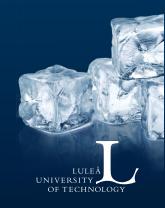


How to improve field work in ore geology research and education using modern technologies

Tobias E. Bauer
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Luleå University of Technology
2021-02-23

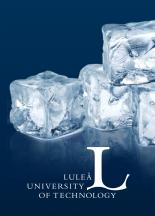


BACKGROUND

- Geology has often a traditional approach
- Advanced analytical techniques
- Modern technologies for field work:
 - UAV
 - VR
 - -3D







VIRTUAL REALITY LAB

VR studio

- Hardwear:
 - 6 x 2.1 m screen (250")
 - 2 x 4K back-projection
 - wireless hand- and head-tracking
 - active 3D shutter glasses
 - HTC Vive
 - Microsoft Holo lens

Software:

- GeoVisionary
- Unity
- 3D Studio Max





APPLICATIONS: TEACHING

- EXplORE course: Applied field exploration
 - Structural mapping
 - Volcanic facies mapping
 - Alteration mapping
 - Drill core logging

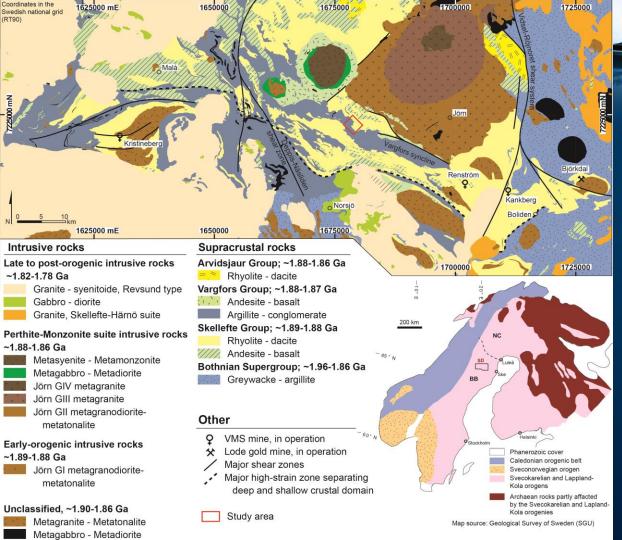
body of the European Union

Synthesis and target generation









Explore course: applied field exploration





VIRTUAL FIELD EXCURSION

- 360 degree pictures with embedded videos
- 3D models of outcrops

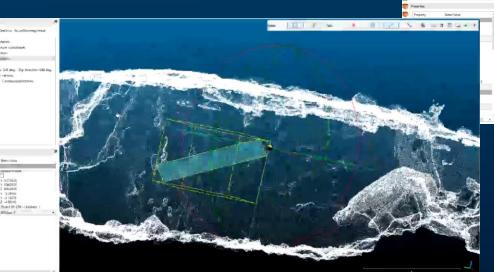




VIRTUAL FIELD WORK

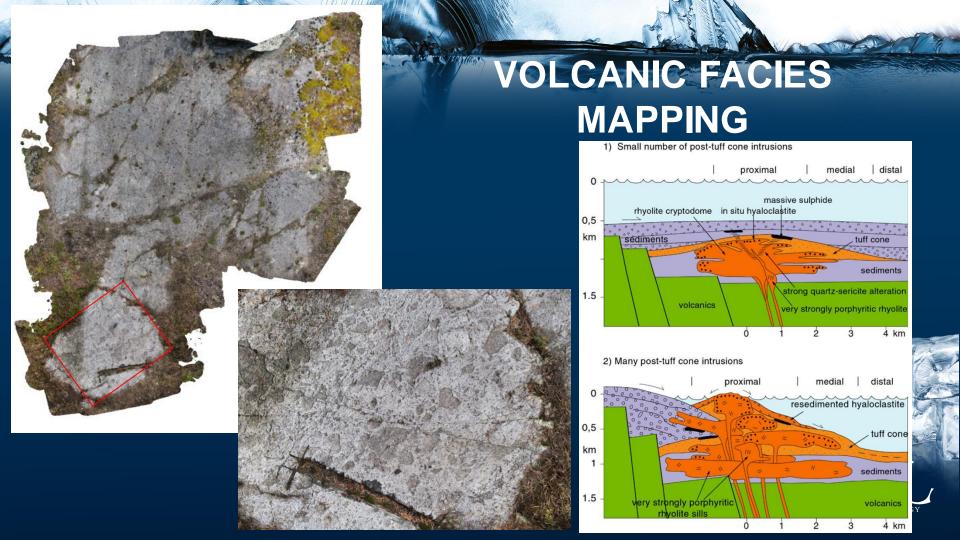
☑ III Texture coordina

Structural measurements

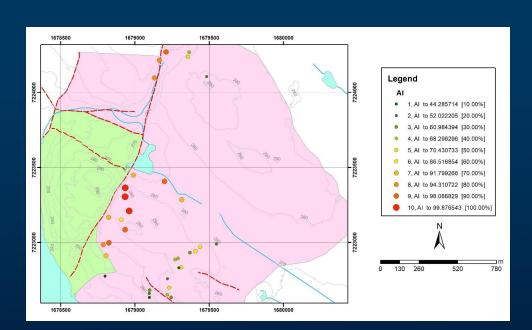








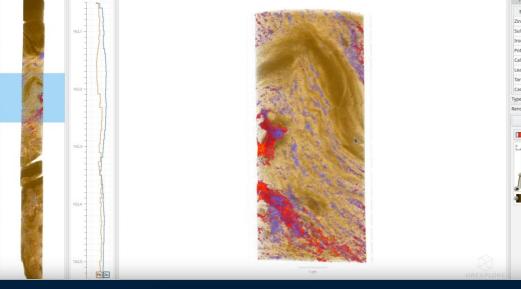
ALTERATION MAPPING





UNIVERSITY OF TECHNOLOGY

DRILL CORE LOGGING



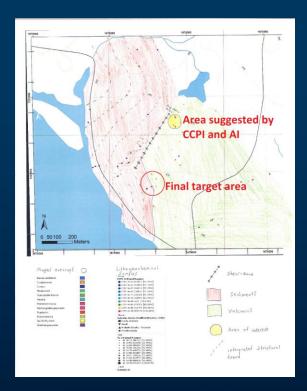
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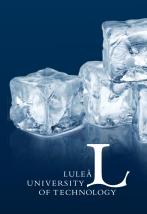






TARGET GENERATION





UAS @ LTU

HUGIN

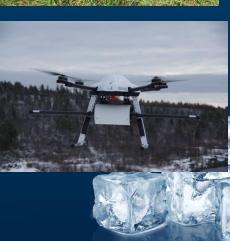
- 3.5 Kg lifting capacity
- Up to 35 min flight time
- 55 000 m² / battery
- 5 batteries
- Manual, semi-autonomous, autonomous flying
- Optical camera, 2 cm GSD at 120m
- 3-axial fluxgate magnetometer
- Thermal IR-camera



Munin

- DJI Mavic Pro
- 3x 30 min action time
- 1cm/pixel at 35 m





APPLICATIONS: RESEARCH CASE STUDY PEÑA DEL SEO

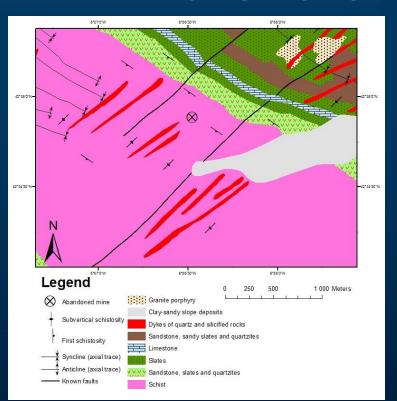


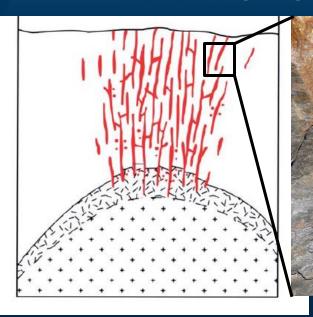






CASE STUDY: PEÑA DEL SEO





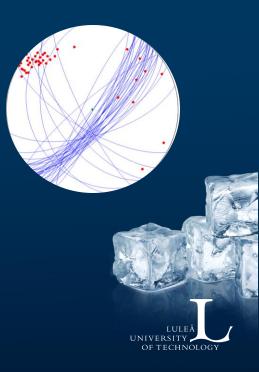
W-greisen system

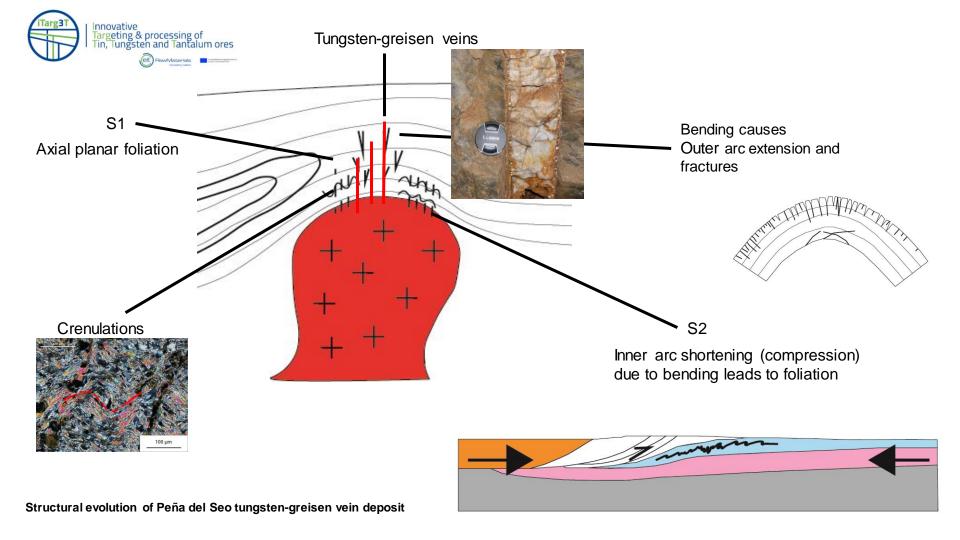


CASE STUDY: PEÑA DEL SEO



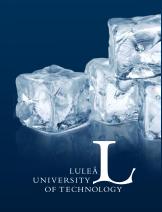






TAKE AWAY MESSAGE

- Modern technologies are excellent compliments to traditional field work
- → No replacement
- Potential to increase learning outcomes
- Simplify communication



LOOK AHEAD

- Augmented reality
- → Take your models into the field





