nm. The light emitted is within a reflective tube so that most of the scattered light is reflected by the tube wall and eventually reaches the detector. From the difference between a and c we can calculate the scattering coefficient (b). The instruments have some error sources. The attenuation can be under-estimated because some of the scattered light is sent forward at an angle less than $0{,}9^0$ and therefor is not detected as scattered light but as the original light. The absorption can also be over-estimated because some of the light that are scattered at higher than 40^0 is not detected and therefor registered as absorbed light. We also have to correct for temperature and salinity differences, thus CTD data is needed for high-quality measurements.

In addition, we took some water samples from the same depths as the AC-S instrument measured. The water samples are then analyzed in another instrument called LWCC, that measures the absorption of the CDOM. CDOM is colored dissolved organic matter which is everything that is smaller than 0,2µm. The results from the AC-S instrument can be compared and correlated with the results from the LWCC. The measurement method of LWCC is much slower compared to AC-S and have lower vertical resolution, however the results are more accurate.

LISST-VSF measurements:

This instrument measures the volume scattering function (VSF) and attenuation at wavelength of 515nm. VSF is a quantity that describes the amount of light scattered at a certain angle. This can be integrated over all angles and the scattering coefficient (b) Is retrieved. The instrument consists of a source that emits light toward a ring detector. In addition, there is an eyeball detector that detects the scattered light at angles above 14^o. This instrument can be used to investigate size and composition of the particles in the water and to correct the AC-S measurements.

Optics measurement procedure

Optical measurements were done at selected CTD stations. Niskin bottles were used in different depths which were decided by the anomalies in the CTD result diagram for specified depth. Five Niskin bottles out of six were used to get the water samples from different depths, as the instrument was taken up to the vessel. The Niskin bottles which have 4 litres of water capacity were poured into different containers to be used for different analyse purposes. Larger amounts of water sample were taken for the particle measurements of TSM (Total Suspended Matter), whereas small amount of it were taken for O18 measurements. CDOM and FDOM water samples out of Niskin bottles were taken by using external in-situ filtration apparat. Some of the analysis procedures were done right after the samples were taken, the rest is stored for further laboratory analyses.

After the CTD cast, a LISST-VSF profile was made. The instrument was first sent to 2-4 m for warm-up (approx. 1 minute, using the pressure start condition), before it was brought to the surface to start the profile. On the down-cast, the LISST-VSF was lowered with a speed of approx. 0.1-0.2 m/s down to maximum 50 m (only data from the down-cast is used in the data set). Afterwards, the ac-s was deploy first a pre-flushing at around 20 m for 3-5 min, followed by a profile down to close to the bottom (speed ~0.7 m/s). LISST-200X was done at three stations (to the bottom) using the LISST-VSF protocol (but higher speed).

Task 3. Acoustic measurements.

Authors: Emilia Botnen Van den Bergh, Frida Klockmann, Håvard Råheim Økland, Kristoffer Tesdal Galtung, Matias Helleve.

Instructors: Kjell Eivind Frøysa, Espen Storheim

During the UAK 2020 we had four days of acoustic experiments where we did both passive and active acoustics. We drove some distance away from KV Svalbard on two small boats (Sjøbjørn) with the crew and communicated with each other by radio and used GPS for getting positions and echo sounder for depth.

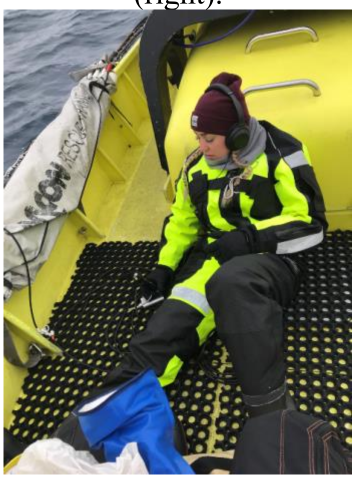
The purpose of the activity was to introduce the students to real field experiments in underwater acoustics, and to the handling and processing of the data collected. The receiver boat went out first and listened to the surrounding sounds (Passive acoustics). Thereafter acive acoustics was applied by sending acoustic signals from one boat to the other boat. All times referred to in the report are in UTC. For the underwater acoustic part we used these instruments:

- Hydrophone (Receiver):
    - Type: SQ 26
    - Band width (-3 dB): 80 Hz– 30 kHz
    - Sensitivity: -167dB rel. 1 µPa
- Recorder
    - Zoom H1n
        - Sampling frequency: 48 kHz (used here)
        - Sampling bit resolution: 24 bit
- Head set:
    - First day: SonyWH900N
    - Second day: Sony WH-1000MX3
    - Third day: Sony WH-1000MX3
    - Fourth day: Sony WH-1000MX3
- Source
    - Transducer: KUM K/MT P.A.C.S.
        - Bandwidth: 7.5 – 15 kHz
    - Deck unit: Edgetech 8011M
- Cast Away CTD

Small boats were used to get away from the ship.

Acoustic transducer (left) transmitting acoustic commands to be received on the hydrophone (right).

Students transmitting the sound signals.



Reception of signals using hydrophone over the side of the small boat

Task 4. Recovery of the Ocean Bottom Seismographs (OBS)

Authors/Instructors: Zeinab Jeddi and Felix Halpaap

Seismic activity in Storfjorden increased after a magnitude Mw = 6.2 event on 21th of February 2008. The increased level of seismicity persists until present. Continuous monitoring of the seismicity from close range is important to resolve the seismic activity better than is possible with the permanent land based seismic stations. For monitoring at close range, the seismology group of UiB deployed three OBSs in Storfjorden in August 2019. During the UAK cruise, these instruments were to be recovered with one year of continuous signals recorded (see Table 1 and Figure 3 for deployment location).

To initiate the recovery process, the vessel stopped at about 200 m away from the deployment location and the transducer of the acoustic deck unit was lowered into the water. By sending a special command (unique for each OBS - see Table 2), the acoustic releaser of the OBS was enabled. This was followed by some range measurement to get an idea about the distance between the OBS and the vessel. After receiving an appropriate response back from the instrument, the OBS was released from the anchor. As the anchor is the largest weight of the instrument setup, releasing the OBS from the anchor has the effect that the floatation holding the instrument moves toward the surface. The ascension time depends on the deployment depth, undersurface streams and weather condition. While ascending, we ranged the OBS a couple of times through the acoustic unit to assure ourselves that the instrument was moving upward.

For STOR1 and STOR3, the instruments' response for different commands (enable, range and release) was as expected. The ascension time was between 2-3 minutes (deployment depth: 120-150 m) and we were able to spot the instruments by the attached flag in about 5 minutes after sending the release command. The instrument is reached with a small boat and proceeded to pull the OBS onto the main deck by crane. The two other localization systems (flasher and radio beacon) failed during the recovery. While inspecting instruments on the deck, we realized that there was a thin cover of sediment on the flashers which disabled them from working properly. Once clean, we moved the OBSs to the lab for the data recovery. Figure below shows an example of recorded data.

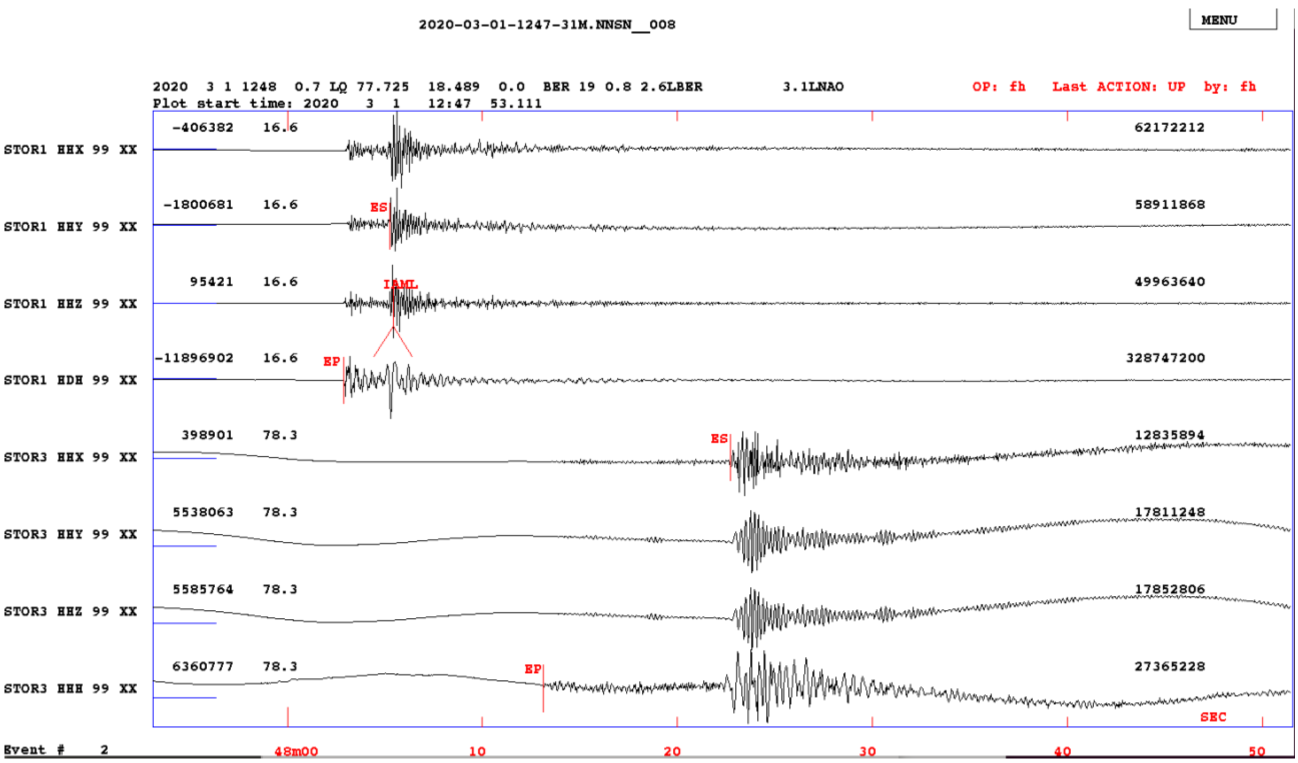
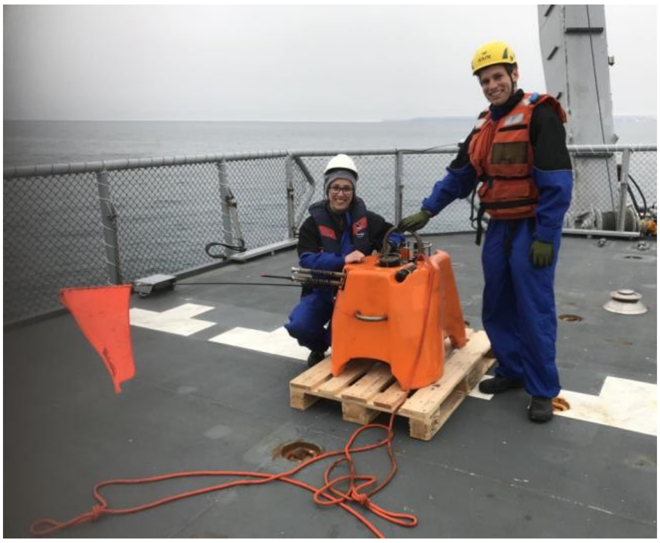


Figure 3: An example of magnitude 2.6 earthquake recorded in STOR1 and STOR3. Each station has four channels (vertical: HHZ, horizontal: HHX and HHY and hydrophone: HDH).

For STOR2, we were able to communicate with the instrument. For the commands "enable", "range" and "release", the instrument sent the expected response. The "range" command after releasing the STOR2 didn't show that the instrument was moving upward. The second "release" command indicated that instrument was still in vertical position and attached to the anchor (16 pings instead of 7 pings for horizontal position). Our initial assessment of the situation is that the instrument is likely trapped in sediment, or that only the hook of the releaser is not able to open properly. Weak battery on the release unit could also be the reason for such an issue. We repeated the same procedure after two days on the way back south. Once again, we established a high-quality communication with the instrument, but it remained on the seafloor upon sending the release command.



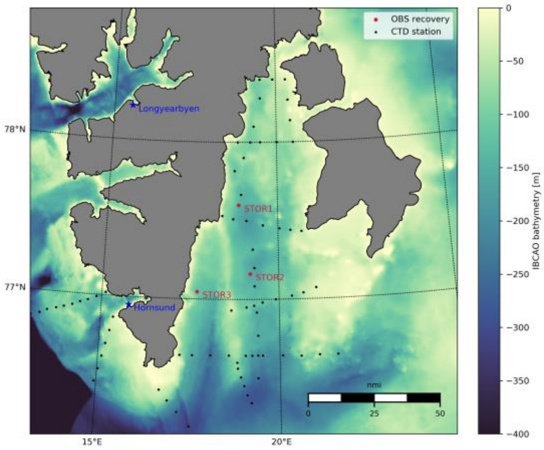


Figure 3. Recovery of the OBS stations (STOR1, STOR2 and STOR3). Transmission of enabling, ranging and release codes to locate and recover the OBS were sent approcimately 200 meters away from the location .

Tables 1 and 2 present the metadata for the Storfjorden deployments.

Table 1: *Deployment positions for OBS instruments in Storfjorden.*

Station	Latitude (°)	Longitude (°)	Depth (m)	Deployment time	Sand sheet	Firmware
STOR1	*77.5981 N*	*18.8531E*	*150*	*2019-08-20 21:40*	*Yes*	*1.3.4*
STOR2	*77.162 N*	*19.186 E*	*150*	*2019-08-20 14:51*	*Yes*	*1.3.4*

STOR3	*77.047 N*	*17.6764 E*	*120*	*2019-08-20 09:00*	*Yes*	*1.3.4*

Table 2: *Recovery information of OBS in Storfjorden (June 2020)*

Station	**Recovery Time (on deck)**	**Data (GB)**	**Skew (micro sec)**	**Comment**
STOR1	2020-06-24 19:10	43.8	-2441181	Flasher and radio beacon didn't work
STOR2	-	-	-	Not recovered (see text)
STOR3	2020-06-23 20:58	43.8	-927878	Flasher and radio beacon didn't work

Data management

Collecting in situ data in Arctic waters requires substantial time and resources. Such data are unique and provide invaluable information about the state of the ocean and of marine mammals and birds. Therefore, it is crucial that these data are handled according to established practices for scientific data management, ensuring secure long-term storage in standard formats with ample documentation (e.g. descriptions of parameters contained and their units (i.e. metadata), instrument and processing specifications), publicly available through online data systems that offer facilities for data search and access, visualisation and downloading.

The most widely accepted practice for data management is the FAIR Data Principles (Figure 4), which states that data must be

- Findable (searchable through an open online data system)
- Accessible (downloadable through links in the metadata)
- Interoperable (possible to read/write with standard libraries or tools)
- Reuseable (having sufficient documentation for other scientists to use)

Each of these principles requires careful planning and execution, with regular check points and follow up activities to ensure collected data is made available in a timely manner. A dedicated document - the Data Management Plan (DMP) - are used to describe the data to be collected or estimated, as well as the procedures for carrying out the needed activities for producing a FAIR compliant dataset. A template for the DMP were provided before the cruise along with instructions for how to complete it.

Figure 4: FAIR Data Principles (Image source: CGIAR).

Before the cruise, general principles for data management and how to generate a Data Management Plan were presented, together with a set of metadata sheets for each category of data planned to be collected during the summer school. These metadata sheets were used in the lab exercises onboard KVA Svalbard, after the data collection to record the needed description (metadata) of the individual dataset. In addition, an online tool called Rosetta for converting ASCII files to NetCDF/CF was presented before the cruise. Students uses Rosetta after the cruise to generate NetCDF/CF files for their CTD and marine optics data. The metadata and datasets in standards formats were published through the Norwegian Marine Data Centre (NMDC), with support from the instructors.

The dates and titles of presentations and group work on data management are as follows:

- 18 June 2020: Lectures on data management before the research
  - Peter Pulsifer: Introduction to data management, data management plan
  - Torill Hamre: Metadata for data processing and storage
  - Frode Monsen: Rosetta format conversion tool
- 6 October 2020: Group work on publishing acoustic data
  - Torill Hamre, Espen Storheim and Kjell Eivind Frøysa: Data Publication Moi
- 7 October 2020: Group work on publishing oceanographic (CTD) data
  - Torill Hamre, Frode Monsen and Espen Storheim: Data Publication Workshop Session 2 – Oceanography
  - Frode Monsen: Rosetta data transformation tool (for CTD data)
- 14 October 2020: Group work on publishing marine optics data
  - Torill Hamre, Frode Monsen and Håkon Sandven: Data Publication Workshop Session 3 – Ocean light
  - Frode Monsen: Rosetta data transformation tool (for marine optics data)
- 16 October 2020: Group work on seismic data
  - Felix Halpaap: Natural hazards in the Arctic Special Focus on Seismological Data Monitoring and Processing

The instructors for data management presented general principles for Data Management, the DMP template and the Rosetta format conversion tool prior to the cruise. Based on the DMP instructions, the instructors for each geo-scientific topic (oceanography, marine optics, acoustics, geohazards) filled in a data management plan for their data. These plans are found in the appendix of this report. After the cruise, data management and geo-sciences instructors jointly organised a set of four workshops to prepare collected data for publication. For two of the topics (oceanography, marine optics) the Rosetta tool was used to prepare NetCDF files for the datasets. For the two remaining topics (acoustics, geohazards) the data files generated during the cruise were used for visualisation and publication of data (e.g. WAV format for active and passive acoustic data). For all topics, a metadata record was prepared for each dataset to register the dataset in NMDC.

Published data

The following datasets have been published in the Norwegian Marine Data Centre as a result of the UAK 2020 Researcher School:

1. **CTD data collected in Storfjorden, Svalbard, during the UAK 2020 Cruise**
   DOI: https://doi.org/doi:10.21335/nmdc-nersc-758932911
   Catalog entry: https://catalog-intaros.nersc.no/dataset/ctd-data-collected-in-storfjorden-svalbard-during-the-uak-2020-cruise

2. **UAK - Active and Passive Acoustic data - 23 Jun 2020**
   DOI: https://doi.org/doi:10.21335/NMDC-NERSC-1373893755
   Catalog entry: https://catalog-intaros.nersc.no/dataset/uak-active-and-passive-acoustic-data-23-jun-2020

3. **UAK - Active and Passive Acoustic data - 24 Jun 2020**
   DOI: https://doi.org/doi:10.21335/NMDC-NERSC-71625140
   Catalog entry: https://catalog-intaros.nersc.no/dataset/uak-active-and-passive-acoustic-data-24-jun-2020

4. **UAK - Active and Passive Acoustic data - 25 Jun 2020**
   DOI: https://doi.org/doi:10.21335/NMDC-NERSC-911275918
   Catalog entry: https://catalog-intaros.nersc.no/dataset/uak-active-and-passive-acoustic-data-25-jun-2020

5. **UAK - Active and Passive Acoustic data - 26 Jun 2020**
   DOI: https://doi.org/doi:10.21335/NMDC-NERSC-1027351247
   Catalog entry: https://catalog-intaros.nersc.no/dataset/uak-active-and-passive-acoustic-data-26-jun-2020

6. Optical property measurements collected in Storfjorden, Svalbard, during the UAK 2020 Cruise
   DOI: https://doi.org/doi:10.21335/NMDC-NERSC-1741962272
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NMDC assigned a Digital Object Identifier (DOI) to each dataset, enabling unique identification and citation. Datasets collected during the cruise were registered in the INTAROS Data Catalogue (https://catalog-intaros.nersc.no/), making them also available to the international scientific community. The catalogue entries above provide descriptions of the individual datasets and link to the data files (through the DOI). All data files are stored in the NERSC THREDDS Data Server.

APPENDIX 1: CTD CASTS – Meta data

	CTD CALIBRATION			UAK	2020		KV Svalbard		Cruise # UAK	
UNIS	Date	Start time (UTC)	Start latitude/ N		Start longitude/ E		Echo depth	Water samples	Optics	Comments
station #	ddmmyyyy		deg	min	deg	min	m	y/n (nr.)	y/n	
501	23/06/2020	07.43.00	76	29,98	19	23,8	243	y (5)	y	Full station - CTD, water samples and optics.
502	23/06/2020	10:38	76	38,77	19	24,37	198	y (5)	y	Full station - CTD, water samples and optics. First cast on station 502
502	23/06/2020	11:13	76	38,72	19	23,25	197	n	n	Second cast on station 502. Named 503 in the written note sheet. No calibration CTD.
503	23/06/2020	14:49	76	46,2	19	24,18	154	n	n	Named 504 in the written note sheet.
504	23/06/2020	16:03	76	54,9	19	21,78	148	n	n	Named 505 in the written note sheet.
505	24/06/2020	10:44	77	4,93	19	18,38	152	y (5)	y	Full station - CTD, water samples and optics. Noted down as "505 correct" in the written log sheet
506	24/06/2020	13:33	77	11,93	19	17,84	174	y(5)	n	Water samples for practice
507	24/06/2020	14:40	77	18,98	19	15,37	140	y(5)	n	
508	24/06/2020	16:24	77	30,05	19	4,33	176	y(5)	y	Full station - CTD, water samples and optics.
509	25/06/2020	7:24	77	39,9	18	55,03	144	y (5)	y	Full station - CTD, water samples and optics.
510	25/06/2020	09:36	77	49,02	18	43,58	115	y (5)	n	SAIV off, practise water sampling
511	25/06/2020	12:42	77	54,00	19	00,14	97	y (5)	y	Full station - CTD, water samples and optics.
512	25/06/2020	15:31	78	00,09	19	12,44	102	n	n	
513	25/06/2020	16:30	78	05,99	19	17,89	90	y (5)	y	Full station - CTD, water samples and optics.
530	26/06/2020	07:05	77	4,21	21	3,03	24	y (2)	n	dønninger denne dagen
531	26/06/2020	08:02	77	02,35	20	41,07	61	y (5)	y	Full station - CTD, water samples and optics.
532	26/06/2020	09:30	77	01,22	20	21,70	112	n	n	
533	26/06/2020	10:45	76	59,91	19	53,95	113	n	n	
534	26/06/2020	11:32	76	58,79	19	30,99	121	n	n	
535	26/06/2020	12:11	76	57,66	19	16,90	119	y (5)	y	Full station - CTD, water samples and optics. Sving på kran mellom 50m og 10m
536	26/06/2020	13:44	76	56,99	19	04,84	102	n	n	
537	26/06/2020	14:39	76	55,70	18	38,93	41	n	n	No end position or time recorded on the bridge
UAK01	26/06/2020						163	n	n	No start position or time recorded on the bridge
UAK02	26/06/2020	16:10	76	54,01	17	59,73	159	y(5)	y	Full station - CTD, water samples and optics. Sving på kran mellom 50m og 10m
UAK03	26/06/2020	17:36	76	53,66	17	49,73	149	n	n	
UAK04	26/06/2020	18:20	76	53,11	17	35,07	124	n	n	
UAK05	26/06/2020	19:00	76	52,88	17	20,32	40	y(5)	y	Full station - CTD, water samples and optics. Sving på kran mellom 50m og 10m

APPENDIX 2: Optical station

Metadata ac-s profiles

File #	Meas. #	Date	Start time	End time	Start latitude		Start longitude		End latitude		End longitude		Echo	Instrument	Comment
		yrmmdd	hhmm (UTC)	hhmm (UTC)	Deg	Min	Deg	Min	Deg	Min	Deg	Min	depth	max depth	(other relevant information)
035	Test	200622	18:24	–	–	–	–	–	–	–	–	–	–	–	
036	501	20200623	08:25	08:49	76	29.89	19	23.86	76	30.04	19	22.98	244	226	
037	502	20200623	11:40	12:05	76	38,48	19	23,38	76	38,60	19	24,45	197	181	
038	505	20200624	10:25	10:32	77	05,10	19	18,09	77	05,14	19	18,18	153	150	
039	508	20200624	15:28	15:43	77	30,02	19	04,48	77	30,15	19	04,87	175	163	
040	509	20200625	07:47	08:00	77	39,90	18	55,10	77	39,89	18	55,11	143	131	
041	511	20200625	13:21	13:38	77	53,96	19	00,11	77	53,98	18	59,93	97,7	97,7	Bottom contact, logger stopped during the flushing
042	513	20200625	17:23	17:35	78	05,94	19	18,07	78	05,86	19	17,87	92,1	47	Logger stopped at 47 m.
043	531	20200626	08:40	08:50	77	02,84	20	41,00	77	02,34	20	40,96	62	57	
044	535	20200626	13:05	13:19	76	57,62	19	17,05	76	57,53	19	15,96	122	104	
045	UAK02	20200626	16:54	17:10	76	54,05	17	59,88	76	54,10	17	59,79	159	130	
046	UAK05	20200626	19:34	19:44	76	52,88	17	20,61	76	52,85	17	20,62	43	39	

Metadata LISST-VSF profiles

File #	Meas. #	Date	Start time	End time	Start latitude		Start longitude		End latitude		End longitude		Echo	Instrument	Comment
		yrmmdd	hhmm (UTC)	hhmm (UTC)	deg.	min	deg.	min	deg.	min	deg.	min	depth	max depth	(other relevant information)
V1750901.VSF	501	200623	0903	0915	76	29.90	019	24.13	76	29.89	019	24.01	244	51	
V1751111.VSF	502	200623	1112	1125	76	38.58	019	22.95	76	38.78	019	23.11	199	51	
V1760932.VSF	505	200624	0933	0943	77	4.93	019	18.14	77	04.98	019	18.38	152	50	
V1761500.VSF	508	200624	1502	1510	77	30.05	019	4.18	77	30.15	019	04,20	173	48	
V1770746.VSF	509	200625	0809	0826	77	39.89	018	55.14	77	49.89	018	55.06	143	50	
V1771302.VSF	511	200625	1303	1315	77	53.98	019	0.11	77	53.96	019	00,16	97.7	50	
V1771655.VSF	513	200625	1656	1509	78	5.97	019	17.88	78	05.89	019	17.63	90.9	51	
V1780822.VSF	531	200626	0823	0832	77	2.34	020	40.97	77	02,34	020	40.99	62	50	
V1781236.VSF	535	200626	1234	1247	76	57.45	019	15.59	76	57.54	019	14.39	127	49	
V1781638.VSF	UAK02	200626	1639	1650	76	54.02	018	0.02	76	54	017	59.9	159	51	
V1781920.VSF	UAK05	200626	1919	1930	76	52.87	017	20.49	76	52.88	017	20.59	42	40	

Metadata LISST-200X profiles

File #	Meas. #	Date	Start time	End time	Start latitude		Start longitude		End latitude		End longitude		Echo	Instrument	Comment
		yymmdd	hhmm (UTC)	hhmm (UTC)	Deg	Min	Deg	Min	Deg	Min		Min	Depth	max depth	(other relevant information)
L1751245.RBN	502	200623	12:49	13:01	76	38,81	019	23,90	76	38,90	019	24,09	198	191	Outside sill
L1761549.RBN	508	200624	15:57	16:06	77	30,00	019	04,97	77	30,10	019	05,34	173	167	Inside sill
L1771343.RBN	511	200625	13:45	13:54	77	53,99	018	59,85	77	54,02	018	59,72	98	92	On slope in inner part of the fjord

APPENDIX: Acoustic Measurements

Day 1: June 23, 2020

Key words: deep water, receiver at one location, several source locations.

Passive Acoustics

Start time: 11:23
Start Position
Longitude: 19 ˚21.72'
Latitude: 76 ˚35.27'

End time 12: 10
End Position
Longitude: 19 ˚22.78'
Latitude: 76 ˚35.73'

File names:

- Recording:
  - UAK-ACOUSTICS-2020-06-23-PASSIVE-1.wav
- Video at hydrophone (continuously, also covering active part):
  - UAK-ACOUSTICS-2020-06-23-VIDEO-HYDROPHONE-1.wav
  - UAK-ACOUSTICS-2020-06-23-VIDEO-HYDROPHONE-2.wav
  - UAK-ACOUSTICS-2020-06-23-VIDEO-HYDROPHONE-3.wav
  - UAK-ACOUSTICS-2020-06-23-VIDEO-HYDROPHONE-4.wav
  - UAK-ACOUSTICS-2020-06-23-VIDEO-HYDROPHONE-5.wav

Recorder gain: 5 at first, then 10 after 2 minutes
Use of drift anchor: no
Nominal receiver depth at 20 meters the entire experiment.

Active Acoustics

File names:

- Recordings:
  - UAK-ACOUSTICS-2020-06-23-ACTIVE-1.wav

- Video at source:
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-1.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-2.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-3.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-4.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-5.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-6.wav
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SOURCE-7.wav
- Video at KV Svalbard
    - UAK-ACOUSTICS-2020-06-23-VIDEO-SVALBARD-1.wav

Recorder gain:10

ME JTC)	S LONG	S LAT	DEPTH (M)	R LONG	R LAT	DEPTH (M)	DIST (M)	SIGNAL SENT	AUDIBLE PINGS RECEIVED
12:36	19 ° 24.0’	76 °35.6’	20			20	750	3 pings	3 pings
12:40			20	19 ° 23.39’	76 ° 35.98’	20			
12:43	19 ° 23.3’	76 ° 35.5’	20			20	980	3 pings	Not Received
12:45			20	19 ° 23.47’	76 ° 36.03’	20			
12:48	19 ° 23.3’	76 ° 35.2’	20			20	1650	3 pings	Not Received
12:50			20	19 ° 23.55’	76 ° 36.09’	20			
12:52	19 ° 23.3’	76 ° 34.9’	20			20	2280	3 pings	Not Received
12:55			20	19 ° 23.62’	76 ° 36.13’	20			
12:58	19 ° 23.5’	76 ° 34.4’	20			20	3300	3 pings	Not Received
13:00			20	19 ° 23.72’	76 ° 36.18’	20			
13:05[1]			20	19 ° 23.81’	76 ° 36.21’	20			
13:10	19 ° 23.8’	76 ° 33.9’	20	19 ° 23.89’	76 ° 36.25’	20	4350	3 pings	3 pings
13:15			20	19 ° 23.94’	76 ° 36.30’	20			
13:18	19 ° 23.9’	76 ° 33.4’	20			20	5440	3 pings	3 pings
13:20			20	19 ° 23.97’	76 ° 36.34’	20			
13:24	19 ° 23.9’	76 ° 32.9’	20			20	6450	3 pings	3 pings
13:25			20	19 ° 24.04’	76 ° 36.38’	20			

[1] KV Svalbard started moving

Sent a ping from KV Svalbard at 12.35 at longitude 19 ˚ 23.71' and Latitude 76 ˚ 38.73'. Distance to receiver (hydrophone) 5090 m.

Sea conditions, Day 1.

Day 2: June 24, 2020

Key words: deep water, receiver at one location, several source locations.

Passive Acoustics

Start time: 13:23
Start Position
    Latitude: 77 ˚23.046'
    Longitude: 19 ˚13.831'
End time 13.39
End Position
    Latitude: 77 ˚ 23.091'
    Longitude: 19 ˚13.677'

File names:

- Recording (same file active and passive):
  - UAK-ACOUSTICS-2020-06-24-PASSIVE-ACTIVE-1.wav
- Video at hydrophone (active and passive):
  - UAK-ACOUSTICS-2020-06-24-VIDEO-HYDROPHONE-1.wav
  - UAK-ACOUSTICS-2020-06-24-VIDEO-HYDROPHONE-2.wav
  - UAK-ACOUSTICS-2020-06-24-VIDEO-HYDROPHONE-3.wav
  - UAK-ACOUSTICS-2020-06-24-VIDEO-HYDROPHONE-4.wav
- Video at source:
  - None

Recorder gain: 10
Use of drift anchor: yes

Other small boat arrives at 13.30
Nominal receiver depth at 20 meters the entire experiment.
Comment: diving birds detected on UAK-ACOUSTICS-2020-06-24-VIDEO-HYDROPHONE-2.wav

Active Acoustics

File names: see under "Passive Acoustics"
Recorder gain: 10

TIME (UTC)	S LONG	S LAT	S DEPTH (M)	R LONG	R LAT	R DEPTH (M)	DIST (M)	SIGNAL SENT	AUDIBLE PINGS RECEIVED
13:43[1]	19 °14.00'	77 °23.60'	20	19 °13.712'	77 °23.116'	20	**900**	5 Pings	Not Recived
13:51	19 °13.90'	77 °24.20'	20	19 °13.677'	77 °23.168'	20	1910	7 Pings	7 pings
13:58	19 °13.55'	77 °24.58'	20	19 °13.634'	77 °23.196'	20	2560	2 Pings	Not Recived
14:06	19 °13.25'	77 °25.11'	20	19 °13.626'	77 °23.226'	20	3490	4 Pings	4 pings
14:10	19 °13.11'	77 °25.61'	20	19 °13.608'	77 °23.255'	20	4370	10 Pings	9 pings
14:16[2]	19 °12.10'	77 °26.11'	20	19 °13.585'	77 °23.399'	20	5060	8 Pings	7 pings
14:22[3]	19 °12.35'	77 °26.61'	20	19 °13.559'	77 °23.390'	20	5980	5 Pings	2 pings
14:29	19 °11.93'	77 °27.10'	20	19 °13.516'	77 °23.367'	20	6940	6 Pings	4 pings

14:44	19 °11.15'	77 °28.10'	20	19 °13.440'	77 °23.451'	20	8660	4 Pings	Not Recived

[1] Possible animal sound
[2] Possible seal. Signal sent two times, Not received first time.
[3] Vroom sound

Sea conditions, Day 2.

Day 3: June 25, 2020

Key words: Shallow water, small ice bergs, glacier not far away. Two receiver locations with passive acoustics and two receiver locations at active acoustics.

Passive Acoustics

This day we did passive acoustics in two locations:

Location 1:
Start time: 11. 29

Start Position

Latitude: 77 ˚ 51.31’

Longitude: 18 ˚ 29.35’

End time 11. 55

End Position

Latitude: 77 ˚ 51.36’

Longitude: 18 ˚ 29.24’

File names:

- Recordings:
  - UAK-ACOUSTICS-2020-06-25-PASSIVE-1.wav
- Video at hydrophone:
  - UAK-ACOUSTICS-2020-06-25-VIDEO-HYDROPHONE-1.mp4
  - UAK-ACOUSTICS-2020-06-25-VIDEO-HYDROPHONE-2.mp4
  - UAK-ACOUSTICS-2020-06-25-VIDEO-HYDROPHONE-3.mp4

Recorder gain: 10

Use of drift anchor: yes

Comment: noise relating to piece of ice berg falling off

Location 2:

Start time: 12.12

Start Position

Latitude: 77 ˚ 53.29’

Longitude: 18 ˚ 22.57’

End time: 12.33[1]

End Position

Latitude: ≈77 ˚ 53.29’

Longitude: ≈18 ˚ 22.57’

File names:

- Recordings (passive and active acoustics):
  - UAK-ACOUSTICS-2020-06-25-PASSIVE-ACTIVE-1.wav
- Video at hydrophone:
  - UAK-ACOUSTICS-2020-06-25-VIDEO-HYDROPHONE-4.mp4

- UAK-ACOUSTICS-2020-06-25-VIDEO-HYDROPHONE-5.mp4

Recorder gain: 10
Use of drift anchor: yes

[1] Started receiving pings, but in same file.

Comment: hydrophone touched sea bottom.

Nominal receiver depth at 20 meters. Depth adjusted to 4 metres after sea bottom was touched.

Active Acoustics

File names:

- Recordings:
  - UAK-ACOUSTICS-2020-06-25-PASSIVE-ACTIVE-1.wav (ZOOM0013.wav) (same as in "Passive Acoustics")
  - UAK-ACOUSTICS-2020-06-25-ACTIVE-1.wav
  - UAK-ACOUSTICS-2020-06-25-ACTIVE-2.wav
- Video at hydrophone:
  - See "Passive Acoustics"
- Video at source
  - UAK-ACOUSTICS-2020-06-25-VIDEO-SOURCE-1.mp4
  - UAK-ACOUSTICS-2020-06-25-VIDEO-SOURCE-2.mp4

TIME (UTC)	S LONG	S LAT	S DEPTH (M)	R LONG	R LAT	R DEPTH (M)	DIST (M)	SIGNAL SENT	AUDIBLE PINGS RECEIVED
12:12 [1]				18° 22 .57'	77° 53.29'				
12:33	18° 24.14'	77° 53.22'	5			4,0	≈1073	5	3
12:37	18° 24.40'	77° 53.10'	5			4,0	≈1073	6	5
12:42[2]				18° 21.98'	77° 53.38'				

Recorder gain:

Comments
[1] Started
zoom0013
[2] Position
[3] Started
zoom0014
[4] Held the
horizontally in
[5] Started
zoom0015

12:46	18° 24.40’	77° 52.89’	5			4,0	1325	4	4	10
12:47[2]				018° 21.87’	077° 53.37’		1325			
12:51	18° 24.34’	77° 52.63’	5			4,0	2095	7	7	
12:52	18° 24.30’	77° 52.40’	5	018° 21.78’	077° 53.40’	4,0	2095	5	5	recording
12:56 [3]				018° 21.67’	077° 53.42’					recording
13:02	18° 24.30’	77° 52.10’	7,7	018° 21.63’	077° 53.43’	4,0	2673	3	0	source
13:02	18° 24.30’	77° 52.10’	1	018° 21.63’	077° 53.43’	4,0	2673	3	0	water surface
13:04 [4]	18° 24.30’	77° 52.10’	0			4,0	2673	3	0	recording
13:17	18° 24.18’	77° 52.20’	5	018° 25.32’	077° 53.35’	20,0	2175	4	4	
13:22	18° 24.03’	77° 51.92’	5	018° 25.19’	077° 53.37’	20,0	2723	9	3	
13:23	18° 24.03’	77° 51.92’	5			20,0	2723	9	2	
13:33 [5]	18° 27.23’	77° 52.07’	5	018° 25.06’	077° 53.38’	20,0	1568	12	12	
13:38				018° 24.98’	077° 53.38’					
13:42	18° 28.03’	77° 51.51’	5	018° 24.93’	077° 53.33’	20,0	3573	10	10	
13:47				018° 24.96’	077° 53.39’					
13:51	18° 28.62’	77° 50.91’	5	018° 24.82’	077° 53.41’	20,0	4860	6	6	
13:57	18° 28.93’	77° 50.45’	5	018° 24.76’	077° 53.41’	20,0	5717	20	0	
13:59	18° 28.93’	77° 50.45’	5	018° 24.73’	077° 53.41’	20,0	5720	20	0	

Sea conditions, Day 3.

Day 4: June 26, 2020

Key words: Deep water (around 90 metres), receiver at one place all the time, source at three different locations, three different source depths used on each location, CTD profile taken at source and all source positions.

Passive Acoustics

Start time (UTC): 07.44
Start Position:
Latitude: 77° 04.188’
Longitude: 20° 35.614’

End time (UTC): 08.30
End Position
Latitude: 77° 03.837’
Longitude: 20° 35.110’

File names:

- Recordings:
  - UAK-ACOUSTICS-2020-06-26-PASSIVE-1.wav

- Video at hydrophone (Passive and Active Acoustics):
  - UAK-ACOUSTICS-2020-06-26-VIDEO-HYDROPHONE-1.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-HYDROPHONE-2.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-HYDROPHONE-3.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-HYDROPHONE-4.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-HYDROPHONE-5.mp4

Recorder gain: 10
Use of drift anchor: yes

Nominal receiver depth at 20 meters the entire experiment.

Active Acoustics

File names:

- Recordings:
  - UAK-ACOUSTICS-2020-06-26-ACTIVE-1.wav
- Video at hydrophone:
  - See “Passive Acoustics” above
- Video at source:
  - UAK-ACOUSTICS-2020-06-26-VIDEO-SOURCE-1.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-SOURCE-2.mp4
- Video at CTD:
  - UAK-ACOUSTICS-2020-06-26-VIDEO-CTD-1.mp4
  - UAK-ACOUSTICS-2020-06-26-VIDEO-CTD-2.mp4

Recorder gain: 10

TIME (UTC)	S LONG	S LAT	S DEPTH [M]	R LONG	R LAT	R DEPTH [M]	DIST [M]	SIGNAL SENT	AUDIBLE PINGS RECEIVED
08:40	20° 31.5’	77° 03.2’	5	20° 34.878’	77° 03.73’	20	1710	7 pings	7 pings
08:42	20° 31.5’	77° 03.2’	12	20° 34.869’	77° 03.729’	20	1705	13 pings	13 pings
08:44	20° 31.5’	77° 03.2’	20	20° 34.85’	77° 03.717’	20	1687	9 pings	9 pings

08:59	20° 24.2’	77° 01.8’	5	20° 34.483’	77° 03.587’	20	6308	6 pings	6 pings
09:01	20° 24.2’	77° 01.8’	7	20° 34.434’	77° 03.566’	20	6266	4 pings	4 pings
09:03	20° 24.2’	77° 01.8’	15	20° 34.408’	77° 03.552’	20	6240	3 pings	3 pings
09:04	20° 24.2’	77° 01.8’	15	20° 34.408’	77° 03.552’	20	6240	Command	Command
09:14	29° 20.9’	77° 01.2’	5	20° 34.127’	77° 03.431’	20	7080	4 pings	4 pings
09:18	29° 20.9’	77° 01.2’	10	20° 34.082’	77° 03.419’	20	7051	6 pings	6 pings
09:20	29° 20.9	77° 01.2’	15	20° 34.058’	77° 03.41’	20	7033	7 pings	7 pings

Sea conditions, Day 4.

APPENDIX 5: Daily student reports.

20.06.2020:
The day started with a flight trip from Bergen to Tromsø. Then a maxi taxi waited for us at the airport and transported us to KV Svalbard. All the equipment were brought on board and the participants found their room and started unpacking their stuff. Then we ate some pizza and had hamburgers in the kitchen at KV Svalbard. At 1700 (?) we started the trip towards bjørnøya. The rest of the day we chilled, got to know the ship and each other.

21.06.2020:
The day starts with information about the following days and then some lectures about the instruments and methods we are going to use on the cruise. We ate some beef and fries for dinner.

22.06.2020
More lectures about the methods and instruments. The day was pretty chill but a lot of information to take in. We ate kjøttkaker I brun saus and everyone was happy. Then we went early to bed and everyone were ready for the next day.

23.06.2020
Now the practical part of the summer school starts. The day starts with a group meeting at the bridge. The group is divided into 2 teams, team a and team b. Team A was divided into 2 group where one started with taking CTD's and the other focus on water samples and marine optics. Team B started with taking acoustics from the small boats were one group is pling'ing and sending signals while the other group is listening and catching the sounds. The group sending signals also meet a seal family on the way back to the ship. It was very interesting, and they were all hyped, while the other group in the other small boat did not see them and felt disappointed. In the evening we collected the first OBS and ofc there was a price for the person observing the OBS first. This was a hard competition, and everybody was on the deck to try to be the first one to observe the OBS. The people on the bridge also participated and ofc they had some advantages over the rest of us since they had the map of were to look for the OBS and a better overview of the ocean. So the first to locate the OBS was a guy and the bridge… But we are all happy that we manage to get the first OBS. Then we all ate some fiskegrateng and then had a meeting at 20:15 to sum up the day. Then everyone went to bed.

24.06.2020
This day was almost the same as the one before. Only different is that the group working with sending signals in the acoustics now must listening to the other group sending sounds through the ocean. This day was cold and the a little windy, so the waves were higher. Some got seasick and some enjoyed more action in the small boats. For dinner we had pork meat which were good.

25.06.2020:
Started the day with trying to collect the second OBS. But we were not successful. After trying for about 1-2 hours we had to give up. Now the groups switch so that group A is doing acoustics and group B is doing marine optics and CTD. In the evening we collected the third OBS and this time it was successful. We ate some bacalao and then went straight to bed.

26.06.2020:
Ones again Felix and Zeinab tried to collect the second OBS but also this time the OBS would not go to the surface. We had to move on with the day and went to the next CTD station were group B collected marine optics and CTD data the hole day. Group A went out in the small boats doing acoustics. This time they recorded an iceberg breaking and a big part of the iceberg broke down into the ocean. Julie was listening with the acoustics at this point and did not fully understand what was happening. At 12:00

the bridge got a call from a sailboat nearby that had issues with their propel and therefore needed their help. We had to continue our work until 22:00 so that we could finish the data collection as fast as possible. From 12 to 20 Group A had lectures about meta data and how to process the acoustic data while group B was still working on the CTD. After everything was finished everybody was relieved and finally (!) we could chill for a bit. We ate some delicious tacos, and everybody was SOO happy for taco Friday! Some went to sleep while others stayed up to play Nintendo switch. Because KV Svalbard had to help this sailboat the next day, the research team could go to bed late and sleep until 10:00.

27.06.2020:
The day started at 10:00 with a meeting at the lounge. We all divided into 2 groups. One working on the acoustics data and processing the data while the other one work on the CTD and marine optics and how to put everything we learned and the data we collected in one big report. The doc had made some very delicious cinnamon bun as a snack in the middle of the day and everyone enjoyed it. It was nice to have little break from all the computer stuff.

28.06.2020
The day started at 09:00 with a meeting and finishing the data and meta data prosessing. Then we had some delicious brunsj followed by naked bathing at Bjørnøya. The temperature in the water was 2,7 degrees Celsius. Malin and Emilia did not dear to do the naked bathing but some tough boys and gurls did, such as Frida, Nil, Matias…. After the bathing everybody went in the sauna and back to the ship……

29.06.2020:
Started the day with a presentation to the workers at KV Svalbard of all the scientific things that we did on the cruise.

30.06.2020:
Arriving Tromsø again. Spending some time in the city and then going on the flight home. Some back to Bergen while other back to Stavanger and Oslo for summer vacation.

KV Svalbard Cruise Data Management Plan: OBS Data

1) What type of data did you use or create in your project?
   - Continuous three dimensional seismograms, *.mseed (Standard for the Exchange of Earthquake Data, ref.: http://www.fdsn.org/pdf/SEEDManual_V2.4.pdf)
   - Continous hydrophone data, *.mseed
   - Earthquake observations in Nordic format (ref: http://seis.geus.net/software/seisan/node242.html)

2) Who is the responsible party for the data over the long term?
   - Norwegian National Seismic Network (NNSN)

3) What are the intellectual property rights for the products that you produce (your final maps)?
   - Raw continuous recordings will be openly available via a data repository (see below) from 2022-01-01. Before that the access is restricted to scientist within the project
   - IPR of earthquake hypocenters and arrival picks done by the NNSN (currently: IPR not defined)
   - IPR of data products that are created as part of research publications depend on the publication venue, but are preferably open data

4) Which metadata format will you use to describe your data/products?
   - stationXML

5) What is your short-term data management plan?
   - Data is available in SD-card mounted on instrument
   - Data is also stored in two external hard drives during the cruise
   - Data will be registered into the UiB-NORSAR EIDA-node within the ORFEUS data management center as a temporary network upon return to Bergen

6) Choose a repository for long term preservation (long-term plan)
   - ORFEUS EIDA node UiB-NORSAR, available openly from 2022-01-01

KV Svalbard Cruise Data Management Plan Oceanography data.

1) What type of data did you use or create in your project?
    - List title, (sources), and data format(s) used
    Temperature, Conductivity, Pressure
    Raw data:
    Seabird SBE19 V2: *hdr format
    SBE 33 – Deck unit N/A
    SBE 55 – Water sampler N/A
    SAIV SD204 - SN 829 *.sd2

Pre-processing steps of Seabird data:

- Use SBE dataprocessing: to create CNV files. Manually added time and position using text editor.
- Use SBE data processing to remove salinity spikes by aligning T and Conductivity with pressure. (Check with Eva that this is done correctly)
- Convert to Matlab data file format used in UNDER-ICE processing - netCDF.

2) Who is the responsible party for the data over the long term?
    - Name a person or organizational contact and contact information
    Hanne Sagen, Nansen Environmental and Remote Sensing Center

3) What are the intellectual property rights for the products that you produce (your final maps)?
    - Open data, Creative Commons license, copyright retained?
    Creative Commons license

4) Which metadata format will you use to describe your data/products?
    (Note: Do research on metadata formats for spatial data)

    CF Convention is used.

5) What is your short-term data management plan?
    - Describe your backup plan to ensure data is not lost during and immediately after the project is completed.
    All data and meta data are collected and stored on several computers during the cruise. After the cruise the data will be stored on serves with back-up.

6) Choose a repository for long term preservation (long-term plan)
    - (Do search on Google or discuss with local instructors)

Data will be available through the Norwegian Marine Data Centre, and stored at Nansen Center.

KV Svalbard Cruise Data Management Plan Ocean Acoustic

1) What type of data did you use or create in your project?
   - Acoustic recordings from a hydrophone. Wav audio files.

2) Who is the responsible party for the data over the long term?
   - Espen Storheim, NERSC. Espen.storheim@nersc.no

3) What are the intellectual property rights for the products that you produce (your final maps)?
   - Open data. The users must cite the data in any publications or data prodicts in the following manner: "These data were made freely available by NERSC under the projects Useful Arctic Knowledge (project no. 274891), Norwegian ScientificDat Network (project no. 245967), and INTAROS (GA no 727890)."

4) Which metadata format will you use to describe your data/products?
   - Metadata is provided in XML, following CEOS IDN DIF.

5) What is your short-term data management plan?
   - Data stored on instruments, and backed up on external hard drives.

6) Choose a repository for long term preservation (long-term plan)
   - Data will be available through the Norwegian Marine Data Centre, and stored at the Nansen Center.

KV Svalbard Cruise Data Management Plan Marine Optics

1) What type of data did you use or create in your project?
   - List title, (sources), and data format(s) used

LISST-VSF instrument (Sequioa Sci.)
Volume scattering function [m-1 sr-1] at 515 nm, beam attenuation [m-1] at 515 nm, and pressure.
Raw data on native instrument format (.VSF), processed data were published as netCDF file.

ac-s instrument (SeaBird, connected to a small SeaBird CTD)
Hyperspectral absorption [m-1] and beam attenuation [m-1] at 400-750 nm, temperature salinity and pressure.
Raw data on native instrument formats (.XXX – where XXX is the cast number), processed data will be published as netCDF file after embargo time.

2) Who is the responsible party for the data over the long term?
   - Name a person or organizational contact and contact information
     Håkon Sandven, UIB, Hakon.Sandven@uib.no

3) What are the intellectual property rights for the products that you produce (your final maps)?
   - Open data, Creative Commons license, copyright retained?

     Creative Commons license

4) Which metadata format will you use to describe your data/products?
   (Note: Do research on metadata formats for spatial data)

   CF Convention is used.

5) What is your short-term data management plan?
   - Describe your backup plan to ensure data is not lost during and immediately after the project is completed.

     All data and meta data are collected and stored on several computers during the cruise. After the cruise the data will be stored on serves with back-up.

6) Choose a repository for long term preservation (long-term plan)
   - (Do search on Google or discuss with local instructors)

     Norwegian Marine Data Center.