ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

PermaSense

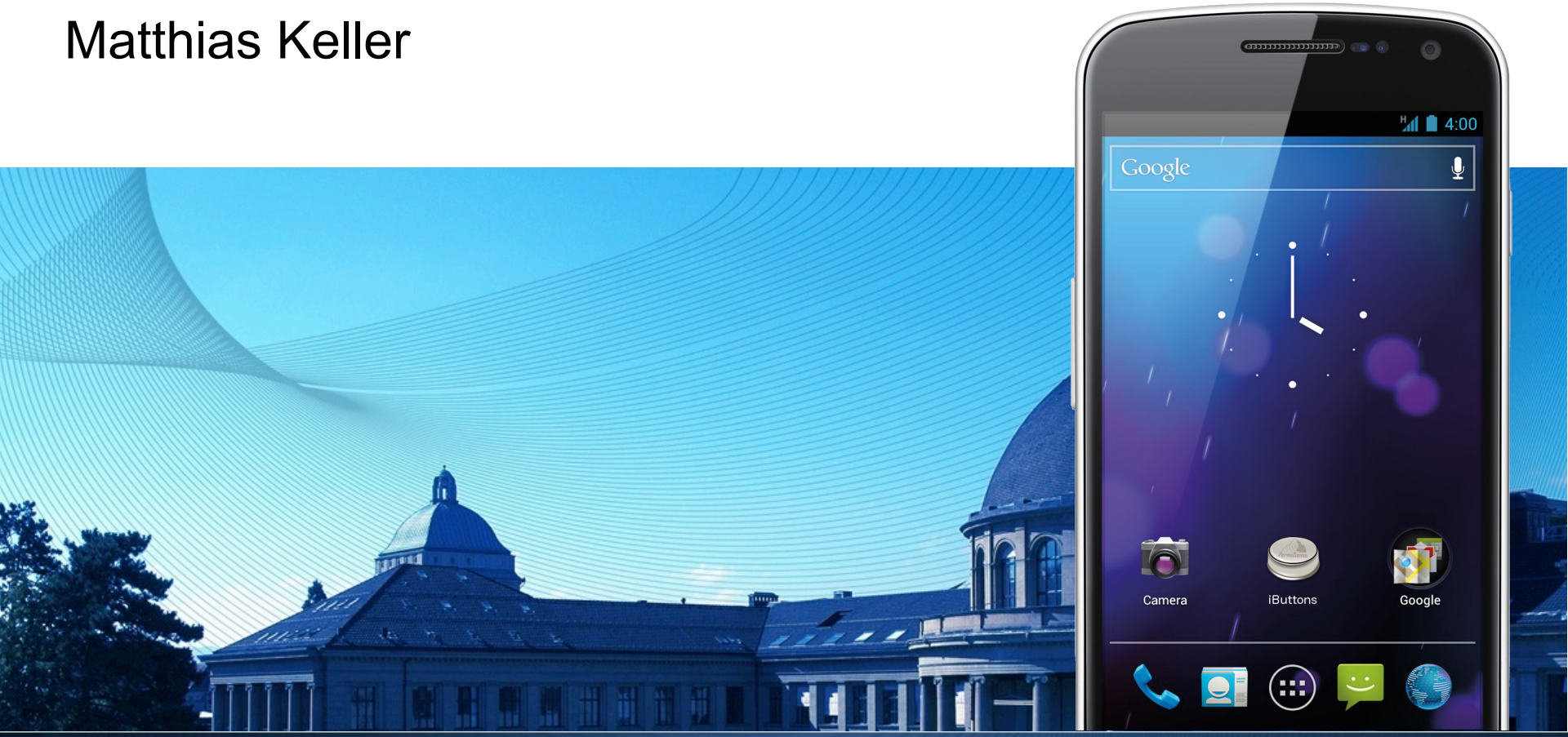
nano-tera.ch

Computer Engineering
and Networks Laboratory
TIK

# iButton Assist + idNotebook for Android

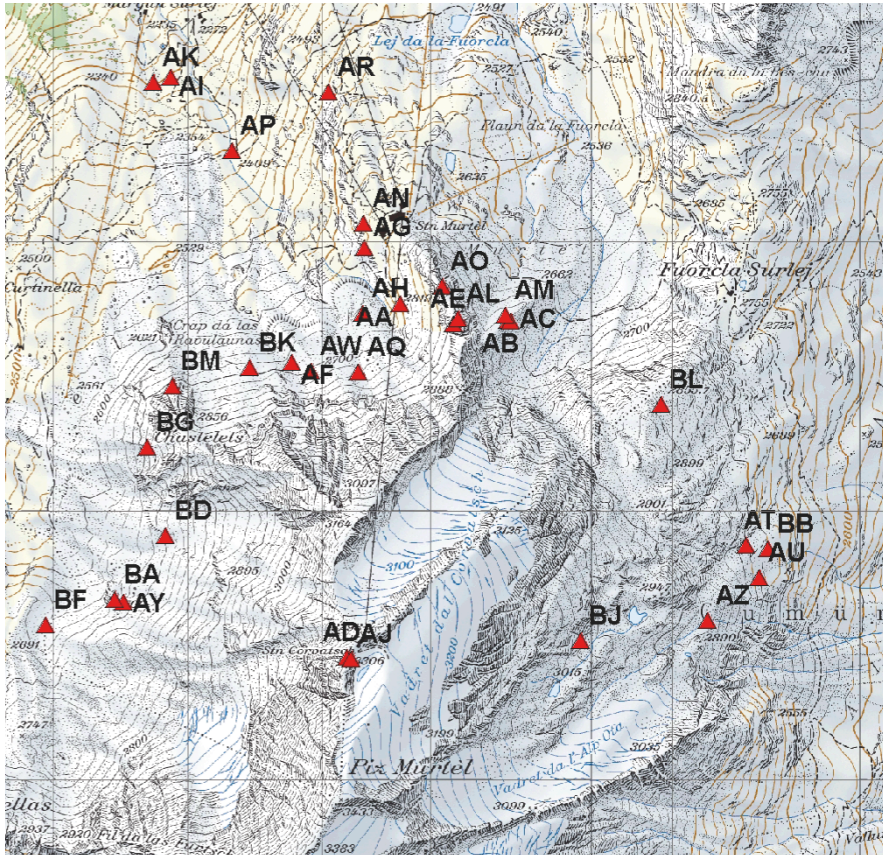
## Mass Deployment of Miniature Temperature Loggers

Matthias Keller

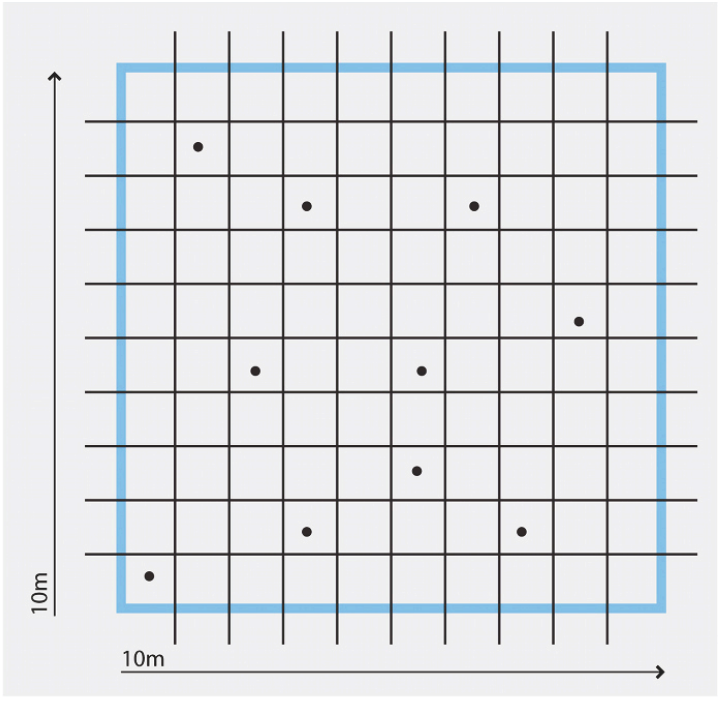


# Example: Measuring GST in the Alps

~30 patches of 10 m x 10 m size



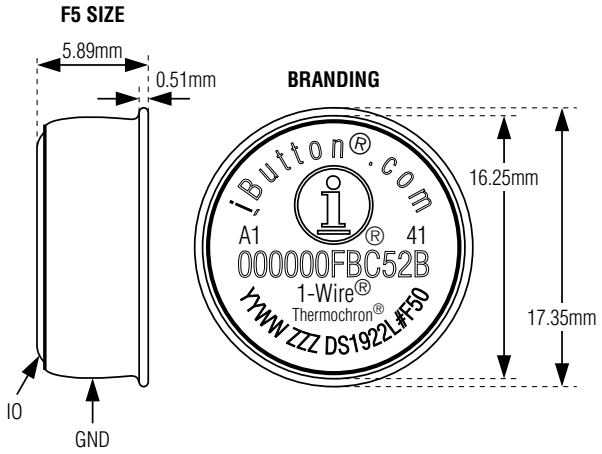

10 temperature loggers per patch

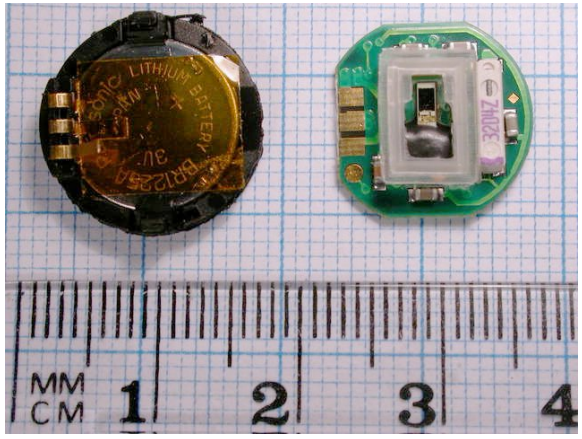



→ Deployment of ~300 loggers

Stefanie Gubler, Joel Fiddes, Matthias Keller and Stephan Gruber: *Scale-dependent Measurement and Analysis of Ground Surface Temperature Variability in Alpine Terrain*, The Cryosphere, Vol 5, Issue 2, 2011

# iButton Temperature Loggers


| Model | Range | Max. resolution | Accuracy | Max. samples | Price (25-99 loggers) |
|---|---|---|---|---|---|
| DS1921G | -30°C..+70°C | 0.5°C | ±1.0°C | 2048 | ~22 US$ each |
| DS1921H | +15°C..+46°C | 0.125°C | ±1.0°C | 2048 | ~22 US$ each |
| DS1921Z | -5°C..+26°C | 0.125°C | ±1.0°C | 2048 | ~22 US$ each |
| DS1922L | -10°C..+65°C | 0.0625°C | ±0.5°C | 8192 | ~45 US$ each |
| DS1922T | +20°C..+75°C | 0.0625°C | ±0.5°C | 8192 | ~65 US$ each |

# User-defined Mission Parameters

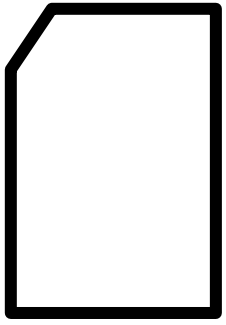
- Sampling rate (seconds to months)
- Delayed start of measurements
- Overwrite or stop when memory is full?
- High or low temperature resolution? [DS1922 only]

```
kellmatt — kellmatt@pc-10022: ~/eee-pc/builds/...
Please enter value: 0
Enter the sample rate in seconds.
3600
Enter start delay in minutes.
0
Enable rollover? (T/F)
F
Should the iButton clock be sync'ed with the OS clock? (T/F)
T
Do you want the temperture channel enabled? (T/F)
T
Do you want to set a high temperature alarm? (T/F)
F
Do you want to set a low temperature alarm? (T/F)
F
Do you want to start mission upon a temperature alarm? (T/F)
F
Do you want the temperatures recorded in high resolution? (T/F)
T
Do you want the data channel enabled? (T/F)
F
```

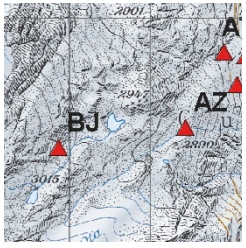
*Screenshot of vendor tool kit*
*~10 questions per logger*

# Bookkeeping Challenges

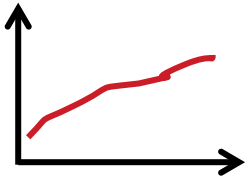

iButton serial #
e.g., *040000001BF32F21*



Mission
parameters



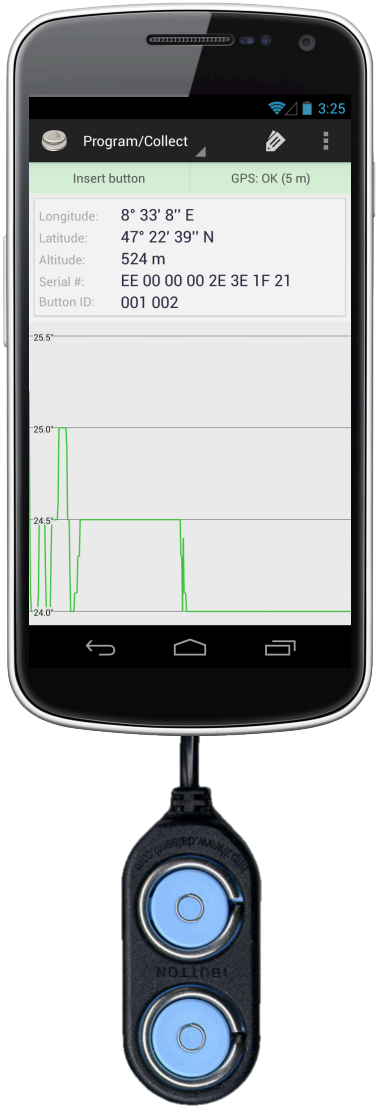

Logger
location



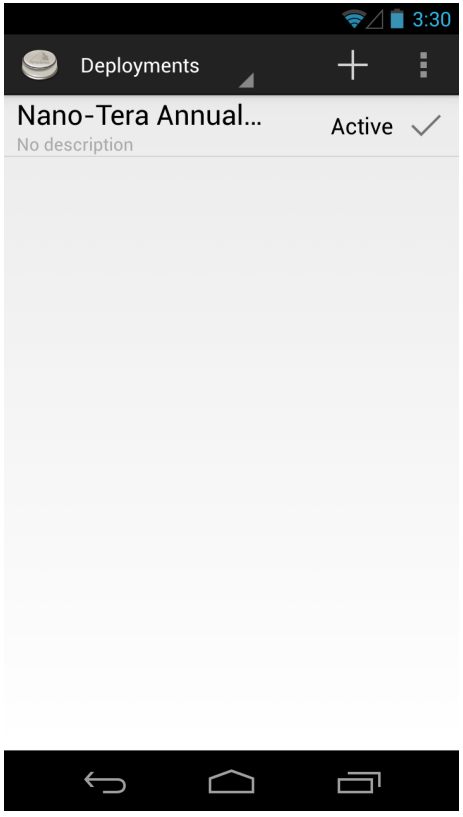
Measurements

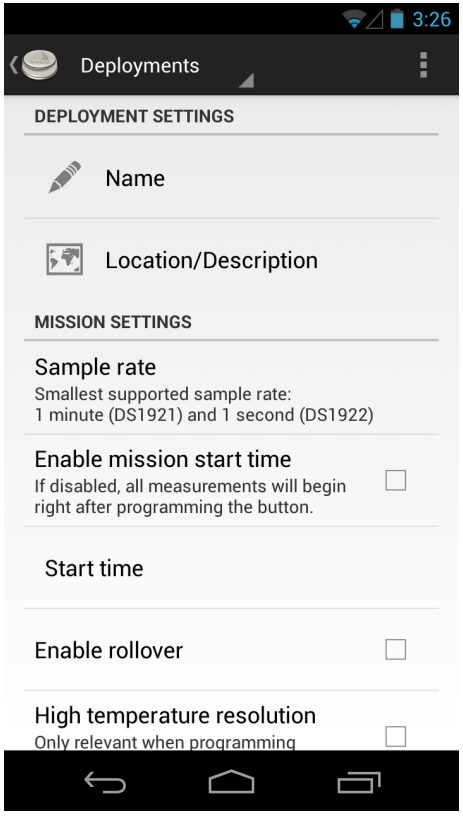
# iButton Assist for Android

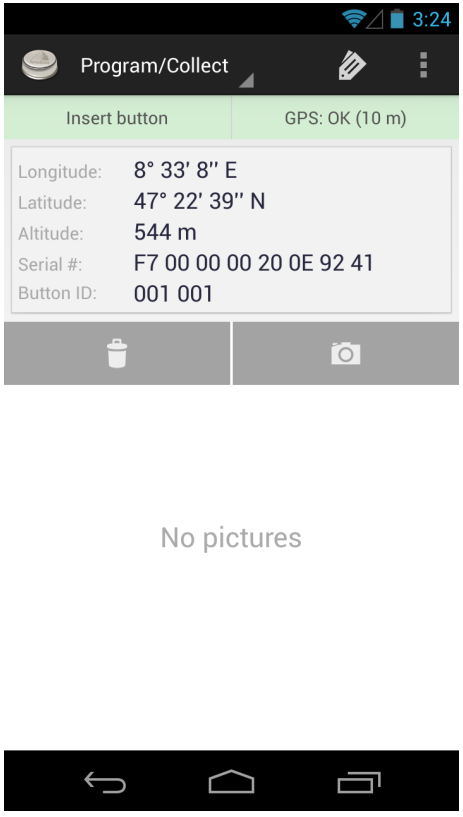
- Touch user interface with hearable and haptic feedback
- Uses GPS, camera and network capabilities provided by the smartphone
- Automatic annotation of time and location information
- All data is stored in a structured database
- Online data synchronization
- Data export to CSV files



# Deployment Workflow

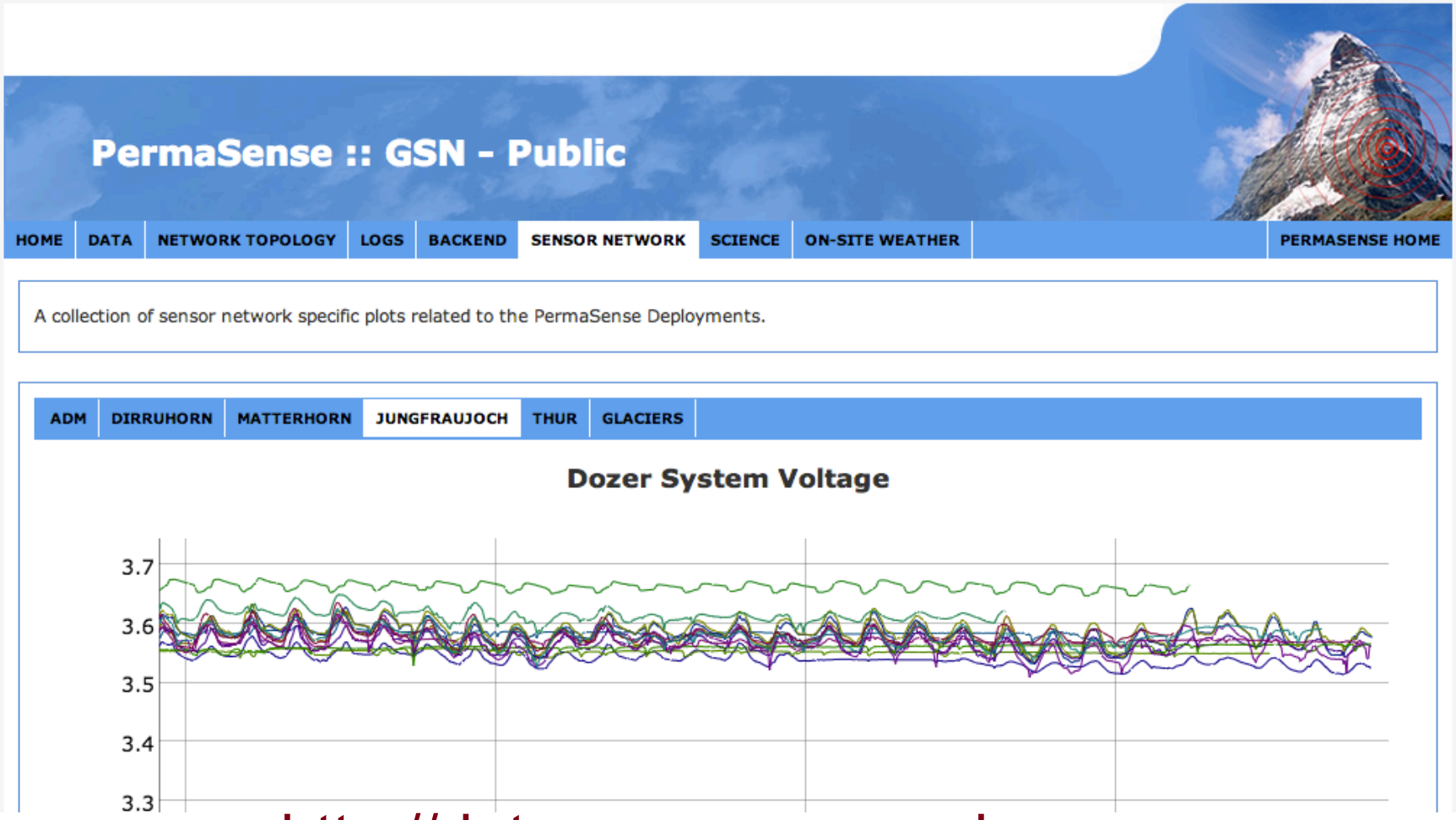



# iButton Assist Demo


# Online Synchronisation with GSN



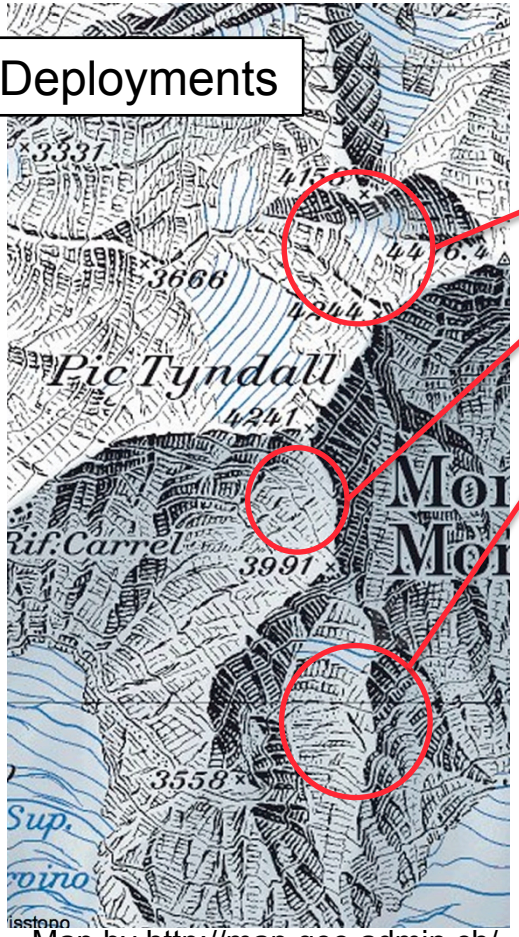

http://data.permasense.ch

# idNotebook – Field Work Logbook

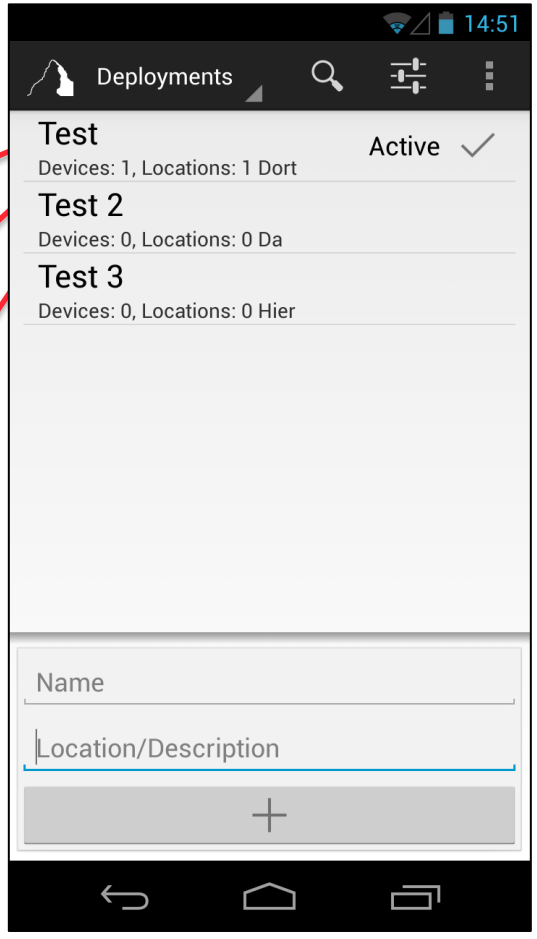
- Mapping of device-specific IDs to locations on a map
- Recording of additional meta data
  - Pictures
  - Voice memos

# Mapping Sensors to Locations

1st level: Deployments

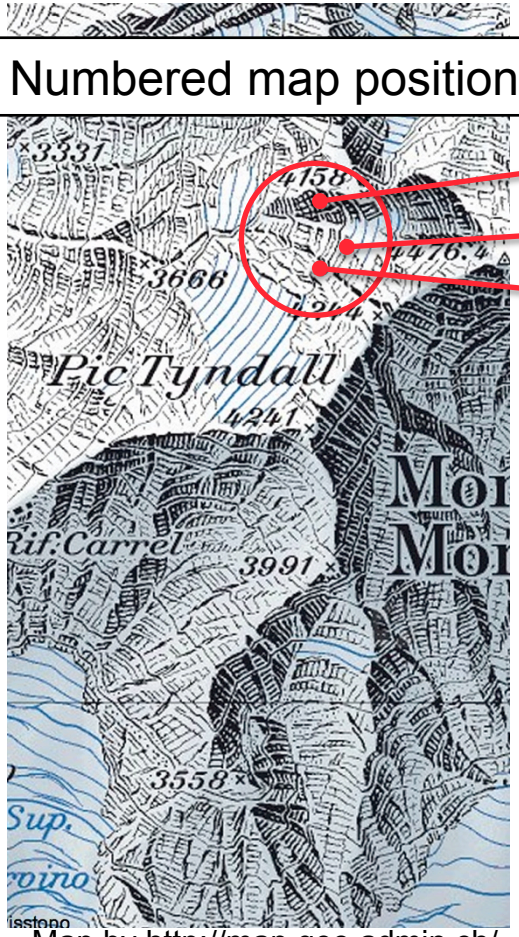



Map by http://map.geo.admin.ch/

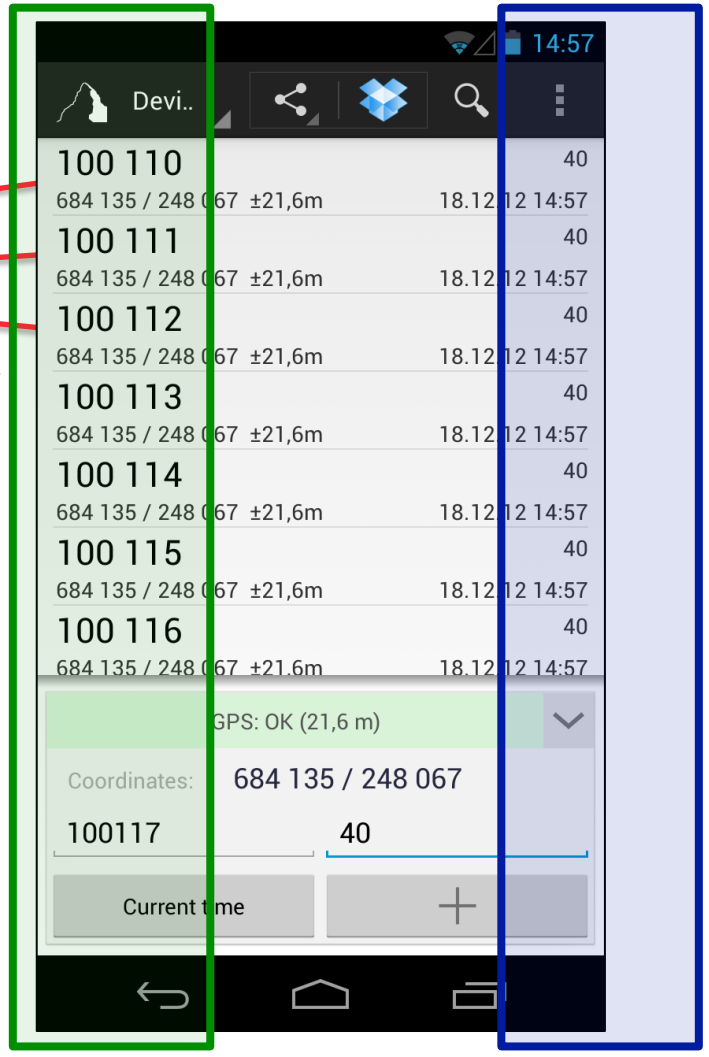


# Device to Position Mapping

2nd level: Numbered map positions




Map by http://map.geo.admin.ch/

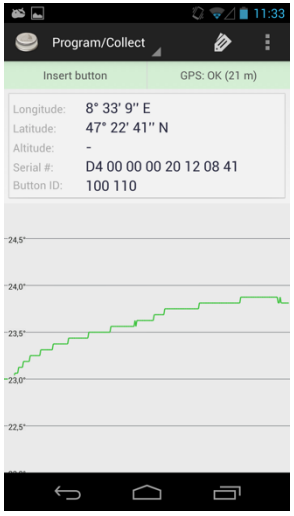



Device IDs

Map positions

# iButton Assist + idNotebook

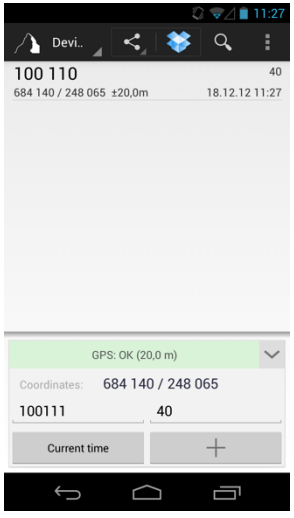
1




## Sensor setup

First use of new button:
Assignment of **unique device ID**


2

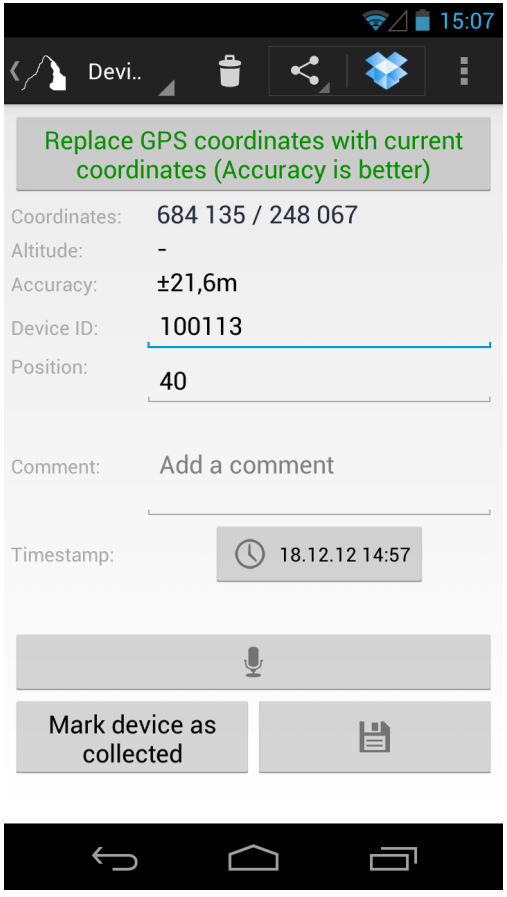



## Deployment and registration in logbook

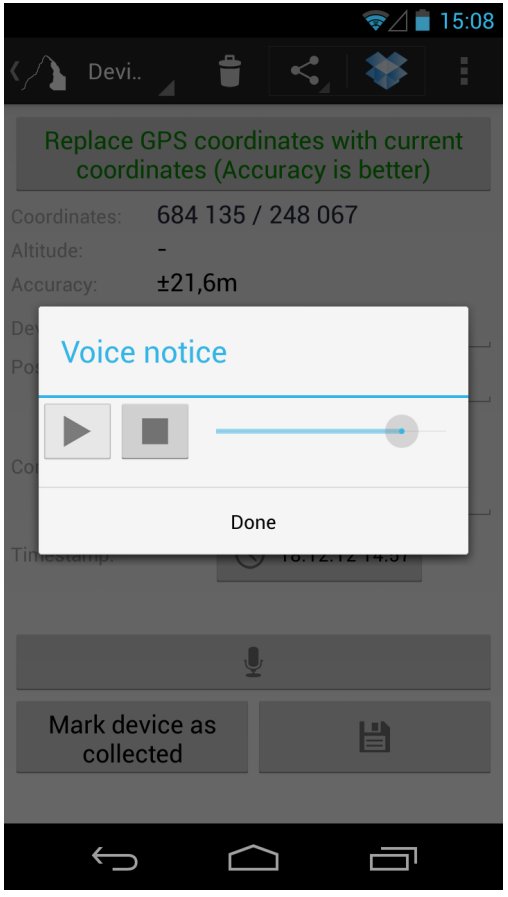
| Map Pos. | Device ID | Time (from-until) | GPS Pos. |
|---|---|---|---|
| 40 | 100 101 | 11/11/2011 12:01 – 20/12/2011 14:01 | … |
| 40 | 100 110 | 20/12/2011 14:05 – 15/03/2012 16:34 | … |
| 40 | 100 121 | 15/03/2012 16:34 – ongoing | … |

# Acquisition of Meta Information

- Save GPS data, comments, …




- Voice memos



# Conclusions

- *iButton Assist* supports the whole deployment lifecycle of iButton temperature loggers
- *idNotebook* helps to manage deployments by providing a multimedia logbook
- Easy installation from Google Play app store, updates are automatically distributed to the users

http://play.google.com/store/apps/details?id=ch.ethz.iassist

http://play.google.com/store/apps/details?id=ch.ethz.idnotebook

http://www.tik.ee.ethz.ch/~kellmatt [slides]

http://www.permasense.ch