

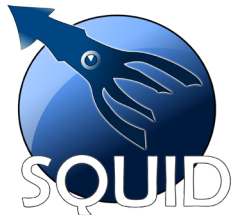
# Digital data Acquisition – Mobile Apps and Tools



- Intro Data Logistics Support group
- Sensor and Sensor actions
- Digital Data acquisition – what and why?
- Mobile Tools for Data acquisition  
Smatrix, Mythaw, Mobile Event Log



- **On the edge to science with our software products:** DSHIP, MDM, DMS, sensor.awi.de, Raw Data Ingest to PANGAEA, Near realtime ingests, Dashboards, MobileEventLog and more
- **We Aim to facilitate** technical workflow for **data transmission** to leave **more time** for scientists to focus on their **scientific** work
- DLS provide **comprehensive help and advice** in connecting your devices



SENSOR INFORMATION SYSTEM

RDIF

HELMHOLTZ

# Data acquisition

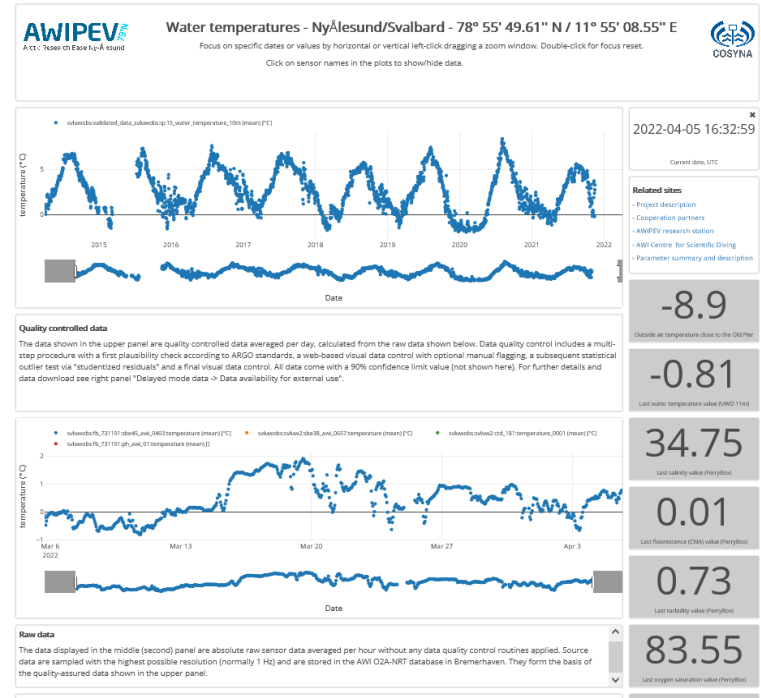
## Data Logistics Support (DLS)

- DLS provides services and products to securely transfer raw data from measuring devices and metadata from scientific activities.



Contact:  
[o2a-support@awi.de](mailto:o2a-support@awi.de)

- Sensor Information System: Repository for metadata information
- Registration of your devices / gears
- Basis for most other AWI data services/products such as
  - NRT dataflows
  - Device Metadata in PANGAEA, Contact Persons, Manuals, Pictures,
  - Assigning devices to a mission or collection
  - Station lists and device operations for Portals and Repositories



NRT-Dashbord

# Sensor Actions

- <https://sensor.awi.de/?id=8402>, 5066, 831

AWI firm core drill

Overview	Contacts	Actions	Parameters	Resources	Properties	Local Frame	Subdev
Current Version							
<a href="#">+ Add</a>							
Show <input type="text" value="25"/> entries							
ID	Type	Label	Date (UTC)	Lat / Long/ Ele			
53103	Deployment	NM06_21_C04	2021-12-12 00:00:00 - 2021-12-13 00:00:00	-70.66653° / -8.2			
53102	Deployment	NM06_21_C03	2021-12-10 00:00:00 - 2021-12-12 20:00:00	-70.66653° / -8.2			

## Action info

Overview Resources Relations

 Edit

<b>ID:</b>	53102
<b>Label:</b>	NM06_21_C03
<b>Type:</b>	Deployment
<b>From:</b>	2021-12-10 00:00:00 UTC
<b>Until:</b>	2021-12-12 20:00:00 UTC
<b>Description:</b>	Firnkern ca. 11 m nahe Wetterstation NM Sepp Kipfstuhl
<b>Latitude:</b>	-70.66653°
<b>Longitude:</b>	-8.27019°
<b>Elevation:</b>	54.9 m

# How is scientific data recorded?

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# How is scientific data recorded?

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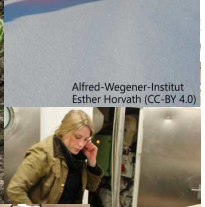
A) Measurement devices (Digital output can be processed)



# How is scientific data recorded?

A) Measurement devices (Data digital output can be ingested)

B) Everyday life: Pen and Paper is used to collect scientific data



# How is scientific data recorded?

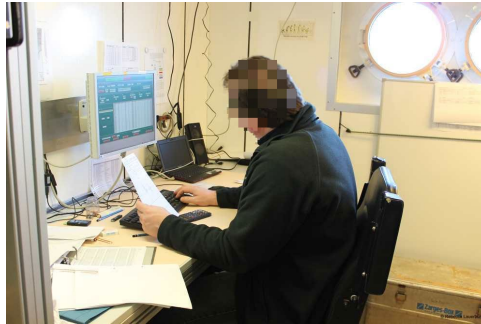
- Data flow

1)



Data collection

2)



Digitalisation

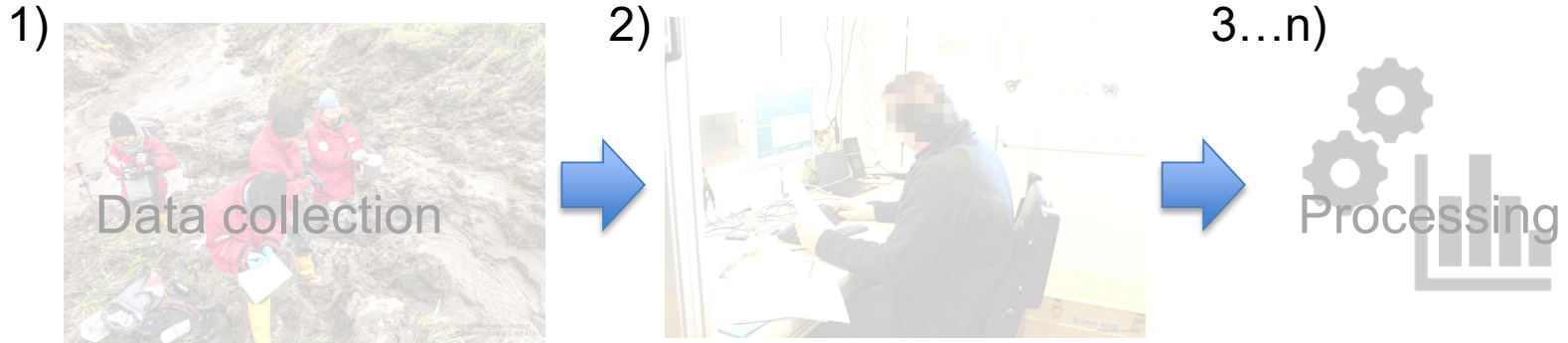
3...n)



Processing

# How is scientific data recorded?

- Data flow



## Downside:

- **Inefficient**
- **Prone to error** (handwritten notes, transcribing...)
- High risk of **Data cemeteries**  
(Scientist leaves institute without digitalising his/her own handwritten protocols)



# How is scientific data recorded?



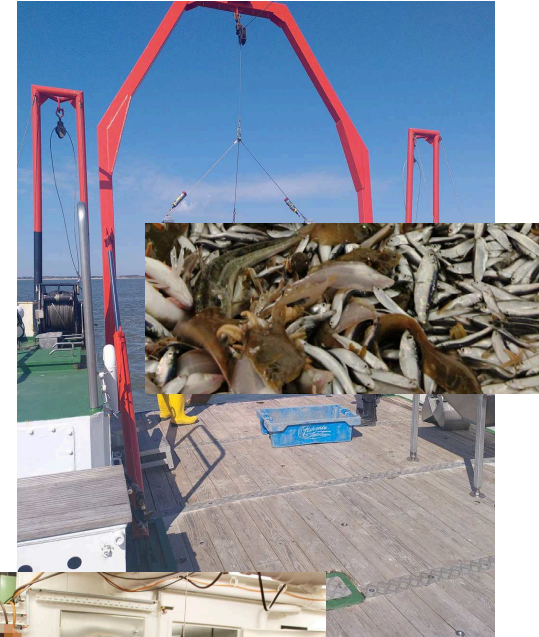
## Mobile Tools & Solutions

- Mythaw – mobile app to collect permafrost data (N.Anselm)
- MobileEventLog – App to log your item events offline during expeditions and sync them later to sensor (M.Betz)
- Voice controlled data collection

- Data is digitalised while ist collected
- Saving time and human resources

## Use Case – Fishmonitoring MYAll with T. Kress

- Monthly sampled time series
- 8 stations, 2 hauls each
- Data collected: Fish species, numbers, lengths, weights



# Smatrix Demo

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[Link to demo video](#)



# Summary – Voice based data collection

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- Fully operates offline
- Large selection of languages
- Not trained for a specific individuum
- Share table templates – having same format of dataset
- Saves time and human resources



# myThaw – permafrost monitoring app



## Objectives

- Better monitor and understand permafrost thaw
- Establish a baseline of data from around the permafrost region
- Establish cooperative work, e.g. INTERACT

## Needs

- No standardized protocol on thaw measurement → develop protocol
- Get everyone on board → “citizen science”

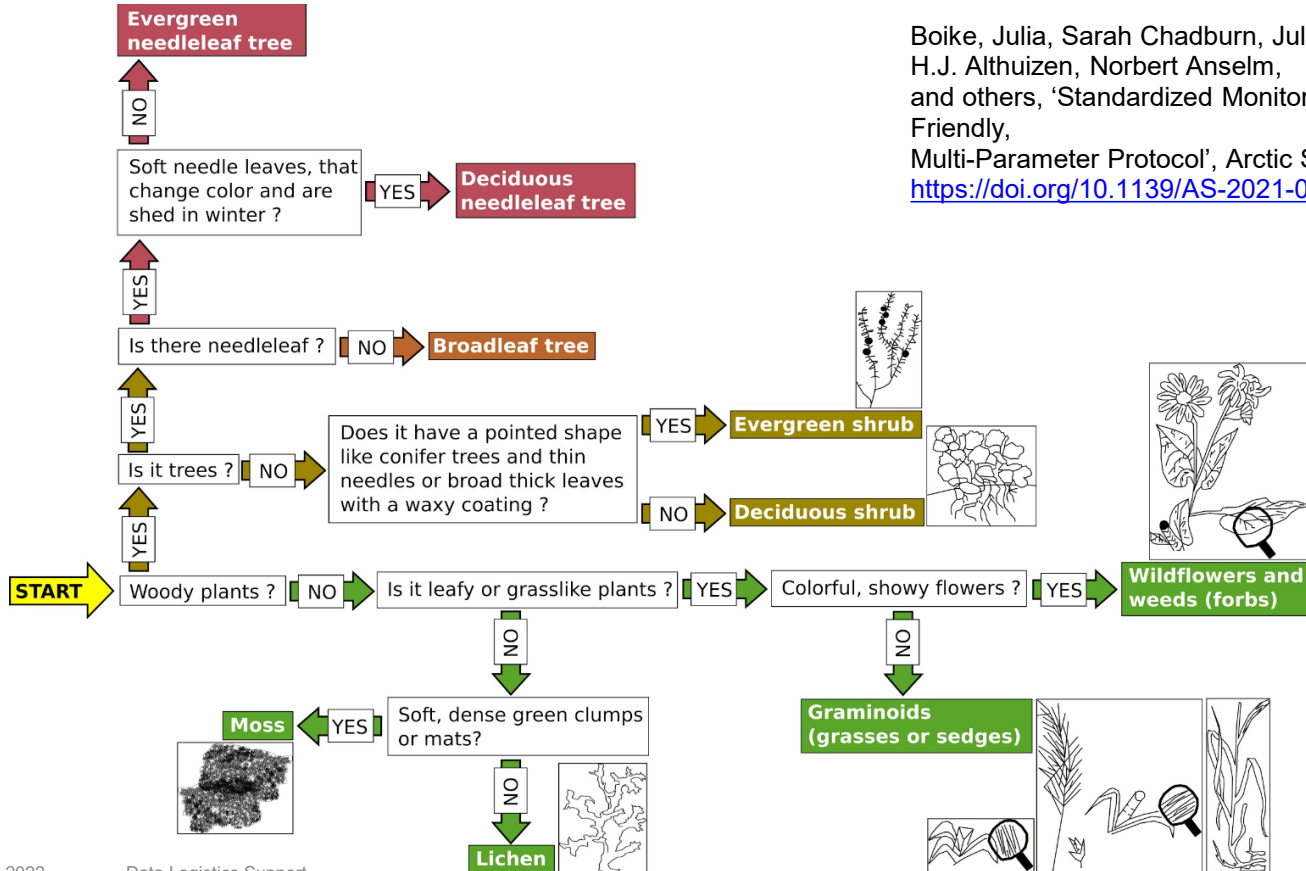
## Challenges

- Lack of digitalization in terrestrial polar sciences field work
- How to facilitate the existing capabilities in a FAIR way

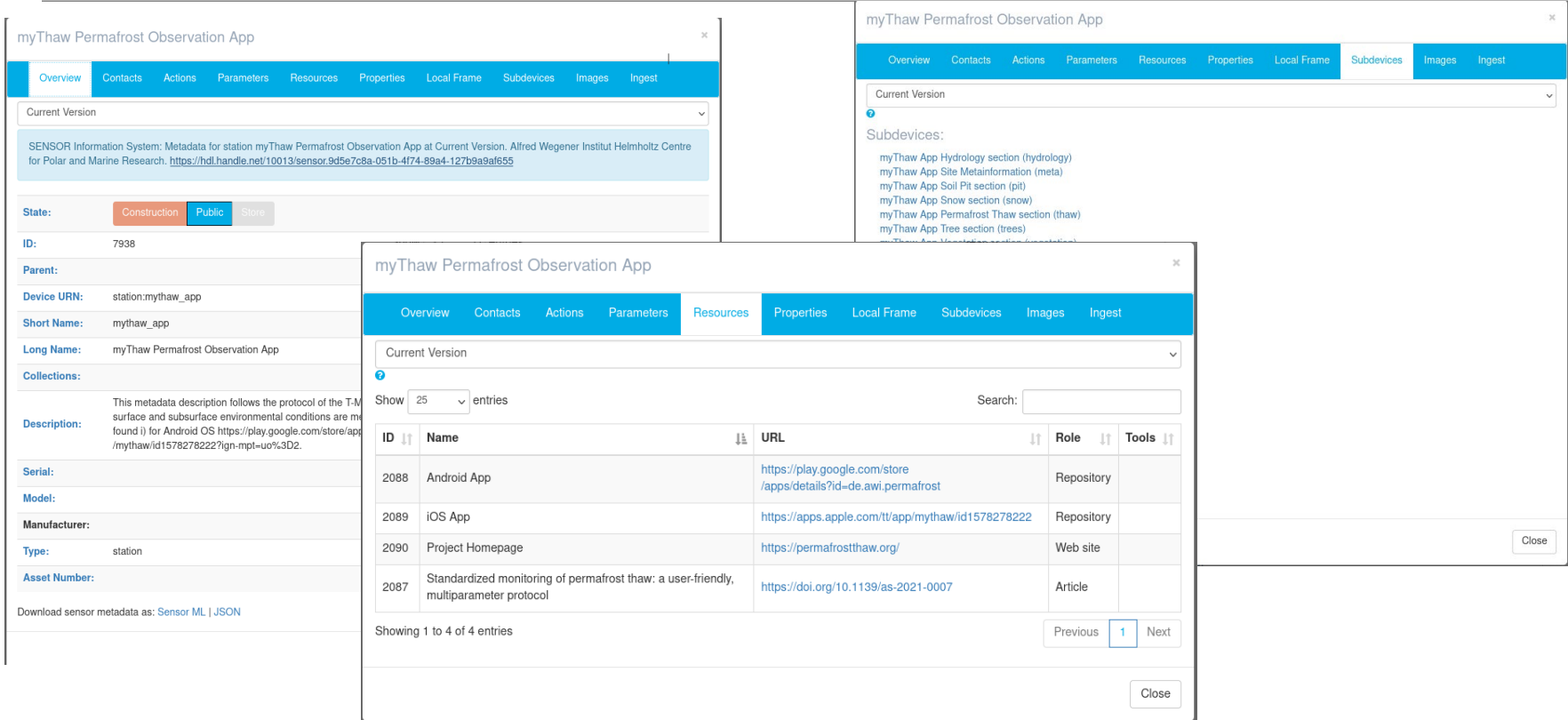


# First time ever protocol

Boike, Julia, Sarah Chadburn, Julia Martin, Simon Zwieback, Inge H.J. Althuisen, Norbert Anselm, and others, 'Standardized Monitoring of Permafrost Thaw: A User-Friendly, Multi-Parameter Protocol', Arctic Science, 2021  
<https://doi.org/10.1139/AS-2021-0007>



# Metadata per protocol



myThaw Permafrost Observation App

Overview Contacts Actions Parameters Resources Properties Local Frame Subdevices Images Ingest

Current Version

SENSOR Information System: Metadata for station myThaw Permafrost Observation App at Current Version. Alfred Wegener Institut Helmholtz Centre for Polar and Marine Research. <https://hdl.handle.net/10013/sensor.9d5e7c8a-051b-4f74-89a4-127b9a9af655>

State: Construction Public Store

ID: 7938

Parent:

Device URN: station:mythaw\_app

Short Name: mythaw\_app

Long Name: myThaw Permafrost Observation App

Collections:

Description: This metadata description follows the protocol of the T-M surface and subsurface environmental conditions are measured for Android OS <https://play.google.com/store/apps/details?id=de.awi.permafrost> /mythaw/id1578278222?ign-mpt=uo%3D2.

Serial:

Model:

Manufacturer:

Type: station

Asset Number:

Download sensor metadata as: [Sensor ML](#) | [JSON](#)

myThaw Permafrost Observation App

Overview Contacts Actions Parameters Resources Properties Local Frame Subdevices Images Ingest

Current Version

Subdevices:

- myThaw App Hydrology section (hydrology)
- myThaw App Site Metainformation (meta)
- myThaw App Soil Pit section (pit)
- myThaw App Snow section (snow)
- myThaw App Permafrost Thaw section (thaw)
- myThaw App Tree section (trees)

myThaw Permafrost Observation App

Overview Contacts Actions Parameters Resources Properties Local Frame Subdevices Images Ingest

Current Version

Show 25 entries Search:

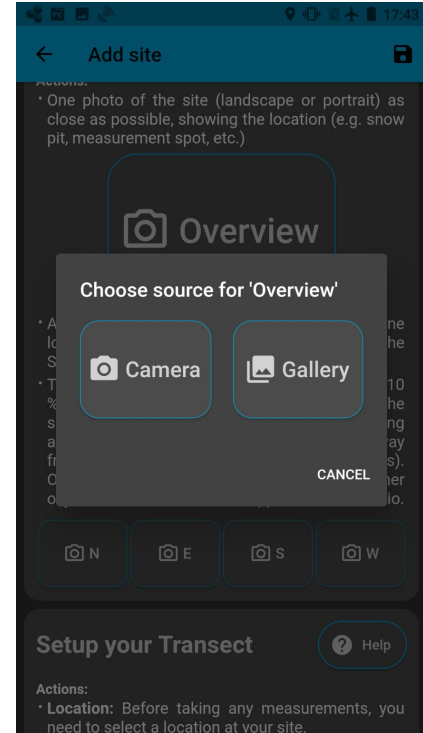
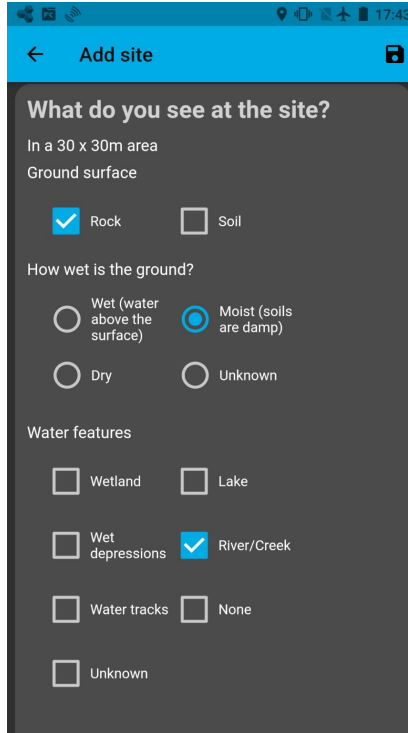
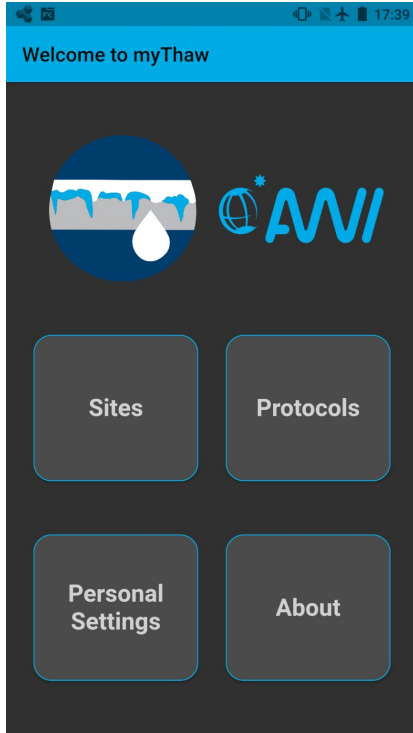
ID	Name	URL	Role	Tools
2088	Android App	<a href="https://play.google.com/store/apps/details?id=de.awi.permafrost">https://play.google.com/store/apps/details?id=de.awi.permafrost</a>	Repository	
2089	iOS App	<a href="https://apps.apple.com/tt/app/mythaw/id1578278222">https://apps.apple.com/tt/app/mythaw/id1578278222</a>	Repository	
2090	Project Homepage	<a href="https://permafrostthaw.org/">https://permafrostthaw.org/</a>	Web site	
2087	Standardized monitoring of permafrost thaw: a user-friendly, multiparameter protocol	<a href="https://doi.org/10.1139/as-2021-0007">https://doi.org/10.1139/as-2021-0007</a>	Article	

Showing 1 to 4 of 4 entries

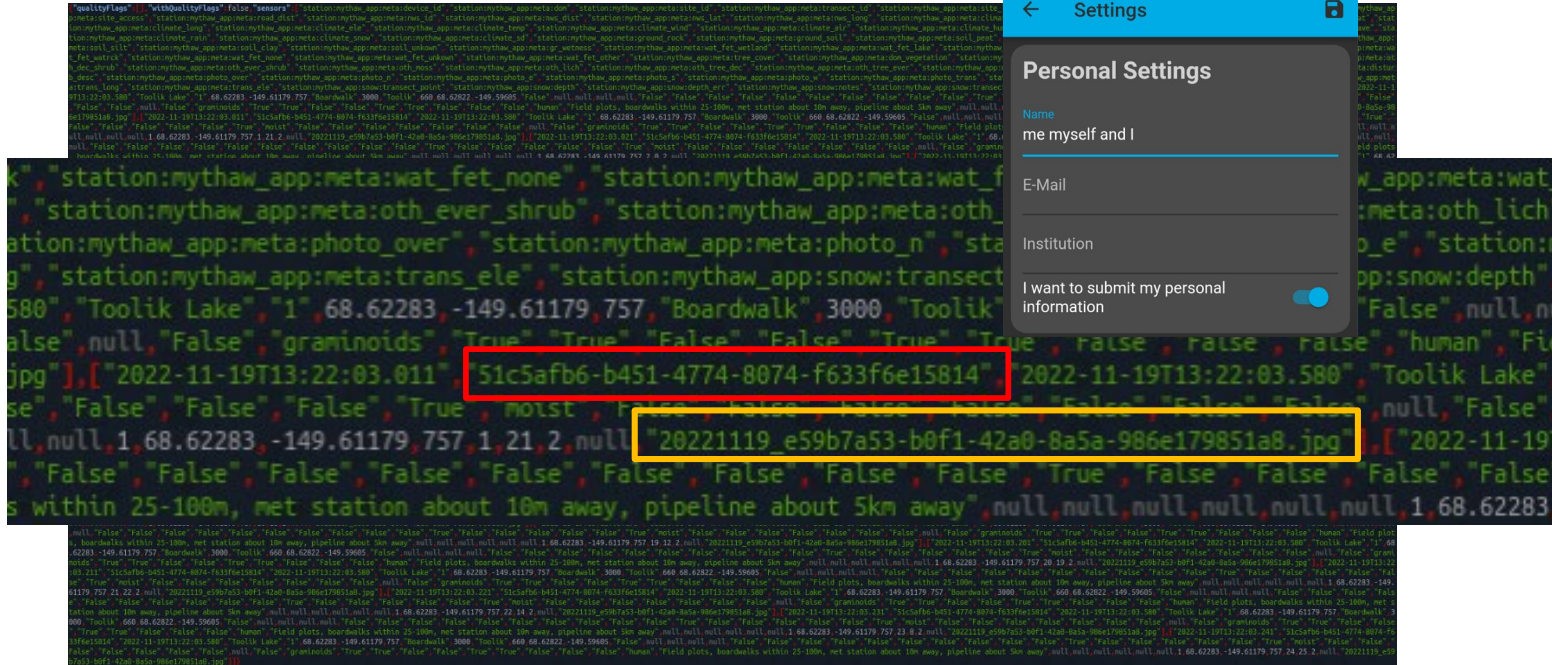
Previous 1 Next

Close

# App based data collection

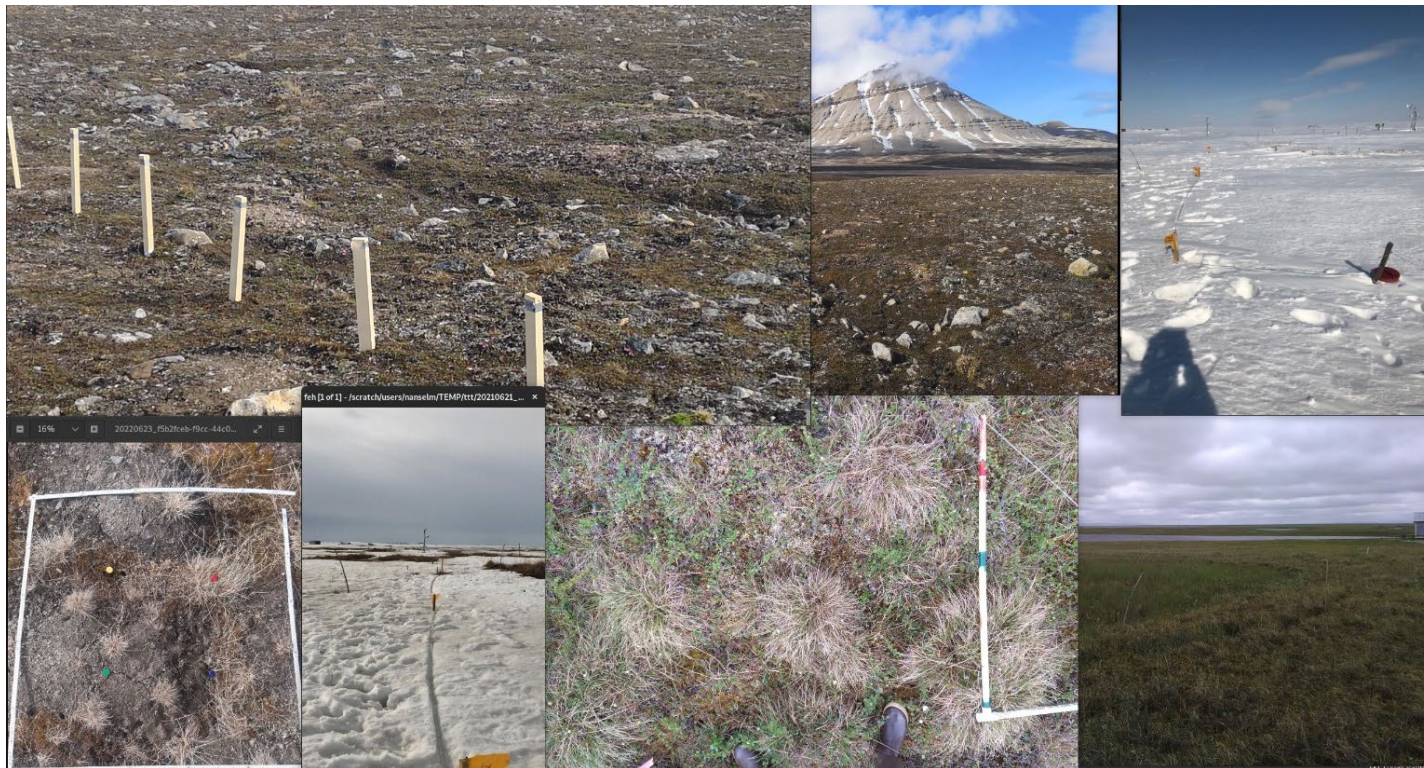


# Looking into the data

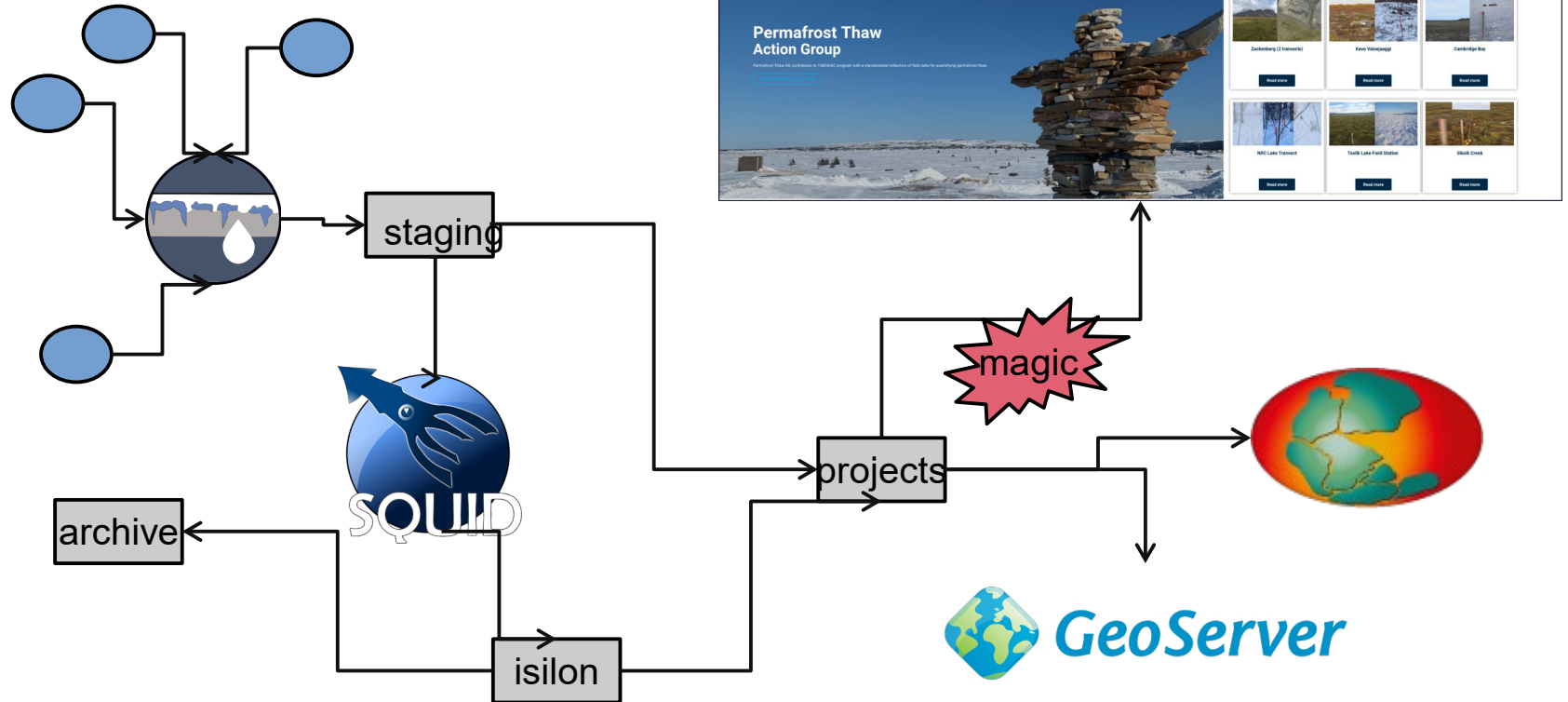


The screenshot displays a mobile application interface. On the right, a 'Settings' menu is visible with the following options: 'Personal Settings', 'Name' (set to 'me myself and I'), 'E-Mail', 'Institution', and a toggle for 'I want to submit my personal information' which is currently turned on. The background shows a data log with various entries. Two entries are highlighted:

- A red box highlights the file name: `51c5afb6-b451-4774-8074-f633f6e15814`
- A yellow box highlights the file name: `20221119_e59b7a53-b0f1-42a0-8a5a-986e179851a8.jpg`



# Simplified workflow



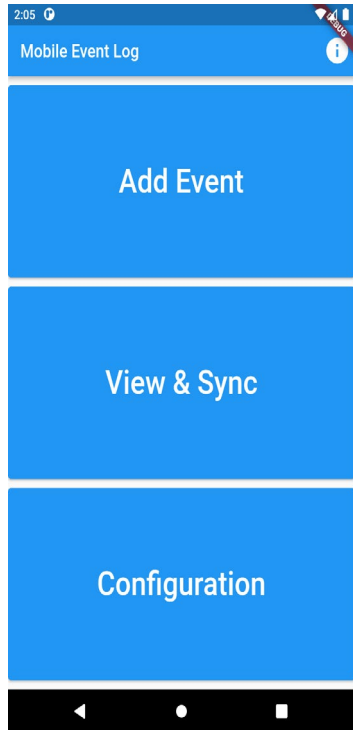
# Summary – permafrost monitoring app

- Easy to use protocol with multi OS support
- Promising new type of data → new challenges as well
- Rewarding mechanism for data authors (not by default)
- Consequent usage of O2A capacities
- Expansion of O2A capabilities → more features to come





# MobileEventLog Concept (M. Betz)

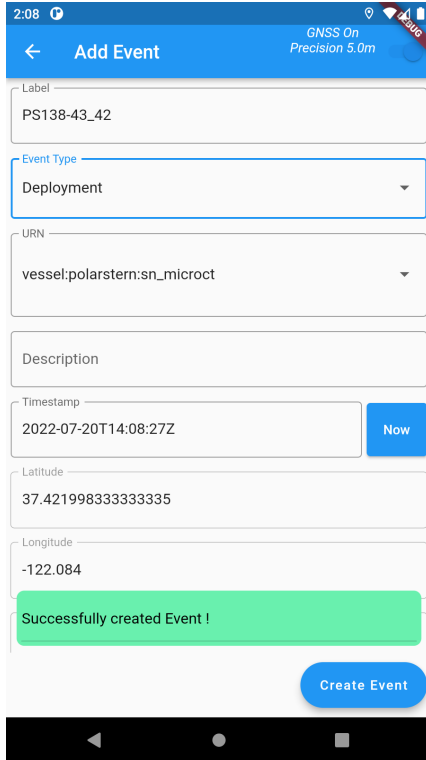


- History
  - DSHIP Apps IceFloeApp for MOSAiC on Android tablets, MobileActionLog App for smartphones.
  - Sync to [sensor.awi.de](https://sensor.awi.de) via additional syncserver
- MobileEventLog: Since 01/2022 based on the Mobile App Development Framework Flutter
- Framework supports both Android and Apple devices
- Offline Event creation and online synchronization to [sensor.awi.de](https://sensor.awi.de)
- Direct REST API communication with [sensor.awi.de](https://sensor.awi.de)

# Add and Edit Event widgets

Select  
Event type and  
Device

- Get  
location  
from  
device



2:08 GNSS On Precision 5.0m

← Add Event

Label  
PS138-43\_42

Event Type  
Deployment

URN  
vessel:polarstern:sn\_microct

Description

Timestamp  
2022-07-20T14:08:27Z Now

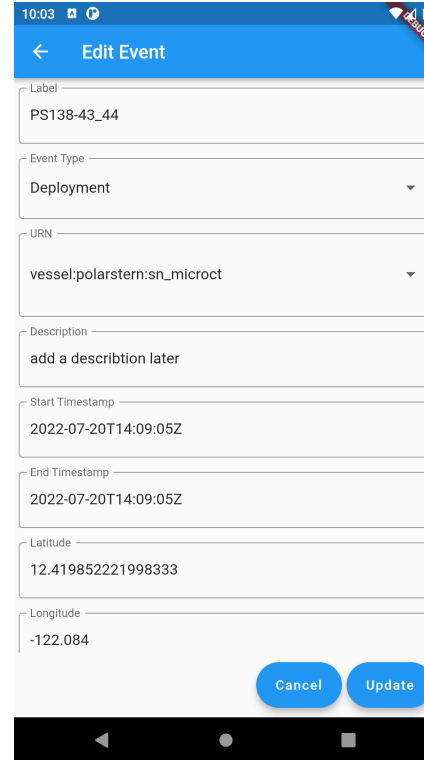
Latitude  
37.42199833333333

Longitude  
-122.084

Successfully created Event !

Create Event

Edit  
parameters  
before upload



10:03

← Edit Event

Label  
PS138-43\_44

Event Type  
Deployment

URN  
vessel:polarstern:sn\_microct

Description  
add a description later

Start Timestamp  
2022-07-20T14:09:05Z

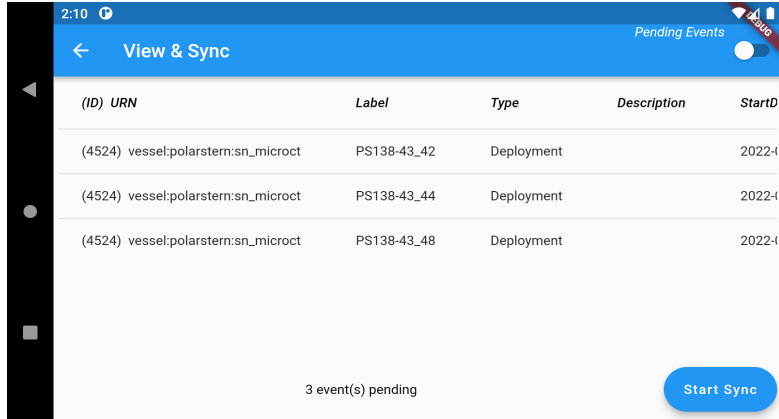
End Timestamp  
2022-07-20T14:09:05Z

Latitude  
12.419852221998333

Longitude  
-122.084

Cancel Update

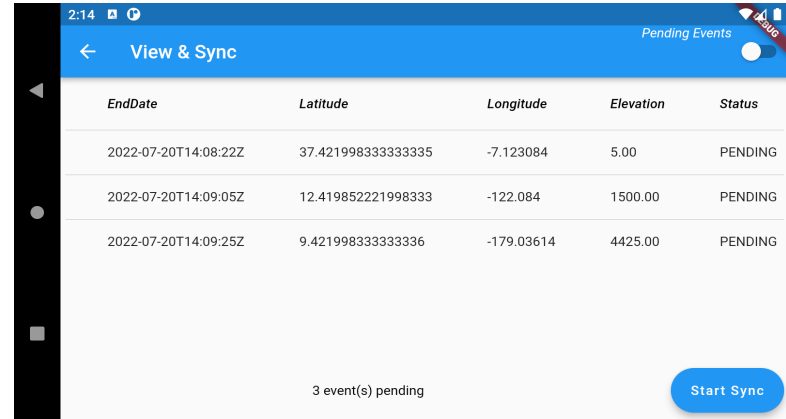
# View & Sync Widgets



2:10 Pending Events  Start Sync

(ID) URN	Label	Type	Description	StartD
(4524) vessel:polarstern:sn_microct	PS138-43_42	Deployment		2022-07-20T14:08:22Z
(4524) vessel:polarstern:sn_microct	PS138-43_44	Deployment		2022-07-20T14:09:05Z
(4524) vessel:polarstern:sn_microct	PS138-43_48	Deployment		2022-07-20T14:09:25Z

3 event(s) pending



2:14 Pending Events  Start Sync

EndDate	Latitude	Longitude	Elevation	Status
2022-07-20T14:08:22Z	37.421998333333335	-7.123084	5.00	PENDING
2022-07-20T14:09:05Z	12.419852221998333	-122.084	1500.00	PENDING
2022-07-20T14:09:25Z	9.421998333333336	-179.03614	4425.00	PENDING

3 event(s) pending

- View and Edit created events
- Sync (Upload) events to sensor.awi.de

- Add possibility to log simple measurements: (not only pure metadata)
  - Record measurement values based on sensors device parameters
  - Upload measurements to the Dashboard Database
  
- New Use-Case: Digitalization of former pencil based field logs
  - Snowlevel measurement Anarctica Kottaspegel / Kohnen with a wifi connected length sensor. (Talk to Martin Petri or Maximilian Betz for more information)

# Thank you for your attention!

For further infos please contact: [o2a-support@awi.de](mailto:o2a-support@awi.de)



- Koppe, Roland, Peter Gerchow, Ana Macario, Antonie Haas, Christian Schäfer-Neth, and Hans Pfeiffenberger (June 2015) “O2A: A Generic Framework for Enabling the Flow of Sensor Observations to Archives and Publications”. In: OCEANS. 2015 Genova. DOI: 10.1109/OCEANS-Genova.2015.7271657. URL: <https://epic.awi.de/id/eprint/38295/>.
- [1] O2A <https://spaces.awi.de/pages/viewpage.action?pageId=105676803>
- [2] Mobile Event Log <https://gitlab.awi.de/data-logistics-support/mobileeventlog>
- [3] Sensor: <https://sensor.awi.de/>
- [4] SAMS: <https://spaces.awi.de/display/SM/SAMS>
- [5] Pictures: <http://multimedia.awi.de/>, WEB\_DE\_Meereis\_Einzelgrafiken\_Schneesonde\_MagnaProbe, WEB\_DE\_Meereis\_Einzelgrafiken\_Bohrungen\_DirekteMessung, 20180515\_PAMARCMiP006\_Ehorvath, 20150919\_PS94\_Arktis\_099\_Mhoppmann, 201509\_Metbuoy\_Mario\_Hoppmann
- [6] Figures: Rebecca Lauerburg

## Fotos:

- Pixabay <https://pixabay.com/de/service/faq/>
- Dr. Marco Zanatta und Nora Fried vom Alfred-Wegener-Institut für Polar- und Meeresforschung sammeln Schnee für Ruß- und Strahlungsmessungen. March 28, 2018, Arktische Ozean, Esther Horvath/Alfred Wegener Institute.
- 06/09/2017-AWI Permafrost team at work in Kurungnakh Island, Siberia, Russia.
- Wissenschaftler installieren eine Verankerung im Südozean. In etwa 500 Metern Tiefe schwimmt daran ein akustisches Messgerät (ADCP), dessen Daten Rückschlüsse auf die Verteilung von Zooplankton zulassen. Im Bild: Studienautor Boris Cisewski steht vor dem ADCP