DIGITAL MAPPING TECHNIQUES 2025

The following was presented at DMT'25
May 18 - 21, 2025

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2025)
http://ngmdb.usgs.gov/info/dmt/

Field data application and UAV

Etienne Girard, Gabriel Huot Vézina

A new open source application for collecting data in the field and a brief overview of using drone in different application

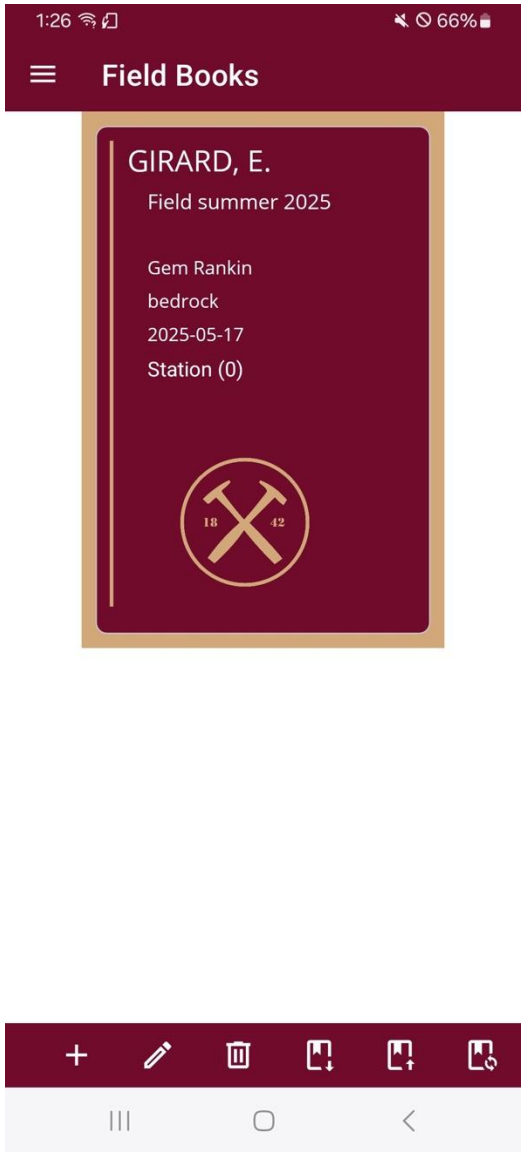
Things to consider during development

- **Esri** license change: Floating / Computer = 400K / 2.5 millions
- More **Qgis** user: scripting / mapping
- FA**IR**: Model and common science language and sharing unique ID
- **AI** : data / maps
- Cartography: **Human** readable / **machine** readable
- New acquisition tools: **data** acquire / **science** behind

FAIR : Findable, Accessible, Interoperable, Reusable

Talk: two examples

- GSC Field Application
  - New environment of development
  - New background data
  - Customize environment
  - Customize dictionary… be careful…
  - Open source
- UAV in the field in development
  - Totally different usage
  - Future usage

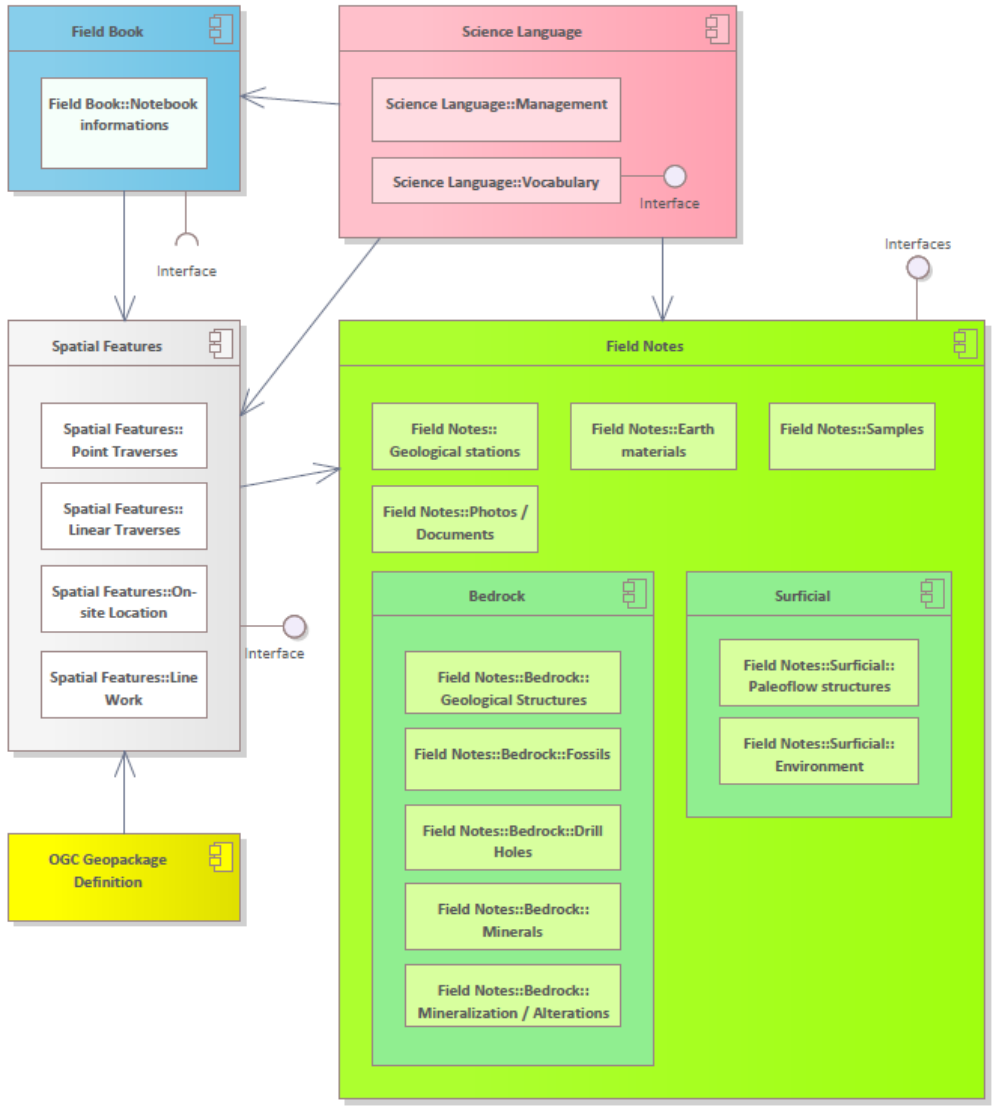


Field App: New environment of development

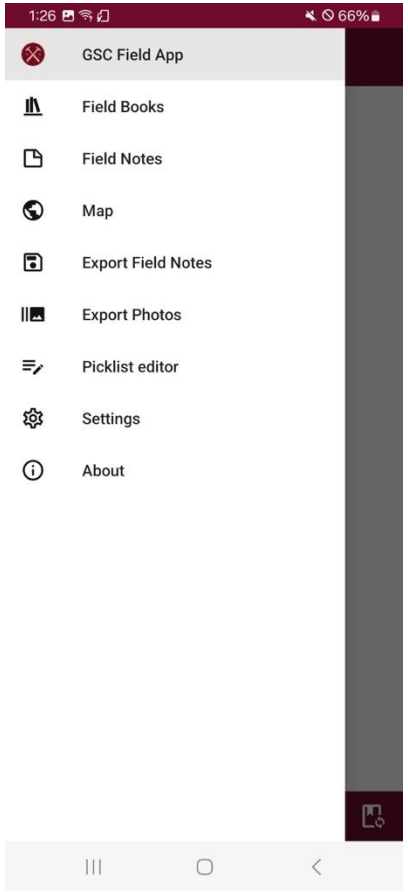
- .Net Maui: development for 3 different platforms:
  Windows, Android and IOS (will be)
- Mapsui instead of ESRI map object
- OGC Geopackage database

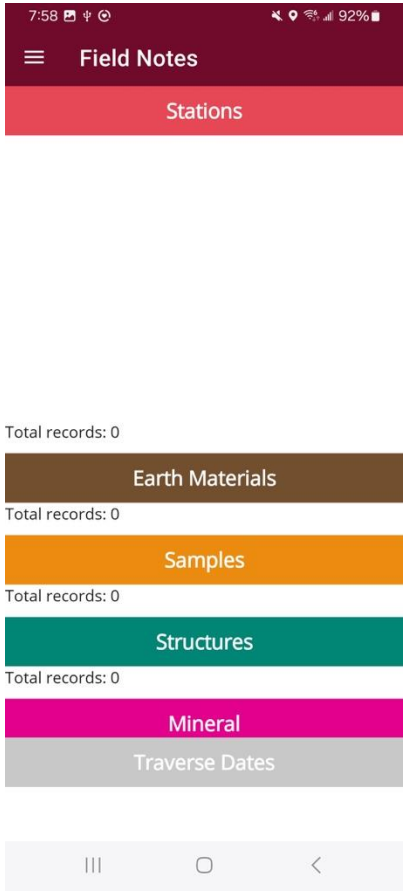
Field App: Data model

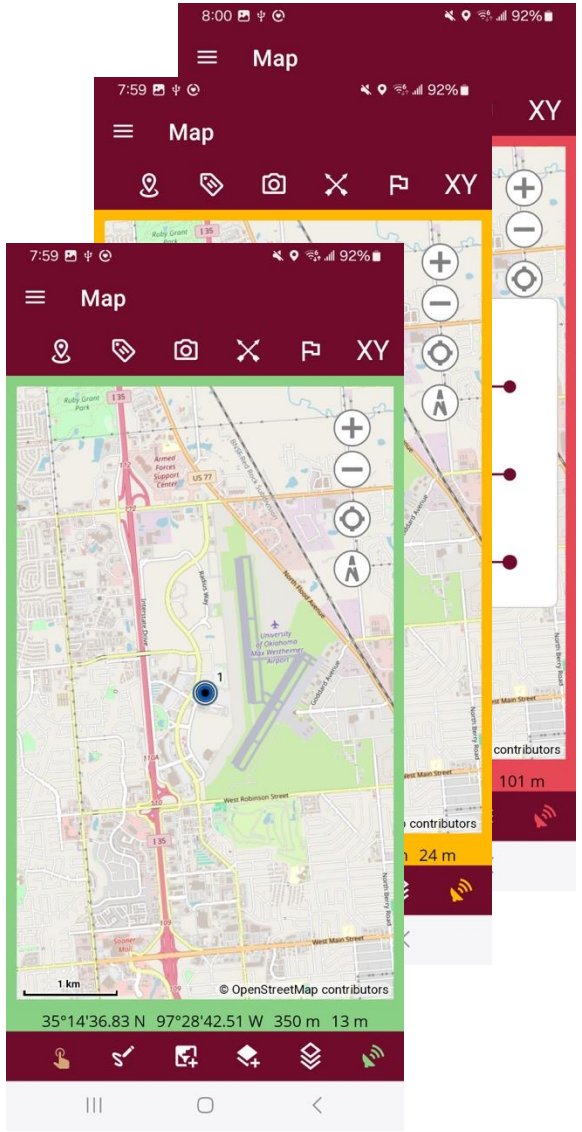
- **Field Book: project metadata**
- **Spatial Features:**
  new line work
- **Field Notes: New drill holes…**
  more to come for instrument
- **Science language:**
  easier to manage
- **Database format: Geopackage**



Field App: Interface







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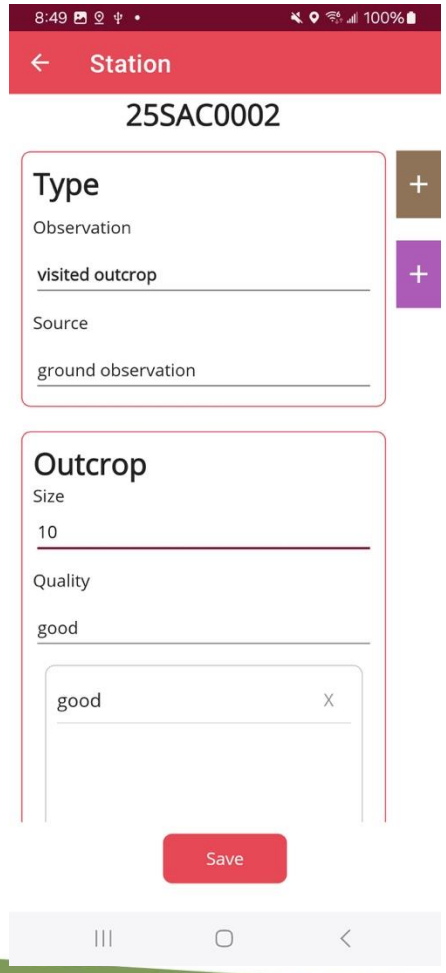
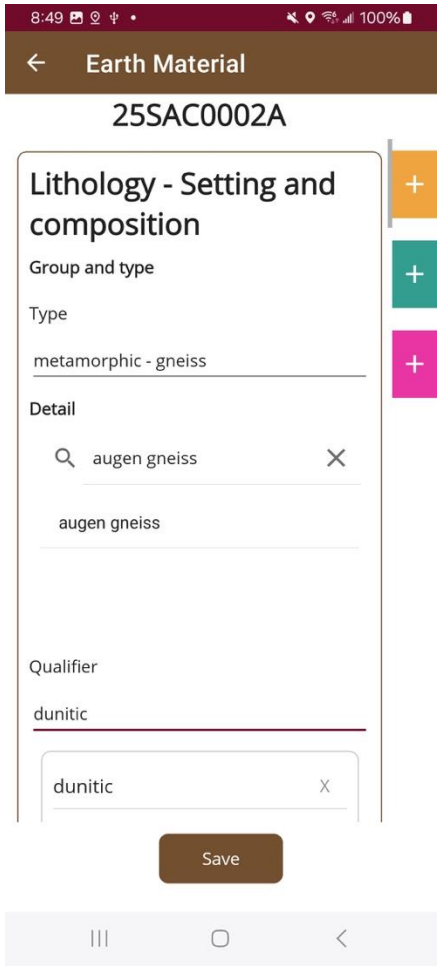
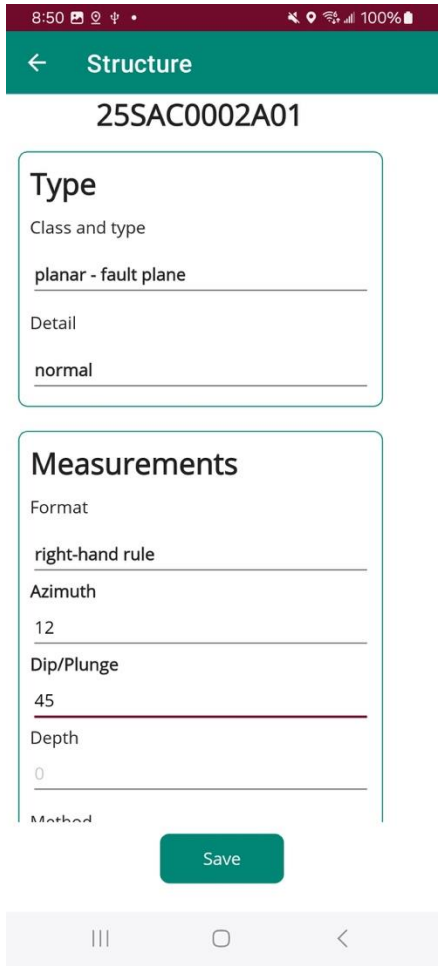
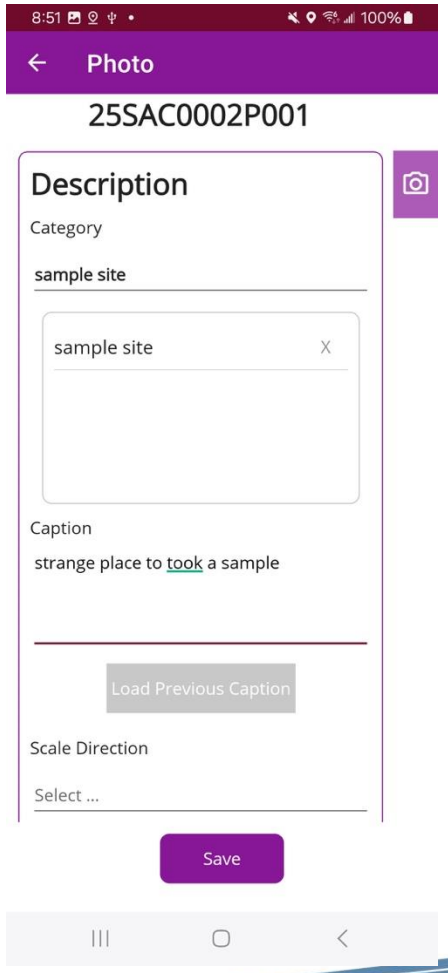


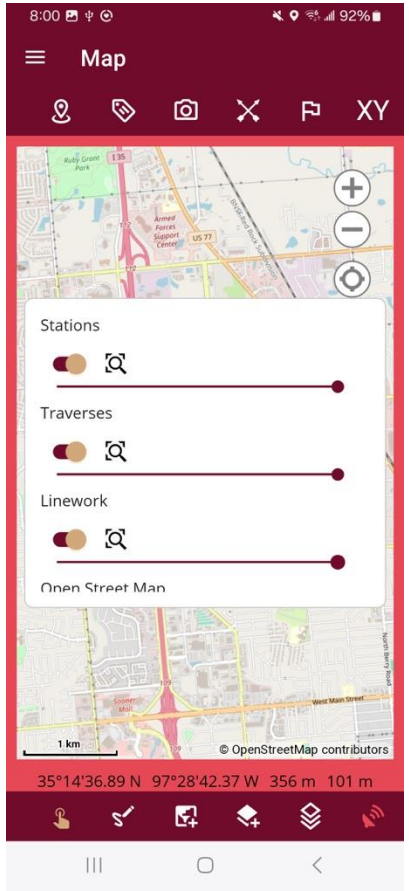






Field App: New background data

- WMS in a buffer (Street map by default)
  - Zoom to the location before you go in the field
- Mbtile
  - For raster easy to create in Qgis
- Geopackage
  - For vector where you want to query something



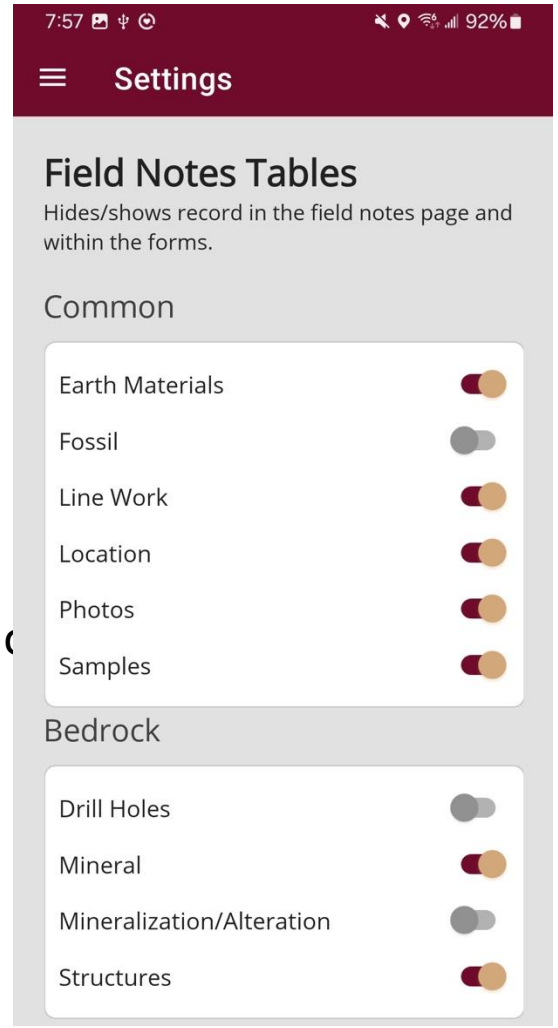
[use SLYR]

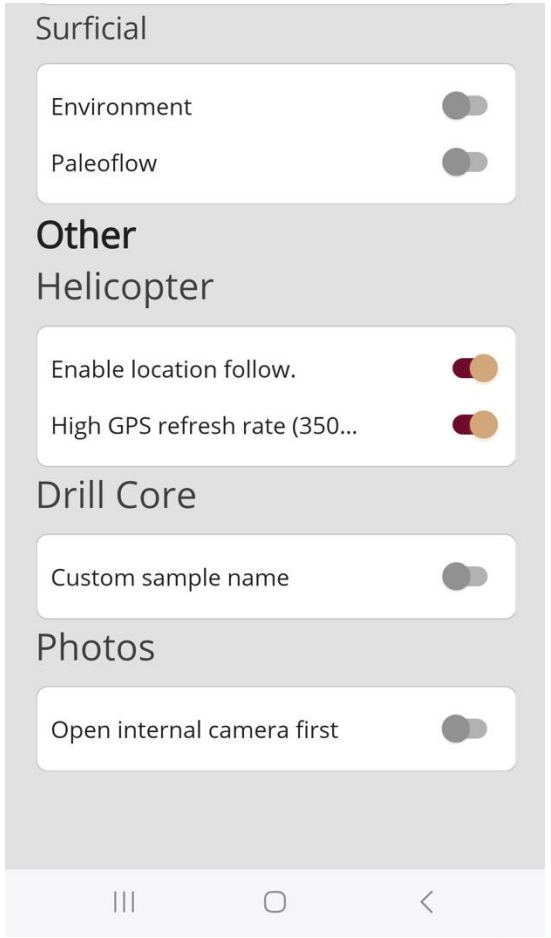
- Extension in Qgis to transfer style or stylex / aprx or mxd / data in compatible format for Qgis… a very interesting way to propose another format for publishing data. Note: their are 2 versions of Slyr: one free and one paid (paid version is better and not really expensive)

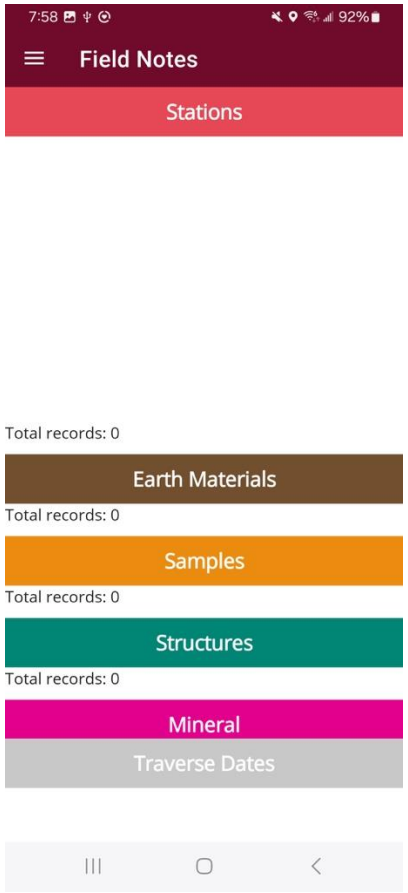
Must be in WGS 84 (EPSG: 4326) or WGS 84 / Pseudo-Mercator (EPSG: 3857). Any other spatial reference system (SRS) set within the geopackage will be projected to EPSG:3857 upon loading in the map page

Field App: Selectable environment

- turn on/off certain tables of data collection
- Option for helicopter due to have to increase refresh speed took more batteries power
- Option to use custom, normally it's automatic merging year / geol code / sequencial number 25RAT_E001
- Option to use internal camera instead external camera

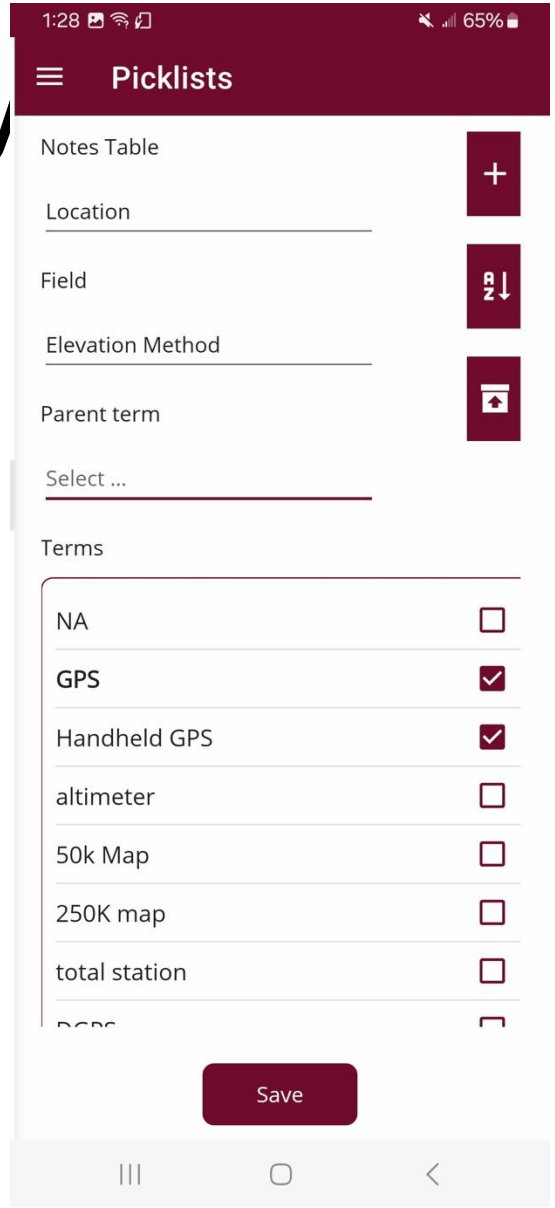


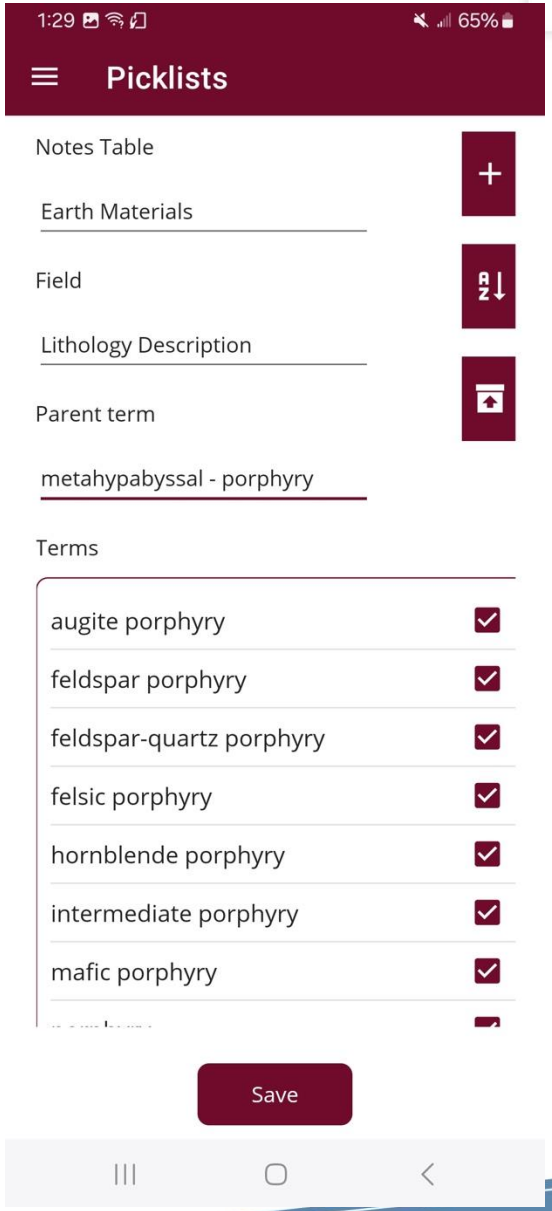




Field App: Customize dictionary

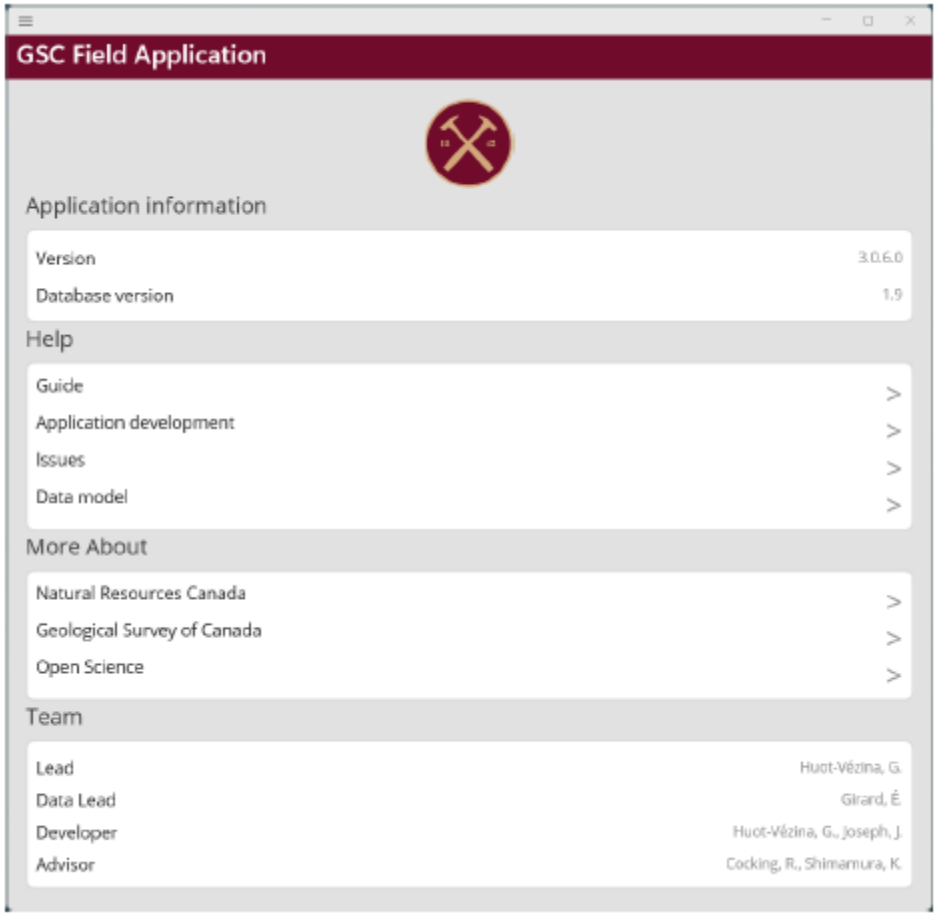
- Edit terms use in the picklist.
  - Table name
  - Use
  - Reoder
  - Simple
  - Default value





Field App: About

- Update software
- Hyperlink to documentation



Team

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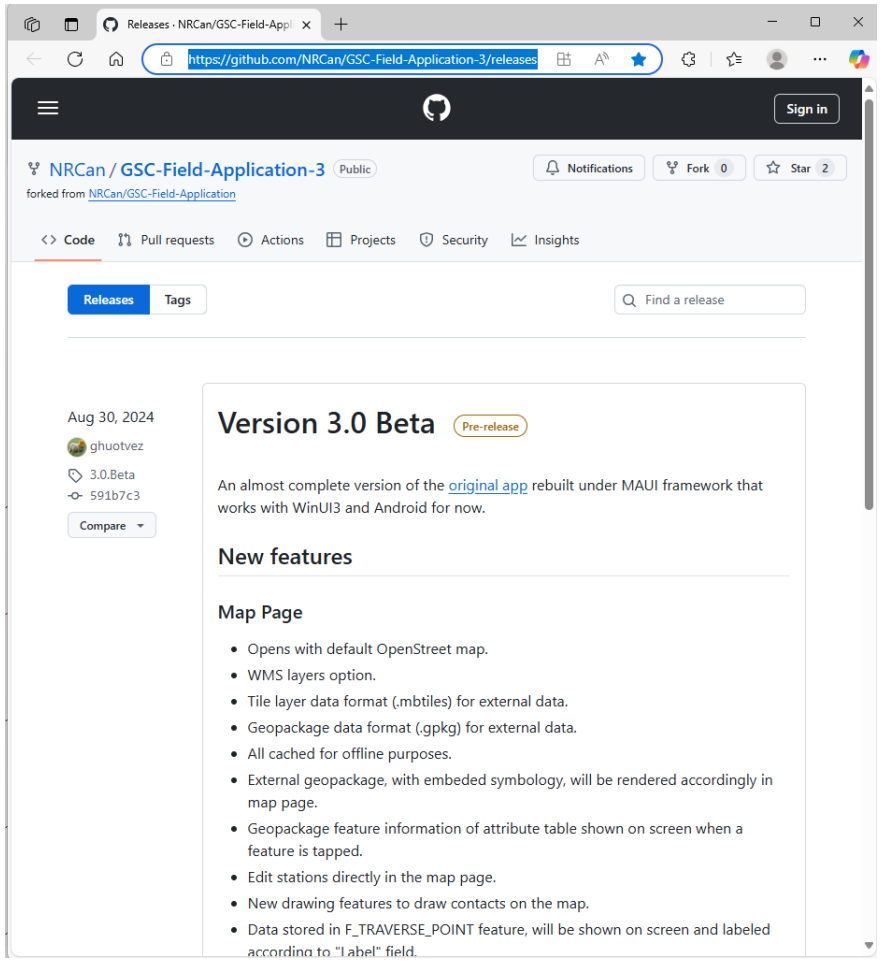
Étienne Girard
Jamel Joseph
Rob Cocking

Field App: Open source

- Releases · NRCan/GSC-Field-Application-3



UAV in the field

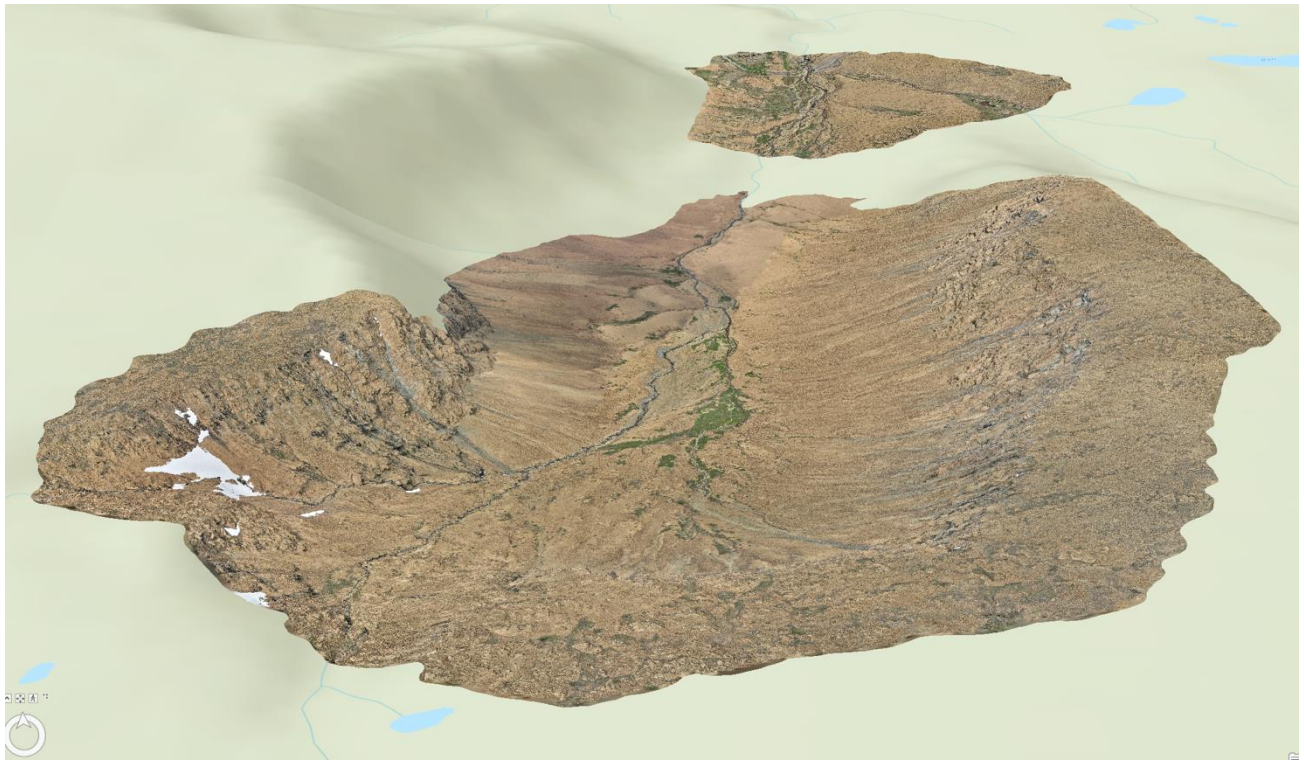
- DJI Matrice 350 rtk
  - Camera RGB P1 42 mp
  - Lidar
  - Thermal camera - H20
- DJI Mavic 3T
  - Camera RGB 20 mp
  - Thermal camera
- BIG CHALLENGE - Travel
  Batteries over 120 Kwh
  cost $1 000 and 1 month

- Photogrammetry / 2.5 D
- Lidar
- Thermal sensor
- Water sampling
- Magnetometer

UAV: Photogrammetry / 2.5 D

Gros-Morne, Newfoundland

- 3200 images
- 5280 x 3956 pixels



- To do
  - 9000 images

Challenge

- Weather
- landform

UAV: Lidar

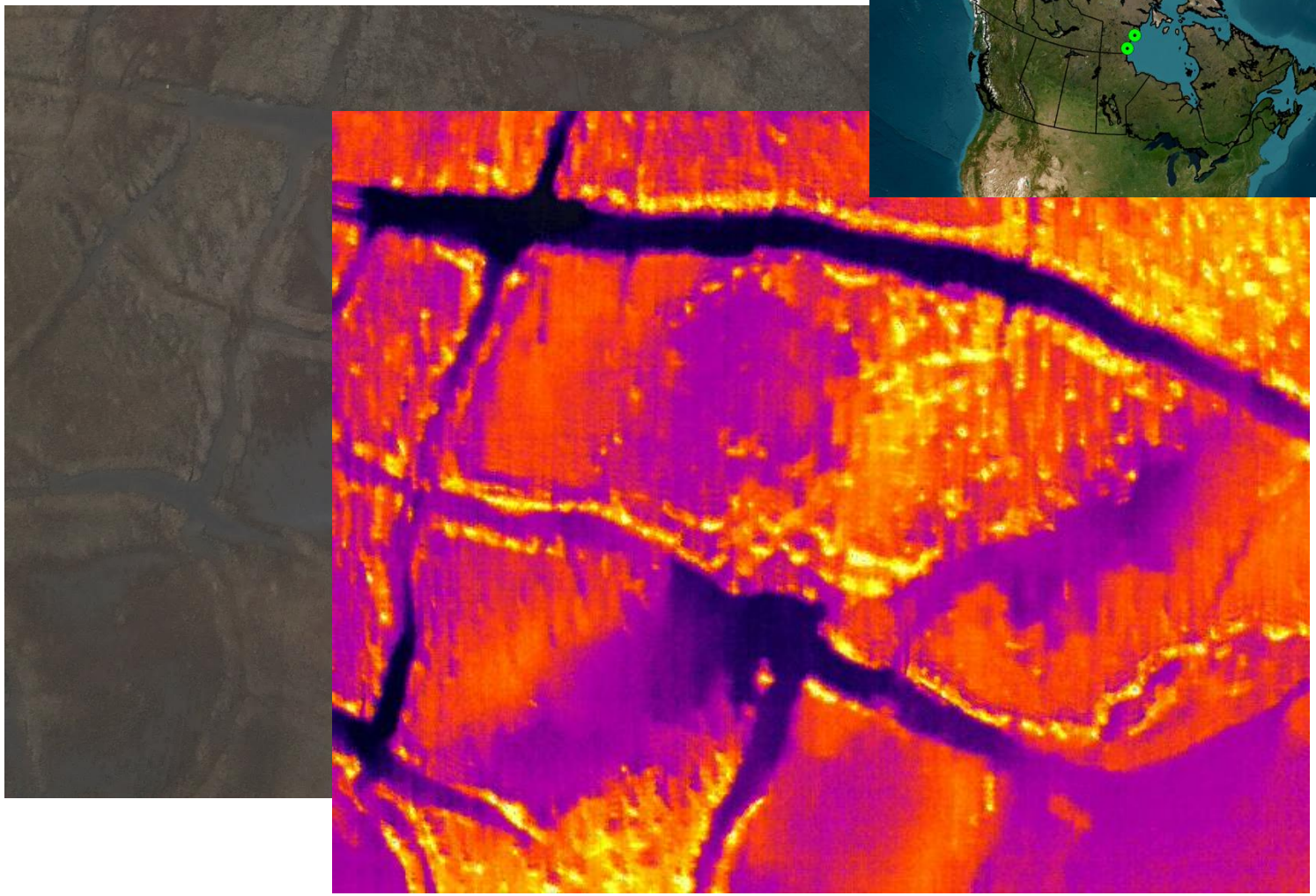
Rankin Inlet, Nunavut
Arviat, Nunavut

For Ice wedge in permafrost

Challenge

- Weather
- Type of lidar…
- Processing the data

UAV: Thermal sensor



Rankin Inlet, Nunavut
Arviat, Nunavut

For Ice wedge in permafrost

Resurgence of groundwater in a river

Challenge

- Weather
- Time of the day
- Season

UAV: Water sampling

Rankin Inlet, Nunavut
Arviat, Nunavut

Lake geochemical

Challenge

- Weather
  - Time of the day
  - Season

[Using UAVs to collect filtered water samples for mineral exploration: Will it take off? - ScienceDirect]

UAV: Magnetometer

Six Nations of the Grand River, Ontario

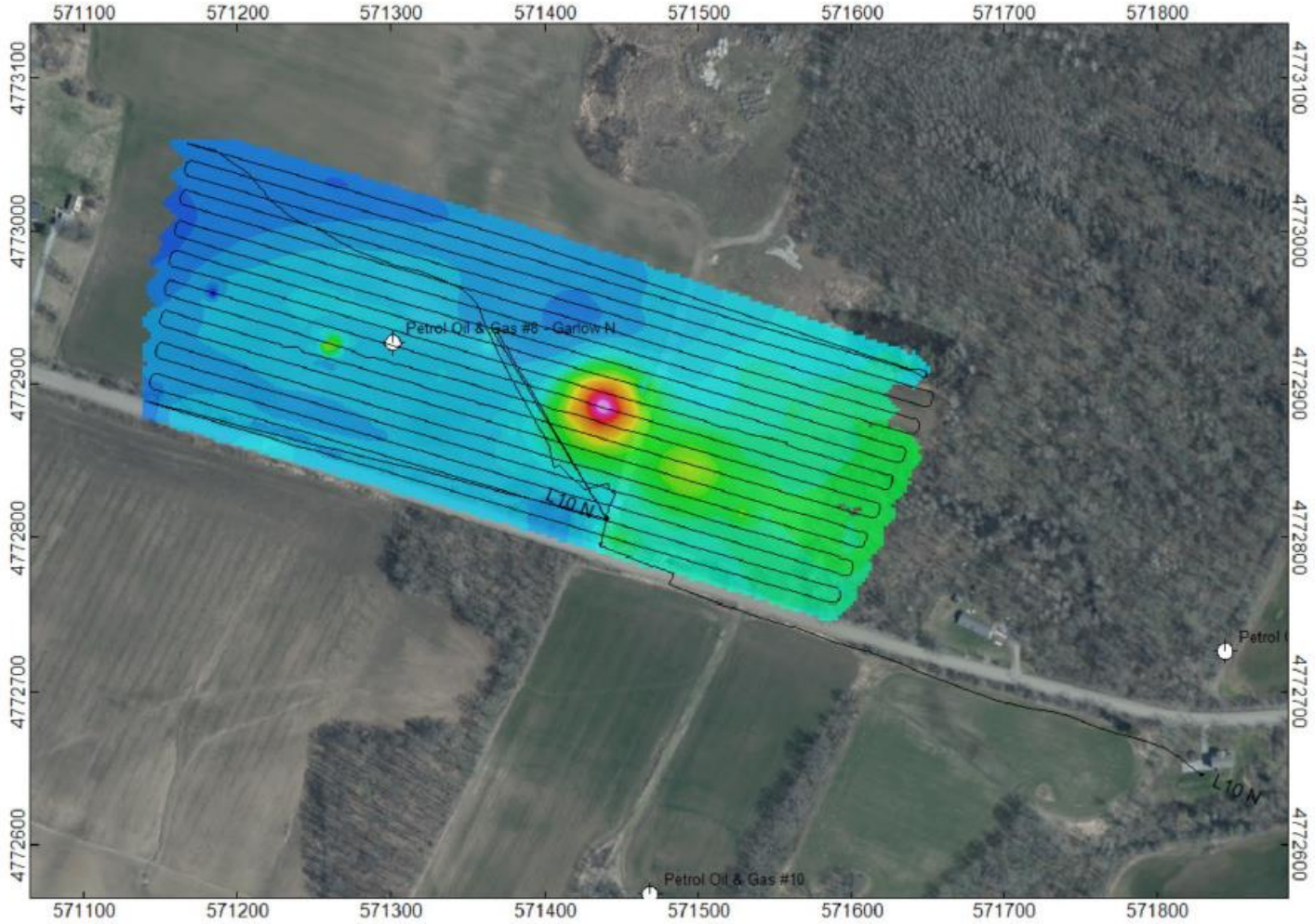
DRONEmag UAV Magnetometer with GSMP-35U **Ultra Light-Weight Potassium Magnetometer (**0.2 pT sensitivity)

Challenge

- Integrate all parts under the drone
- Settings
- Data
- Permit
- Number of flight

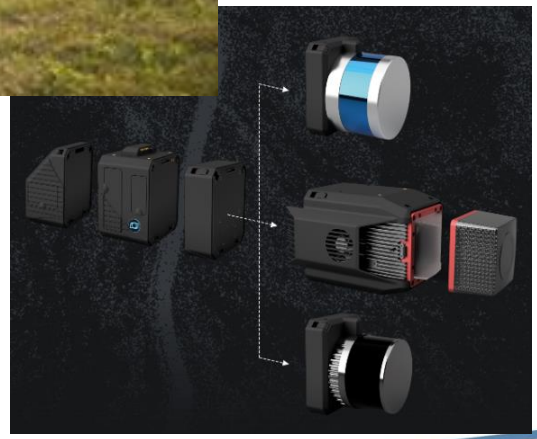
UAV: Magnetometer in the field

UAV: Magnetometer in the field



Next step for UAV

- UAV Pegasus: 3 hours flight / 10 kg / small batteries + gaz
- Integration of different sensor: Balko
  - New hyperspectral sensor
  - Lidar
  - Very high resolution camera 102 megapixels
  - New capability for planning
  - BLOS
- Bigger price



Conclusion

AI give us opportunities to increase:

- Management of our data
- Standardisation of data model
- Works on scientific language

Challenge us to preserve cartography

New technology in UAV change the scale of studies
New technology give us new opportunities to learn

Where we go. Will see ;-)

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