Digital data Acquisition – Mobile Apps and Tools

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Digital Data Acquisition – Content

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- 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

Data Logistics Support (DLS) group

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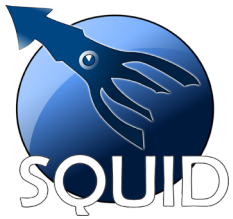
- **On the edge to science with our software products:** DSHIP, MDM, DMS, sensor.awi.de, Raw Data Ingest to PANGAEA, Near realtime ingests, Dashboards, MobileEventLog and more

- **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

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Data acquisition

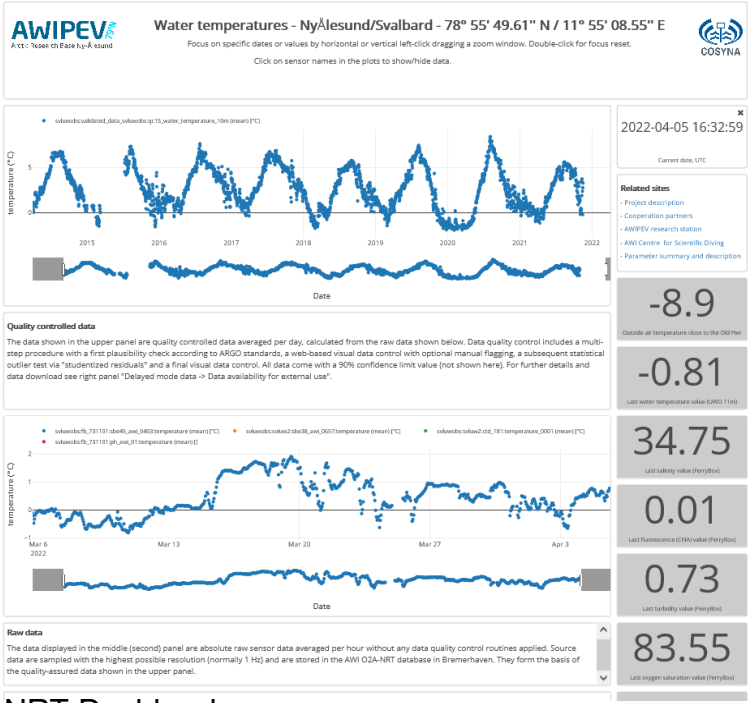
Data Logistics Support (DLS)

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

Contact:
o2a-support@awi.de

Sensor.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

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

AWI firn core drill

Overview | Contacts | Actions | Parameters | Resources | Properties | Local Frame | Subdev

Current Version

Add

Show 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

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

How is scientific data recorded?

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A) Measurement devices (Digital output can be processed)

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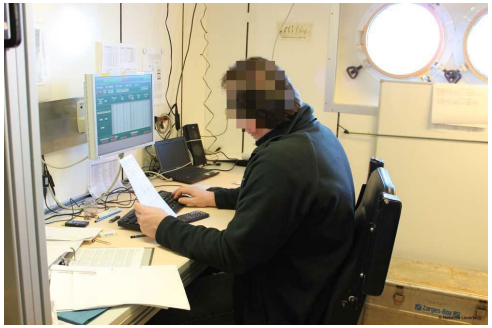
B) Everyday life: Pen and Paper is used to collect scientific data

How is scientific data recorded?

- Data flow

1) 

Data collection

2) 

Digitalisation

3…n) 

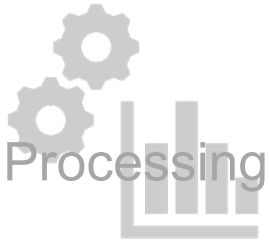
Processing

How is scientific data recorded?

- Data flow

1) 

2)

3…n) 

Downside:

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

How is scientific data recorded?

1)

2)

3…n)

Digital Data Acquisition

Data collection

Digitalisation

Processing

Digital data acquisition

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

Voice based data collection – smatrix by dawin

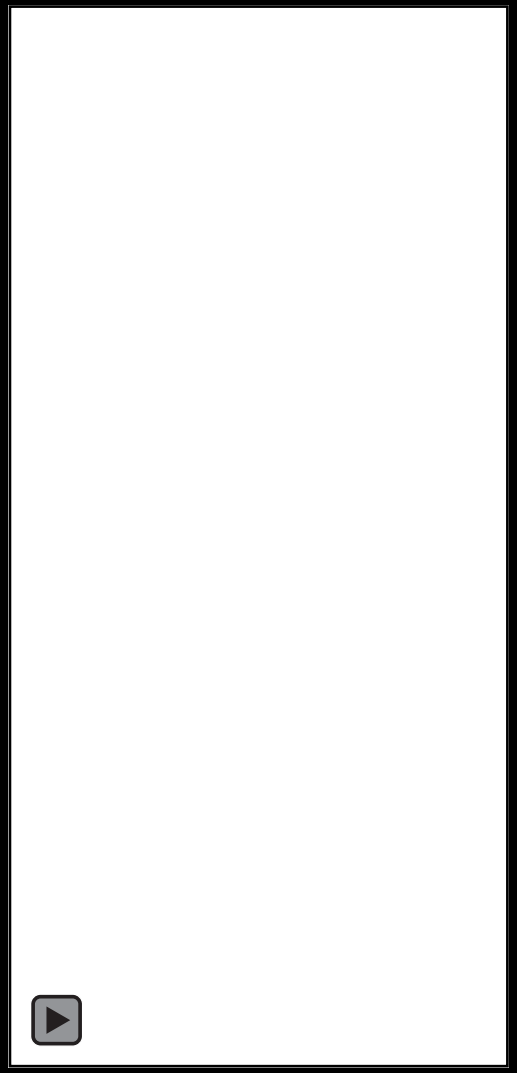
- Data is digitalised while ist collected
- Saving time and human resources

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

Link to demo video



Summary – Voice based data collection

- 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

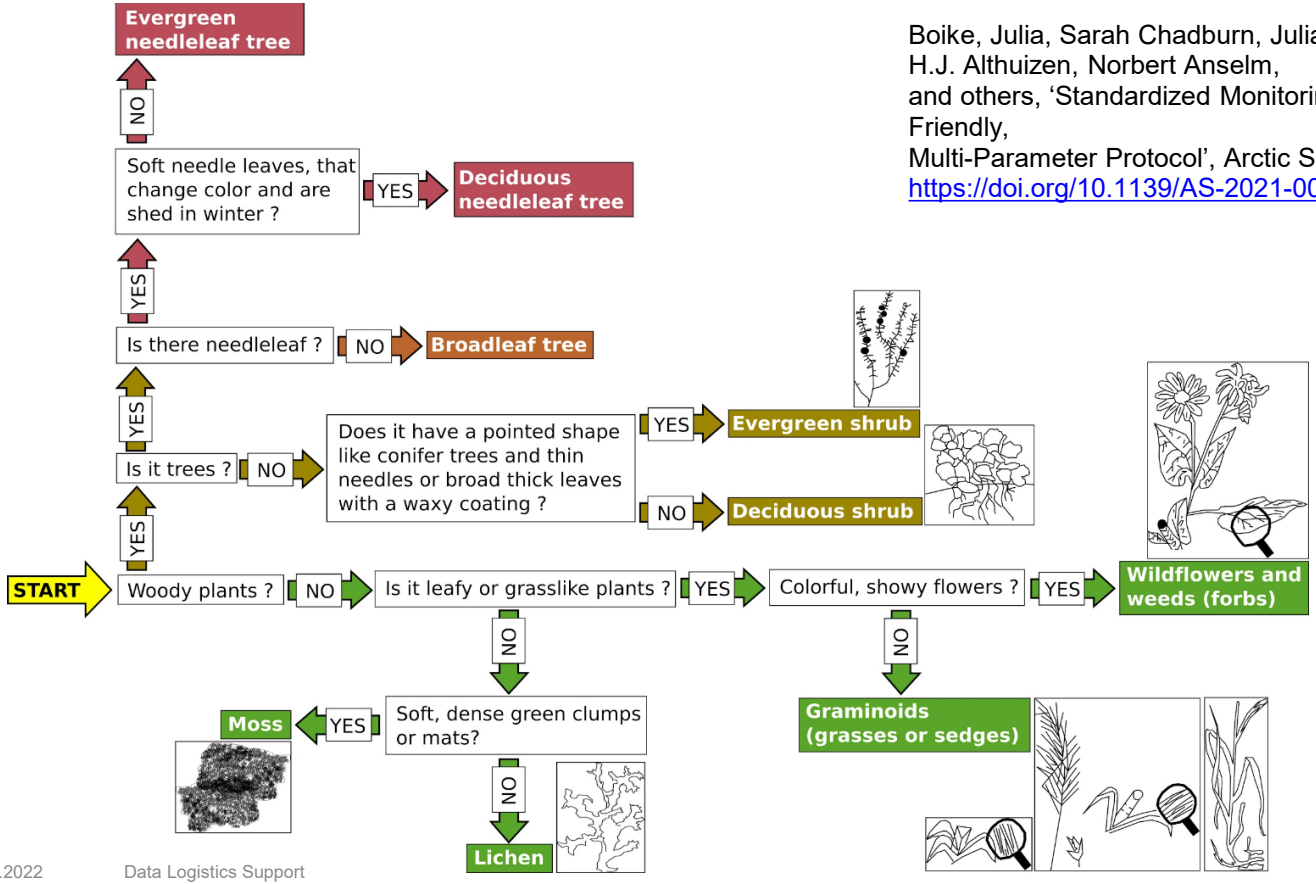
Needs

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

Challenges

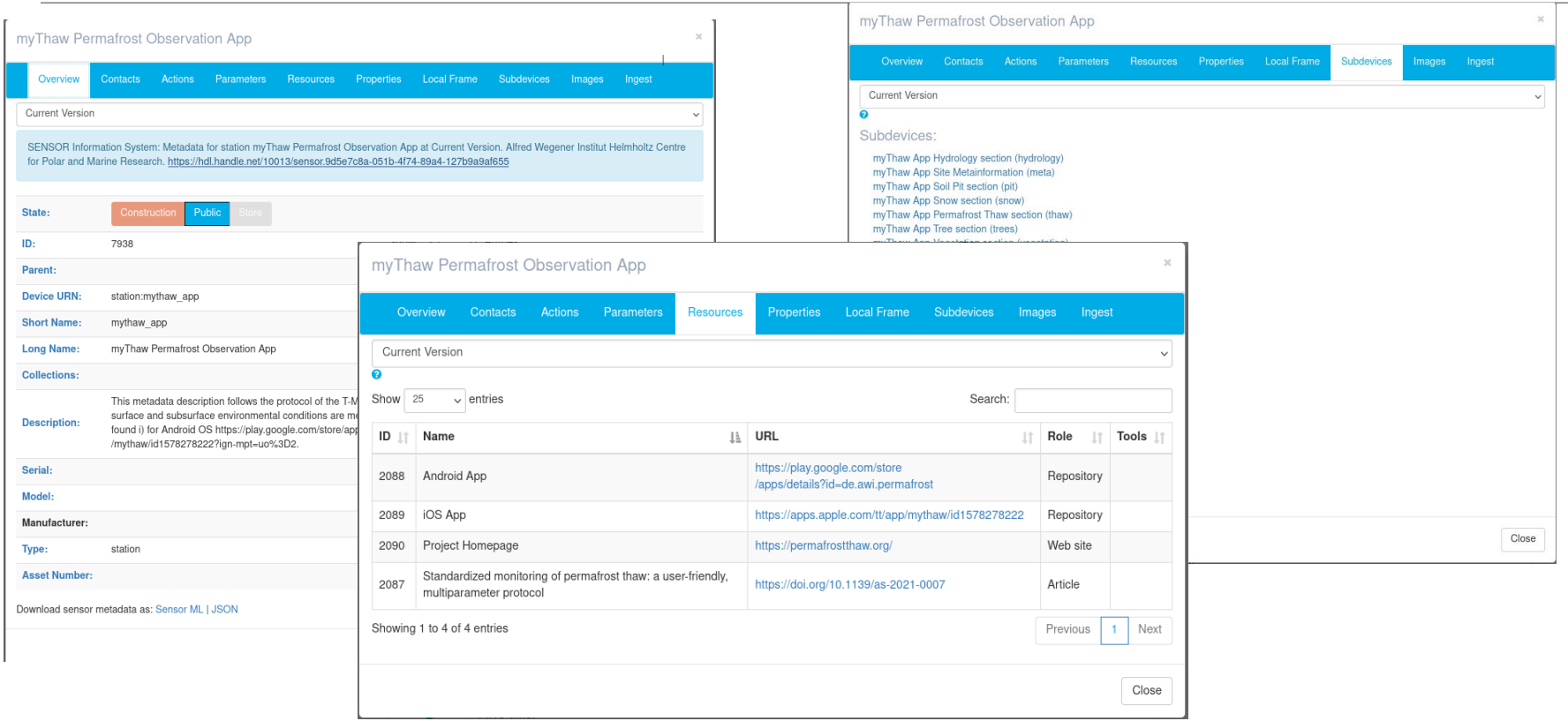
- Lack of digitalization in terrestrial polar sciences fiel work
- How to facilitate the existing capabilities in a FAIR way

First time ever protocol



Boike, Julia, Sarah Chadburn, Julia Martin, Simon Zwieback, Inge H.J. Althuizen, 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



App based data collection

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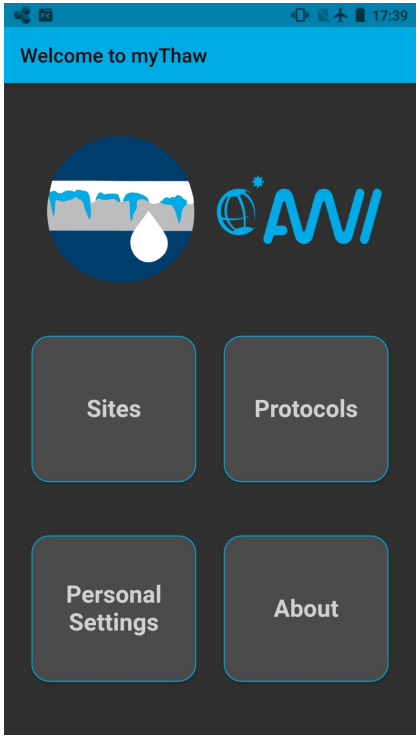

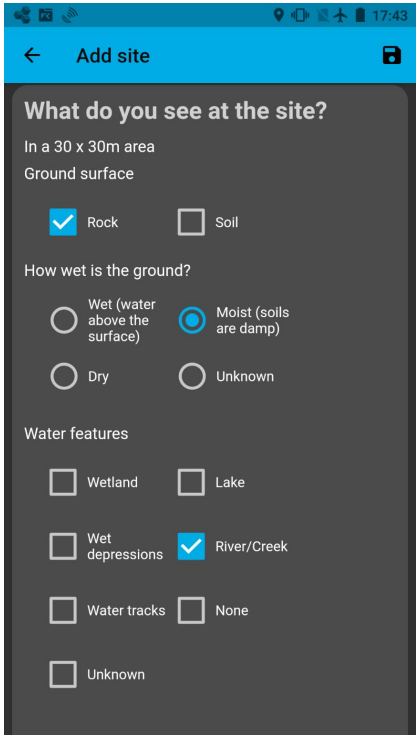

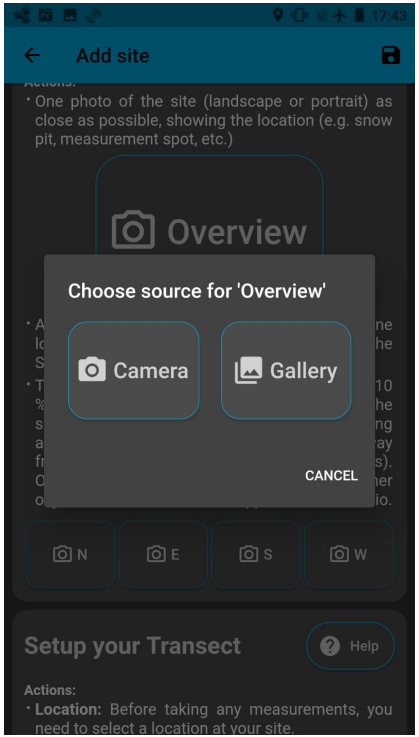

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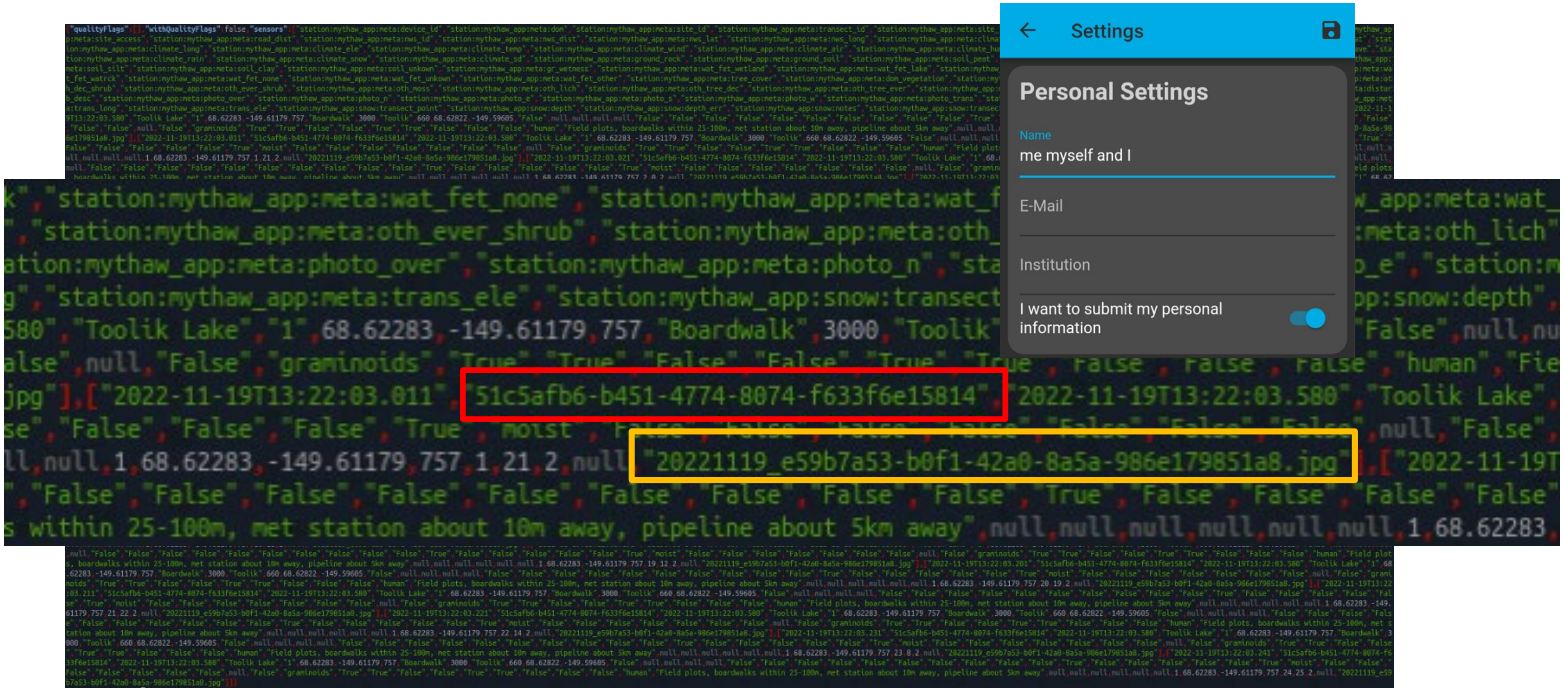
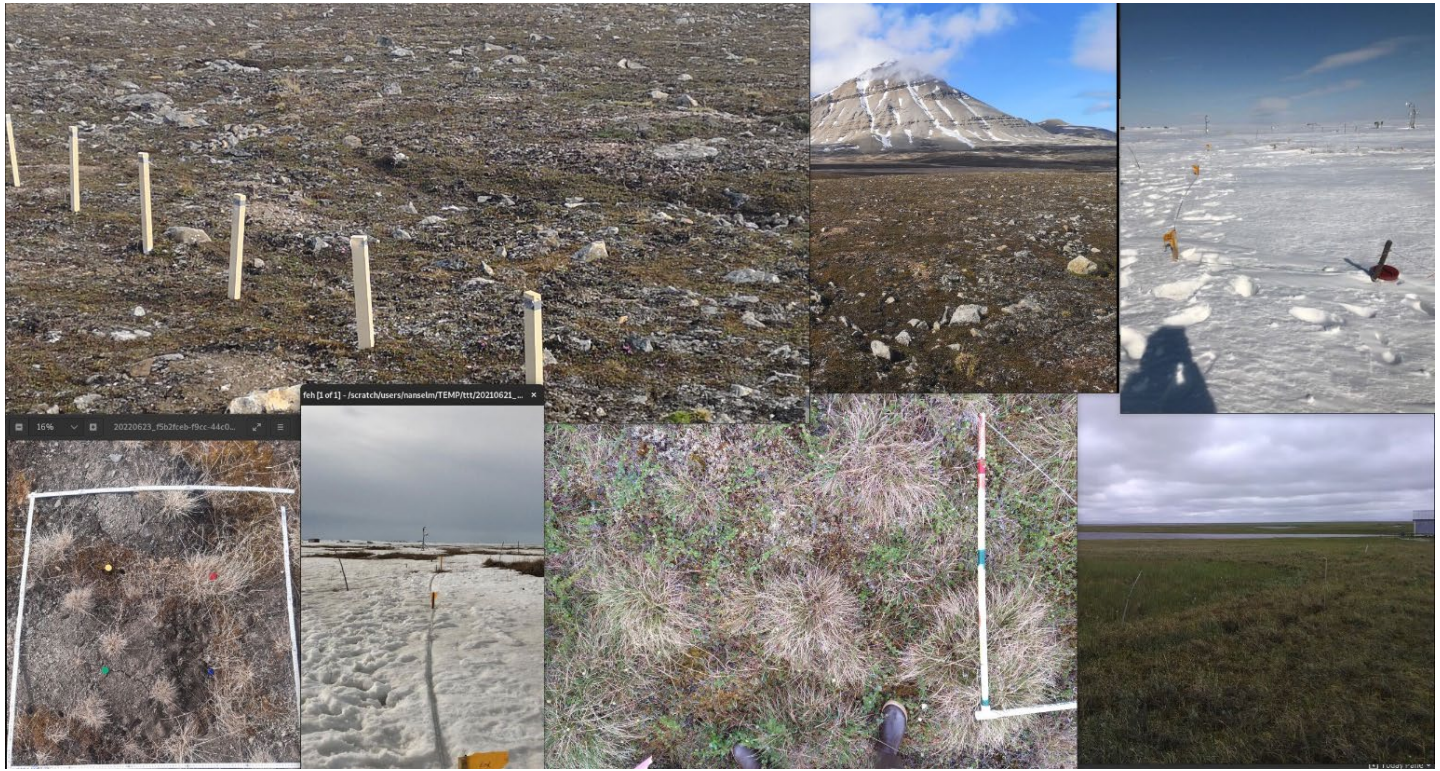
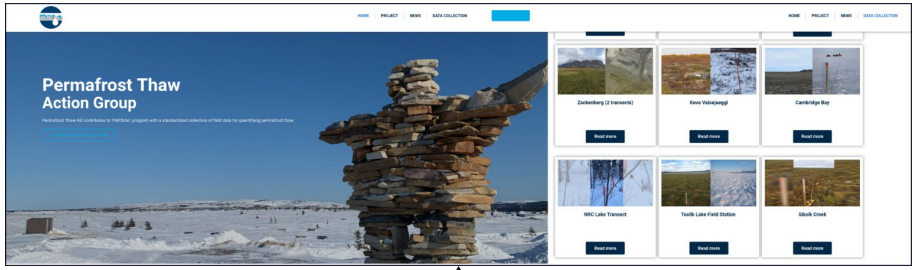
Looking into the data




feh [1 of 1] - /scratch/users/nanselm/TEMP/ttt/20210621_...
16%
20220623_f5b2fceb-f9cc-44c0...

Simplified workflow



staging

magic

SQUID

projects

archive

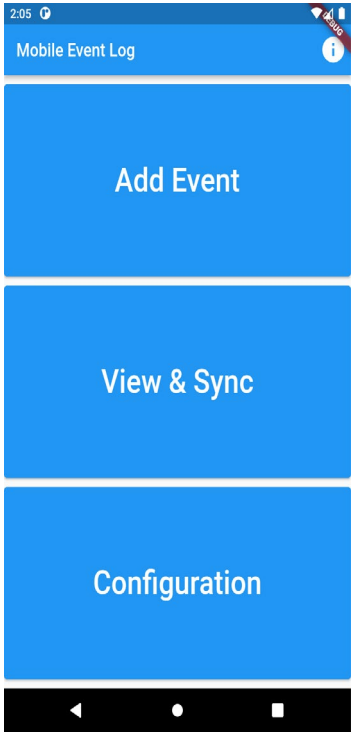
isilon

GeoServer

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 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
- Direct REST API communication with sensor.awi.de

Add and Edit Event widgets

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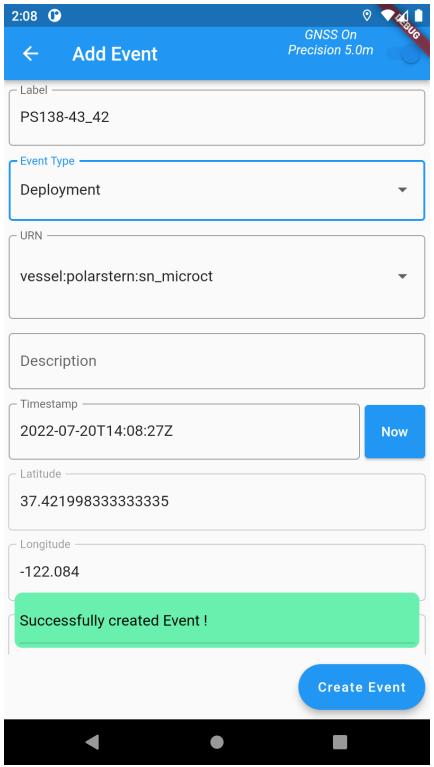
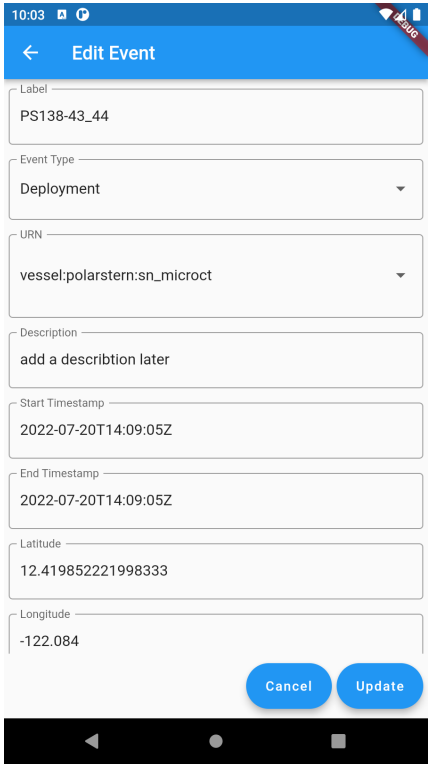
Select Event type and Device

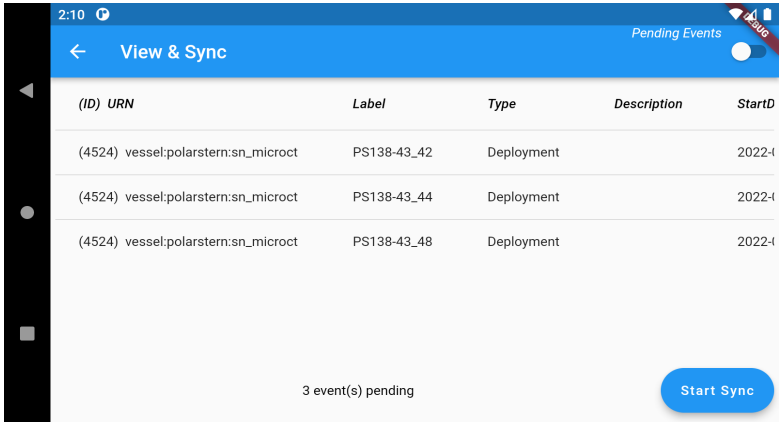
Get location from device

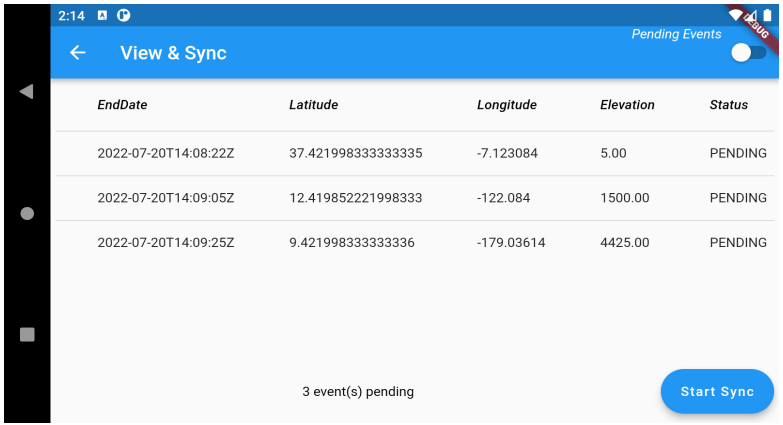




Edit parameters before upload

View & Sync Widgets





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

Roadmap

- 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: Digitialization 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!

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For further infos please contact: o2a-support@awi.de

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References

- 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