



ARCTIC PASSION

Deliverable 2.1 *Data Management Plan*

Version 0.6, 2023-08-24: Detailed information on datasets added, methodology for updates established



Project

Arctic PASSION

EU Horizon 2020 grant agreement

101003472

Work package 2

Bringing the Arctic Data System into action

Lead beneficiary

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Status

Coordinator accepted

Dissemination level

PU

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003472



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1. Data summary

The purpose of the data management plan is to document how the data generated by the project Arctic PASSION are handled during and after the project. It describes the basic principles for data management within the project. This includes standards for documentation at discovery and data levels as well as data sharing and preservation including life cycle management of datasets.

IMPORTANT

This document is addressing datasets (e.g. observations of conditions in the ocean, atmosphere, cryosphere). In addition the project is collecting information on activities that are generating data like research cruises, field work activities etc. This type of information is not covered by this document, but the information model used for the data catalogue allows linking data with further information about the mechanisms used to collect data.

This document is a living document that will be updated on a regular basis during the project. Updates will be made when deemed necessary, but updates will at least be made in relation with the Arctic PASSION reporting periods, which are currently scheduled for December 2022, June 2024 and June 2025. Arctic PASSION is following the principles outlined by the Open Research Data Pilot and The FAIR Guiding Principles for scientific data management and stewardship (Wilkinson et al. 2016). The data management plan is based on the [OpenAIRE guidelines](https://www.openaire.eu/how-to-create-a-data-management-plan) [https://www.openaire.eu/how-to-create-a-data-management-plan].

The Arctic PASSION project is described in more detail in the project website which is available at <https://arcticpassion.eu/>. The purpose of Arctic PASSION is creation and implementation of a coherent, integrated Arctic observing system. This implies integrating already existing observing systems in a systems of systems approach as well addressing gaps in the current observing system. Arctic PASSION will generate data through the project implementation, but equally important is to map and establish access to already existing datasets in support of the pilot services and other activities of Arctic PASSION.

Arctic PASSION will promote the use of self-explaining file formats (e.g. NetCDF, HDF/HDF5, DwCA) combined with semantic and structural standards like the Climate and Forecast Convention for data documentation. The default format for Arctic PASSION datasets in the geoscientific domain is NetCDF following the Climate and Forecast Convention (feature types grid, timeseries, profiles and trajectories if applicable). For data in the biological domain Darwin Core Archive is promoted. If none of these formats are suitable other formats can be used, but a detailed product manual following a template has to be prepared to ensure proper reuse of the data in the future.

Arctic PASSION will exploit existing data in the region. In particular operational meteorological data made available through WMO Global Telecommunication System (GTS) will be important for the model experiments. No full overview of third party data that will be used is currently available. An overview of the third party data that are planned to be used by the pilot services and that need some sort of handling within the Arctic PASSION data catalogue will be provided in subsequent updates of this plan based on input from the pilot services. Essentially this will e.g. include data from the World Meteorological Organisation, Copernicus services in Europe, data already generated by project partners and data found when harvesting discovery metadata from relevant data centres.

If deemed necessary (required by the scientific community in Arctic PASSION) metadata describing relevant third-party observations will be harvested and ingested in the data management system and

through this simplifying the data discovery process for Arctic PASSION scientists. If specifically needed by one of the pilot services of Arctic PASSION, data may also be cached to ensure interoperable data that can be used by the web based services of the pilot services^[1].

Arctic PASSION will rely on data generated by project partners during the duration of the project, legacy data and observing systems of the partners and third party data available through data centres not part of Arctic PASSION.

An overview of the data generated (or used) by the project is available in [Appendix A](#). The tables shown there are continuously updated and are used to check availability of datasets through the searchable catalogue. [Table 1](#) shows a very high level overview of the data the project will generate and this will eventually be fully replaced by [Table 3](#). The latter is still under development and relies in particular on the interaction with Work Package 1. The first table is just a coarse overview based on the Description of Work, while the second is updates submitted by partners during the project. [Table 2](#) lists datasets that are already available by external data providers, but that Arctic PASSION is planning to actively use in services. Information in [Table 1](#) is primarily building on existing measurement programmes or extending these to new areas. Eventually all datasets should be discoverable through the Arctic PASSION data catalogue.

| | |
|-----------|---|
| IMPORTANT | Table 1 is vaguely populated and will be populated in more detail in the subsequent versions of the data management plan following interaction with the data generating work packages (in particular WP 1 and 3) of Arctic PASSION. This will be done through replacing Table 1 with Table 3 , but this process relies on interaction with data providers and repeated requests to data providers to provide information. |
| NOTE | A mechanism for interaction with data producing work packages and data providers has been established, but requires repeated requests to data providers for information. This mechanism has been adopted for usage against the pilot services of Work Package 4 as well. |

There is currently no estimate for the expected volume of the data. Such volume estimates only make sense for the data actively managed by Arctic PASSION. These estimates will be generated when a better overview of the exact datasets is available. However it is expected that it will be in the order to several Terabytes.

Arctic PASSION aims to *bring the Arctic data into action*. Thus data can be relevant for many communities. Internally the primary purpose of the data is to serve the needs of the project’s pilot services.

| | |
|------|--|
| NOTE | It is not the intention to use the Data Management Plan as a catalogue service, all datasets Arctic PASSION is generating should be available through the SAON Data Portal which is used as the catalogue service. |
|------|--|

2. FAIR data

2.1. Making data findable, including provisions for metadata

Arctic PASSION will use the SAON data portal (Figure 1), for the time being accessible through <https://saon.met.no/> ^[2], to serve data consumers with both human and machine interfaces. Human and machine interfaces relies on a data catalogue that is generated using an information mode that is in use for multiple projects and activities. This is the [MET Norway Metadata Format Specification \(MMD\)](https://htmlpreview.github.io/?https://github.com/metno/mmd/blob/master/doc/mmd-specification.html) [<https://htmlpreview.github.io/?https://github.com/metno/mmd/blob/master/doc/mmd-specification.html>]. This is developed to be compliant with GCMD DIF and ISO19115 and is widely used for mapping harvested metadata into a unified data model. Mappings to DCAT is in progress.

The SAON Data Portal doesn't host datasets, but harvest information about datasets from a number of data repositories^[3] and integrates this information in a unified search interface.

| | |
|-----------|---|
| IMPORTANT | Arctic PASSION require that data generated in the project are published in a data centre that allows machine access using standard interfaces and information objects for discovery metadata. |
| IMPORTANT | Arctic PASSION require that data generated in the project are published with a project tag populated with the text "Arctic PASSION" in both the short and long name for the project. This is used to group Arctic PASSION datasets in the SAON Data Portal. |

The screenshot displays the SAON Data Portal interface. At the top, there's a header with the SAON logo and 'SUSTAINING ARCTIC OBSERVING NETWORKS'. Below the header, there's a navigation bar with 'Home', 'Search for data', and 'Support'. The main content area is divided into several sections:

- Search:** Includes a search bar with 'Enter your search here' and a 'Search' button. There are also filters for 'Contains all of these words' and 'Start Date'/'End Date'.
- Dataset Level:** A section with a 'Parent' filter showing 41997 datasets.
- Iso Topic Category:** A list of categories including 'climatology/Meteorology/Atmosphere' (14609), 'geoscientificInformation' (362), 'biota' (278), 'oceans' (211), 'biotaenvironmentoceans' (172), 'environment' (150), 'climatology/Meteorology/Atmosphereenvironment' (143), 'Oceans' (127), 'environmentoceans' (89), and 'Climatology/Meteorology/Atmosphere' (55).
- Map:** A map of the Arctic region with a black dot indicating a location. Below the map, it says '41997 datasets found. Showing datasets 1 - 15 on page 1 of 2800 pages.'
- Project:** A list of projects including 'Nansen Legacy' (1080), 'Hausgarten' (589), 'APPLICATE' (544), 'YOPP' (488), and 'SIOS' (450).
- Collection:** A list of collections including 'ADC' (41997), 'NSDN' (35546), 'GCW' (22369), 'SIOS' (2787), and 'AeN' (1126).
- Personnel:** A list of personnel including 'Michael Diepenbroek' (1514), 'Arntfinn Morvik' (1307), 'NSIDC User Services' (1152), 'Ann Kristin Østrem' (806), and 'Elke Bieber' (784).
- Organisation:** A list of organizations including 'World Glacier Monitoring Service, University of Zurich' (18752), 'British Antarctic Survey' (1463), 'NO1L, Norwegian Institute for Air Research, NILU, Atmosphere and Climate Department, Instituttveien 18, 2007, Kjeller, Norway' (1163), 'DE03L, Umweltbundesamt, UBA-LA, Langen, Paul-Ehrlich-Str. 29, 63225, Langen, Germany' (1003), and 'NO1L, Norwegian Institute for Air Research, NILU, Instituttveien 18, 2007, Kjeller, Norway' (837).
- Data Center:** A list of data centers including 'PANGAEA' (1528), 'JP/MEXT/NIPR' (1132), 'NO/NMDC/IMR' (1015), and 'Institute of Marine Research, Norwegian Marine Data Centre, Tromsø' (803).

Figure 1. Screenshot of the SAON Data Portal (for the time being available through <https://saon.met.no/>) which Arctic PASSION supports the development of.

NOTE

Although Arctic Council has suspended all *official meetings of the Council and its subsidiary bodies until further notice*, no information is received to suspend operation of the SAON Data Portal. The SAON Data Portal is an in kind contribution from the Norwegian Meteorological Institute.

When data are served using self-describing file formats like NetCDF according to the [Climate and Forecast Conventions](https://cfconventions.org) [https://cfconventions.org] with global attributes according to the [Attribute Convention for Dataset Discovery](https://wiki.esipfed.org/Attribute_Convention_for_Data_Discovery_1-3) [https://wiki.esipfed.org/Attribute_Convention_for_Data_Discovery_1-3] (ACDD)^[4] and served through OPeNDAP, discovery metadata can be directly generated from the data files. A similar set up is possible to achieve with [Darwin Core Archives](http://tools.gbif.org/dwca-assistant/) [http://tools.gbif.org/dwca-assistant/] (DwC-A), which also have metadata embedded. However, the procedure for extracting this information is yet not operational in the context of Arctic PASSION. The workflow for CF-NetCDF is currently in testing. The workflow for

DwC-A is still under development. In essence application of CF-NetCDF and DwC-A addresses both the perspectives of making data findable and interoperable.

IMPORTANT

Sensitive data generated by community based monitoring will be handled in a separate system and only aggregated information will be made available in the data catalogue. However, this data Management Plan will also be developed to cover the sensitive data.

2.2. Making data openly accessible

Data will be served from the host data centre wherever possible. Datasets that are needed by a pilot service, but are not openly available although the data license allows open access, will be cached by MET during the project duration and made available for potential users internally and externally.

Selected datasets are preserved for the future through PANGAEA and FMI who will also provide discovery metadata and online access to these datasets.

MET offers limited (large volumes may be too costly) hosting support for "homeless data" that are important for the project deliverables. If data providers have funding to support hosting of large datasets, this can be discussed with MET.

2.3. Making data interoperable

Arctic PASSION will primarily rely on self describing, standardised file formats for data encoding. These standardised formats also have semantic frameworks for annotation of the data. This simplifies integration of data across data providers and communities and is in line with efforts undertaken in large data exchange activities, like operational data exchange through the World Meteorological Organisation (WMO) working with atmospheric, oceanographic and hydrological data and the [Global Biodiversity Information Facility](https://www.gbif.org/) [https://www.gbif.org/] (GBIF). The specific standards that will be promoted by Arctic PASSION include:

CF-NetCDF

NetCDF adhering to the [Climate and Forecast Conventions](http://cfconventions.org/index.html) [http://cfconventions.org/index.html] is widely used, both in the oceanographic community, in the Earth System Grid Federation, in Copernicus services, by ESA and EUMETSAT for Sentinel data provision and WMO is developing WMO specific profiles of the standard. By adding the [Attribute Convention for Dataset Discovery](https://adc.met.no/node/4) [https://adc.met.no/node/4]^[4], discovery level metadata can be embedded in the datasets.

Darwin Core Archive

According to the [Darwin Core Archive Assistant](http://tools.gbif.org/dwca-assistant/) [http://tools.gbif.org/dwca-assistant/] *Darwin Core Archive (DwC-A) is a Biodiversity informatics data standard that makes use of the Darwin Core terms to produce a single, self contained dataset for species occurrence or taxonomic (species) data. It is the preferred format for publishing data to the Global Biodiversity Information Facility. You export your data as a set of one or more text (CSV) files. A simple XML descriptor file (called meta.xml) is required to inform others how your files are organized.*

Data that doesn't fit into these categories will be accompanied by a detailed product manual providing

guidance to data consumers. These data will require some more human effort to utilise. Both CF and DwC-A standards are managed in well defined governance processes and the standards are used widely beyond the original user communities.

IMPORTANT

The template for the product manual is to be developed.

IMPORTANT

Guidance on how to use the standards mentioned above will be made available through <https://saon.met.no/apguidance>.

2.4. Making data reuseable

A very important requirement for reuseable data is that data are released using a clear data license. Arctic PASSION will promote the usage of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/) [https://spdx.org/licenses/CC-BY-4.0.html] license.

The standards for use metadata that are promoted by Arctic PASSION, i.e. [Climate and Forecast Conventions](http://cfconventions.org/index.html) [http://cfconventions.org/index.html] and [Darwin Core](https://www.gbif.org/darwin-core) [https://www.gbif.org/darwin-core] ensures self describing data according to a shared terminology.

As noted in the previous chapter, not all data fits in these formats. These data will not follow rich metadata standards and will require human effort to properly reuse.

When data are documented according to the standards mentioned above, reuse is simplified as standardised tools and services will offer support out of the box. CF-NetCDF and DwC-A is e.g. widely used within many data exchange frameworks.

While CF-NetCDF have been widely used in many communities for a long time, the standard is pretty wide and the degrees of freedom sometimes makes it hard to maintain software support for all options, not least when integrating data across providers. WMO has recognised this and through interaction with the CF governance, WMO has included CF-NetCDF as part of the [WMO Information System](https://public.wmo.int/en/wmo-information-system-wis) [https://public.wmo.int/en/wmo-information-system-wis] (WIS) governance through a dedicated [Task Team on CF-NetCDF](https://community.wmo.int/governance/commission-membership/commission-observation-infrastructure-and-information-systems-infcom/commission-infrastructure-officers/infcom-management-group/standing-committee-information-management-and-technology-sc-int/expert-team-data-standards-1) [https://community.wmo.int/governance/commission-membership/commission-observation-infrastructure-and-information-systems-infcom/commission-infrastructure-officers/infcom-management-group/standing-committee-information-management-and-technology-sc-int/expert-team-data-standards-1] which will develop WMO profiles of the CF standard for specific WMO purposes.

3. Allocation of resources

Arctic PASSION Work Package 2, Bringing the Arctic Data System to action, has allocated resources for cataloguing, serving and preserving data within the project period. Handling of sensitive data from Community Based Monitoring is done in Work Package 4. Overall responsibility for the Data Management Plan lies with Work Package 2.

4. Data security

Most of the data generated by Arctic PASSION is open. Arctic PASSION is working to establish secure

connections between data centres and data consumers to ensure that correct decisions can be made using data. However, data from third parties will also be made available, for these data there is limited room for Arctic PASSION to ensure integrity and security of data.

| | |
|-----------|---|
| IMPORTANT | Arctic PASSION promotes the application of secure transport protocols between data centres and data consumers. |
| IMPORTANT | For the discovery metadata harvested into the Arctic PASSION data catalogue, translation rules have been developed that rely on well defined document standards and controlled vocabularies/terminologies. This is further described in the project deliverable (D2.3) which describes the website. |

Data from Community Based Monitoring that could be of sensitive nature will not be publicly available, only aggregated non sensitive information will be available through the Arctic PASSION data catalogue.

5. Ethical aspects

As mentioned above, sensitive information from Community Based Monitoring is handled in a separate system adhering to the ethical and legal regulations for such data. There could be other information that has constraints for ethical reasons (e.g. species information or breeding areas), but identification of these will be part of the further development of the data management plan and in particular [Table 1](#).

| | |
|-----------|---|
| IMPORTANT | Data within Arctic PASSION will be handled according to the principle of "as open as possible, as closed as necessary". |
|-----------|---|

6. Other issues

A major challenge when working with scientific communities is to raise the awareness of interoperability at the data level. Often data are published and shared in the form of spreadsheets or in other unstructured forms, which complicates efficient reuse of the data in decision support systems. Arctic PASSION is actively working to change this, but it is a task that is tedious and time consuming since the cost for scientists to overcome the threshold of using FAIR compliant file formats is substantial and the benefit is not evident immediately.

7. References

Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci Data 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

Appendix A: Datasets

Table 1. Overview of datasets generated within Arctic PASSION. Dataset definitions are preliminary and high level. Each record will materialise in many discovery metadata records.

| # | Dataset | Description | Responsible | Generated | Published | Comment |
|---|---------------------------------|--|-------------|-----------|-----------|---|
| 1 | CTD-data | CTD casts taken during regular cruises in the Arctic and surrounding areas | | | | Details are still being investigated. |
| 2 | Mooring-data | Information from long-term ocean moorings of temperature, current etc. | | | | Details are still being investigated. |
| 3 | CBM climate data | Climate information from Community Based monitoring | | | | Details are still being investigated. |
| 4 | Aerosol-data | Information on Arctic Aerosols. | CNR | | | Details are still being investigated.. |
| 5 | Surface irradiance measurements | Information on the short- and longwave surface irradiance. | | | | Details are still being investigated. |
| 6 | Surface weather stations | | | | | Details are still under investigation, based on relations to INTERACT |
| 7 | Terrestrial data | Information on terrestrial features, including biodiversity and snow etc. | | | | Details are still being investigated. |

| # | Dataset | Description | Responsible | Generated | Published | Comment |
|----|---------------------------------|--|-------------|-----------|-----------|---------------------------------------|
| 8 | Permafrost data | Depth profiles of temperature in the permafrost. | | | | Details are still being investigated. |
| 9 | Ice mass balance buoys | | | | | Details are still being investigated. |
| 10 | In situ observations of sea ice | Information received from ships in the ice through the IceWatch activity. | | | | Details are still being investigated. |
| 11 | Arctic Land Ice from satellite | | | | | Details are still being investigated. |
| 12 | Airborne snow and ice data | | | | | Details are still being investigated. |
| 13 | Ice-Thethered Ice Observatories | | | | | Details are still being investigated. |
| 14 | Numerical simulations | Supporting observation impact studies, including climate at different temporal scales. | | | | Details are being investigated. |
| 15 | | | | | | |

Table 2. Overview of datasets to be actively used by Arctic PASSION services.

| # | Dataset | Description | Responsible | Generated | Published | Comment |
|---|------------------------------|---|------------------------------|------------------------------------|-----------|---|
| 1 | TOPAZ (ARC MFC) | Sea ice concentration and thickness forecast | MET Norway, NERSC | Daily | CMEMS | Daily 1 Integration of datasets in the catalogue is under evaluation. 0 day forecast |
| 2 | NeXtSIM (ARC MFC) | Sea ice concentration and thickness forecast | NERSC | Daily, Monthly | CMEMS | 1-day hinIntegration of datasets in the catalogue is under evaluation. dcast and 9-day forecast |
| 3 | GLO MFC | Sea ice concentration and thickness forecast | Mercator Océan International | Daily, Monthly | CMEMS | Integration of datasets in the catalogue is under evaluation. |
| 4 | Baltic MFC | Sea ice concentration and thickness forecast | SMHI | Sub-hourly, Hourly, Daily, Monthly | CMEMS | 6-day forecast Integration of datasets in the catalogue is under evaluation. |
| 5 | EUMETSAT OSI SAF time series | Sea ice extent/area | MET Norway | Daily | EUMETSAT | Integration of datasets in the catalogue is in progress. |
| 6 | Baltic OMI (CMEMS) | Sea ice extent/area | Ifremer (FMI/SMHI) | Daily | CMEMS | |
| 7 | Surface weather stations | Information from operational surface weather stations where data is exchanged through programmes of WMO | MET | | | Extraction of public available information is in progress |

| # | Dataset | Description | Responsible | Generated | Published | Comment |
|---|----------------------------------|---|-------------|-----------|-----------|---|
| 8 | Vertical profiles of temperature | Information from operational stations exchanging data through programmes of WMO | MET | | | Extraction of public available information is in progress |
| 9 | | | | | | |

NOTE

[Table 3](#) is based on a webform that has more information than shown in the table and the information shown is also truncated for some columns as they exceed the height of the page. The information is processed automatically, thus the table can contain typos and similar. Work is in progress to address these issues and also to map details to the data catalogue. Some datasets have been published, but not in repositories where discovery metadata can be harvested into the catalogue. How to address this is under evaluation, but the fallback solution is manual registration of datasets using a webform (already available, but not deployed).

Table 3. Overview of datasets Arctic PASSION will generate and initial plans for publication. Some datasets have more information than shown in the table.

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|--------------------------------|----------------------------------|---|--------------------------------------|--|---|
| Temperature of air, snow, ice and seawater from drifting buoys in the Eurasian Basin and Fram Strait | Data from drifting sea ice buoys deployed in the interior Arctic Ocean, allowing for determination of thickness of snow cover and sea ice. | In Work | ,87,,0 | 2022-07-10, 2025-06-30 | Mats Granskog | NPI - Norsk Polarin stitutt (NO) | NPI/NP DC - https://data.npolar.no/home/ | 2025-06-30 | The data set will contain data from multiple buoys deployed at different locations in different years. Data from individual buoys will be published as soon as they are processed, i.e at different times depending on their deployment date and duration of drift in sea ice. | Unprocessed data (temperature of air, snow, ice and seawater) are also made available in near-real time at meereisportal.de |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|---|----------|-----------------------|------------------------|-----------------------------------|---------------------------------------|--|---|---------------------------------|--|
| High-Resolution Svalbard Calving Front Dataset from 1972-2023 | Using a novel deep learning model, we have produced a new high-resolution glacier calving front data product for Svalbard from different optical and radar satellite sensors between 1972 and 2023. | In Work | ,,, | 1899-12-30, 1899-12-30 | Jonathan Bamber | UBristol - University of Bristol (UK) | | | | |
| Raw data from thermistor string ice mass balance buoy 2021M31 | Raw data from thermistor string sea ice mass balance buoy. Raw data, no quality control. Data files (csv) are in zip file. Deployment card (pdf) is also attached to the data set. | Complete | ,,, | 2021-09-17, 2022-02-11 | Mats Granskog | NPI - Norsk Polarinstitutt (NO) | NPI/NPDC - https://data.npolar.no/home/ | 2022-12-07 | Single collection. | https://doi.org/10.21334/npolar.2022.1037bd1e https://data.meereisportal.de/relaunch/buoy.php?lang=en&active-tab1=method&active-tab2=buoy&singlemap&buoyname=2021M31 |
| Data from ice mass balance buoy 2022T95 | Ice mass balance buoy 2022T95 deployed near North Pole in summer 2022 | Planned | 75,88,-30,10 | 2022-07-31, 2023-02-28 | Mats Granskog | NPI - Norsk Polarinstitutt (NO) | AWI/PANGAEA - https://pangaea.de/ | 2023-12-31 | Single collection (most likely) | https://data.meereisportal.de/relaunch/buoy.php?lang=en&active-tab1=method&active-tab2=buoy&singlemap&buoyname=2022T95 |

| Title | Description | Status | BBox (S,N,W,E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|--|---------|-------------------|------------------------|--------------------------------------|---|---|--------------------------------------|---|---|
| Data from ice mass balance buoy 2022T97 | Data from buoy 2022T97 deployed in the western Amundsen basin in summer 2022 | Planned | 80,86.5,-10,0 | 2022-08-06, 2022-11-22 | Mats Granskog | NPI - Norsk Polarinstitutt (NO) | AWI/PANGAEA - https://pangaea.de/ | 2023-12-31 | Single collection (most likely) | https://data.meereisportal.de/relaunch/buoy.php?lang=en&active-tab1=method&active-tab2=buoy&singlemap&buoyname=2022T97 |
| Sea ice mass balance from autonomous measurements | Sea ice parameters derived from autonomous measurements. The data set comprises sea ice thickness, snow depth, sea ice temperatures and further derived physical properties from sea ice mass balance buoys. We mainly deployed thermistor-string buoys (type SIMBA) on sea ice drifting across the Arctic (and Antarctic) ocean. All data may be found already on data.meereisportal.de | In Work | 80,90,-180,180 | 2014-01-01, 2023-05-09 | Andreas Preusser and Marcel Nicolaus | AWI - Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (DE) | AWI/PANGAEA - https://pangaea.de/ | 2023-05-09 | One data set per buoy plus collections of several buoys, e.g. by expedition | Find more details here: https://data.meereisportal.de/relaunch/buoy.php?lang=en |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|--|---------|-----------------------|------------------------|--------------------------------|---------------------------------|--|--------------------------------------|--|---|
| Hydrography and currents from ocean mooring in the Western Amundsen Basin, Arctic Ocean | Time-series of water temperature, salinity and current profiles from ocean mooring in the Western Nansen Basin, Arctic Ocean | In Work | 83.9,22.3,, | 2022-08-07, 2024-07-31 | Arild Sundfjord | NPI - Norsk Polarinstitutt (NO) | NPI/NPDC - https://data.npolar.no/home/ | 2024-12-20 | The data set will contain all data from different instruments located on the same mooring for the full two-year deployment | Additional data from partner instruments on the same mooring may be added at a later time |
| Hydrography and currents from ocean mooring in the Western Amundsen Basin, Arctic Ocean | Time-series of water temperature, salinity and current profiles from ocean mooring in the Western Amundsen Basin, Arctic Ocean | In Work | 86.6,,36.6, | 2022-08-07, 2024-07-31 | Arild Sundfjord | NPI - Norsk Polarinstitutt (NO) | NPI/NPDC - https://data.npolar.no/home/ | 2024-12-20 | The data set will contain all data from different instruments located on the same mooring for the full two-year deployment | Additional data from partner instruments on the same mooring may be added at a later time |

[illegible]

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|------------|-----------------------|-----------------------------------|-----------------------------------|--|--------------------------------------|---|-------------|----------|
| Atmospheric vertical profiles of temperature and Humidity | Profiles of Atmospheric temperature and Humidity obtained from continuous recording microwave radiometer | In Work | 79,79,1 2,12 | 1899- 12-30, 1899- 12-30 | Nuncio Muruke sh | NCPOR - Nationa l Centre for Polar and Ocean Researc h – NCPOR (IN) | Nationa l Polar Data Centre | | | |

[illegible]

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|-----------------------------------|-------------|---------------------------------------|
| Upwelling and downwelling visible radiation measurements of the autonomous ice-tethered OptiCAL ‘qq’ buoy (LT-ITO) deployed on drifting sea ice in the "North Pole sea ice station" during Arctic Ocean 2022 cruise. | Optical Chain And Logger (OptiCAL) systems capture PAR-like data at 12 logarithmically-spaced levels down to 50 m depth, and, along with positional data, transmit these data hourly via Iridium. The PAR sensors have a wide dynamic range, able to detect PAR from 5x10 ⁻⁴ μMol s ⁻¹ m ⁻² to 100 μMol s ⁻¹ m ⁻² and thereby graph a wide range of light behaviour from winter to summer and from surface to depth. Sampling at the 12 levels is accomplished by resin-containment 'nodes' located along a power and communication cable that hangs vertically from the underside of the surface spar-buoy. The nodes are at nominal | In Work | 85.7,89.7,-28.2,3.6 | 2022-07-31, 2022-10-19 | Jørgen Berge | UiT - Universitetet i Tromsø – Norges Arktiske Universitet (NO) | | | | Some data is received for publication |

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| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|---|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|-----------------------------------|-------------|----------|
| Data from an automated weather station (AWS) deployed on drifting sea ice in the "North Pole sea ice" station during Arctic Ocean 2022 cruise. | This data set includes meteorological data (air temperature, air relative humidity, atmospheric pressure accompanied with datetime and geographical position) obtained from an automated weather station (AWS-ITO) deployed in Central Arctic Ocean on 2022-07-29 at 89.82N, 26.28W. Data was collected until 2023-01-20 when the last message was delivered from 73.43N, 13.90W. | In Work | 73.4,89.8,-26.3,-13.9 | 2022-07-29, 2023-01-20 | Jørgen Berge | UiT - Universitetet i Tromsø – Norges Arktiske Universitet (NO) | | | | |

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| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|-----------------------------------|---|--------------------------------|---|-------------|----------|
| Temperature and heating induced temperature difference measurements from the sea ice mass balance buoy SIMBA 02-02 deployed on drifting sea ice in the "North Pole sea ice station" during Arctic Ocean 2022 cruise. | <p>Sea ice mass balance buoy measures snow and sea ice thickness (ice growth and loss). The SIMBA-ITO is equipped with a thermistor string about 5 meter long (240 temperature sensors placed at 2cm intervals: thermistors 0 to 239). The instrument is estimating snow and ice thickness by measuring thermal conductivity of the media (the sensor chain is heated daily, and temperature changes are measured after 30 and 120 seconds from heating the sensor chain).</p> <p>This ITO is also equipped with one in-air temperature sensor, deployed ~1m above the surface (thermistor 240).</p> | In Work | 71.6,89.9,-29.1,-14.3 | 2022-07-29, 2023-01-30 | Jørgen Berge | UiT - Universitetet i Tromsø – Norges Arktiske Universitet (NO) | | | | |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|---|---------|-----------------------|------------------------|--------------------------------|---|---|--------------------------------------|-------------|----------|
| Terrestrial climate and cryosphere data from Toolik field station | Parameters added to monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Soil moisture • Soil temperatures • Soil heat flux | In Work | 68.6,-149.6, | 2023-09-01, 1899-12-30 | Syndonia Bret-Harte | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | https://www.uaf.edu/toolik/edc/monitoring/abiotic/met-data-query.php | | | |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|---|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|-----------------------------------|-------------|---|
| Terrestrial climate and cryosphere data from Western Arctic Research Center (WARC) | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Air temperature • Air humidity • Air pressure • Short wave incoming and outgoing radiation • Long wave incoming and outgoing radiation • Net radiation • Soil moisture • Soil temperature | In Work | 68.3,-133.5, | 2023-09-01, 1899-12-30 | Erika Hille | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | Work is ongoing to integrate data through INTERACT data management. |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|---|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|--------------------------------------|-------------|--|
| Terrestrial climate and cryosphere data from CEN Whapmagoostui-Kuujjuarapik Station, Canada | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Air temperature • Air humidity • Short wave incoming and outgoing radiation • Long Wave incoming and outgoing radiation • Wind velocity • Wind direction • Snow depth • Ground/permafrost temperature | In Work | 55.3,-77.7, | 2023-09-01, 1899-12-30 | Mickael Lemay | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | Work is in progress to integrate data through collaboration with CCADI |

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| Terrestrial climate and cryosphere data from Arctic Station, Greenland Denmark | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Air temperature • Air humidity • Air pressure • Short wave incoming and outgoing radiation • Long wave incoming and outgoing radiation • Precipitation • Permafrost/ ground temperature | In Work | 69.3,,53.6, | 2023-09-01, 1899-12-30 | Morten Rasch | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | https://data.g-e-m.dk/ | | | |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|--------------------------------|---|---|--------------------------------------|-------------|----------|
| Terrestrial climate and cryosphere data from Zackenberg Station, Greenland Denmark | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none">• Permafrost/Ground temperature | In Work | 74.5,,20.6, | 2023-09-01, 1899-12-30 | Torben R. Christensen | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | https://data.g-e-m.dk/ | | | |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|--------------------------------------|-------------|---|
| Terrestrial climate and cryosphere data from Kevo Station, Finland | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none">• Permafrost/Ground temperature | In Work | 69.8,,27, | 2023-09-01, 1899-12-30 | Otso Suominen | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | Work is in progress to integrate data directly through GEM using schema.org served through INTERACT |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|--|---------|-----------------------|------------------------|--------------------------------|---|---|--------------------------------------|-------------|---|
| CNR Arctic Station “Dirigibile Italia”, Svalbard, Norway | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Soil moisture • Air temperature • Air humidity • Permafrost/Ground temperature • Snow depth | In Work | 78.9,,11.9, | 2023-09-01, 1899-12-30 | Mauro Mazzola | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | CNR/IA DC - https://iadc.cnr.it/cnr/ | | | Data from IADC are actively harvested into the catalogue. |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|---|---|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|-----------------------------------|-------------|----------|
| Terrestrial climate and cryosphere data from Rif field station, Iceland | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none">• Permafrost/Ground temperature• Snow depth• Net radiation• Short wave incoming and outgoing radiation• Long wave incoming and outgoing radiation• Soil heat flux | In Work | 66.5,-15.9, | 2023-09-01, 1899-12-30 | Pedro Rodrigues | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | |

| Title | Description | Status | BBox (S,N,W, E) | Durati on | Princip al Investi gator | Affiliat ion | Expect ed Data Center | Expect ed publica tion date | Granularity | Comments |
|--|---|---------|-----------------------|------------------------|--------------------------------|---|-----------------------------|--------------------------------------|-------------|----------|
| Terrestrial climate and cryosphere data from NIBIO Svanhovd research station, Norway | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Permafrost/Ground temperature • Incoming and outgoing short wave radiation • Incoming and outgoing long wave radiation • Net radiation • Heat flux | In Work | 69.5,,30.1, | 2023-09-01, 1899-12-30 | Cornelya Klutsch | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | |

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|--|---|---------|-----------------------|------------------------|-----------------------------------|---|--------------------------------|---|-------------|----------|
| Terrestrial climate and cryosphere data from Churchill Northern Studies Centre, Canada | Parameters added to terrestrial monitoring through Arctic PASSION funding include: <ul style="list-style-type: none"> • Air temperature • Air humidity • Short wave incoming and outgoing radiation • Long wave incoming and outgoing radiation • Wind speed • Wind direction • Air pressure | In Work | 58.7,,94.8, | 2023-09-01, 1899-12-30 | Joni Reimer | INPO - INTERACT – International Network for Terrestrial Research and Monitoring in the Arctic - INPO (SE) | | | | |

[1] This could be necessary to establish an Arctic Window of Copernicus or when data are available through third party data centres but not in standardised and interoperable form.

[2] This address will change at some point to the internet domain of SAON

[3] Details to be provided.

[4] More detailed information on how to format the ACDD global attributes to ensure the best possible discovery metadata being generated is available at <https://adc.met.no/node/4>.