1400 years of man-environment interactions and soil evolution in the Saint-Mont mountain (Remiremont, Vosges)


To cite this version:

A. Poszwa, A. Grzesznik, A. Gebhardt, A. Agat, P. Even, et al.. 1400 years of man-environment interactions and soil evolution in the Saint-Mont mountain (Remiremont, Vosges). Historical Ecology for the future - International conference in historical ecology, May 2021, Metz, France. , 2021. hal-03236655

HAL Id: hal-03236655
https://hal.univ-lorraine.fr/hal-03236655
Submitted on 26 May 2021
The Saint-Mont site
A relatively inhospitable mountain:
- hard climate, steep slopes,
- on acid soils developed from a granitic rock,
- nowadays covered by forests.

Remains suggest human presence for at least 1400 years:
- At the top, the monasterium Habendinum (from the 7th century to the French Revolution) and a late antique occupation (Chenal 2016).
- Monumental enclosure dry-stones walls of unknown age (Grzesznik 2019).

- The « Point des Fées »
An enigmatic structure

To investigate traces of ancient anthropic activities in soils and landscapes, on areas where archaeological structures have not yet been detected.

Context of the study

Objectives

Material and methods

Joint work involving soil scientists, archaeologists, geographers, geologists, and computer scientists

Approaches from the landscape to the microscopic scales.

Archaeological data

Field prospecting / rocks and soils descriptions and sampling, forested surveys

Studies along gradients from highly to poorly human impacted areas.

Software tools to extract and analyse geometric structures in LiDAR data

LiDAR image to locate platforms connected to archaeological structures and all our sampling stations: subsurface soils, pits and rock outcrops.

Results

Interactive extraction of linear structures from LiDAR raw data

Development of new algorithms based on digital geometry tools to directly process 3D ground points and get rid of digital terrain model approximations in forested areas (Even and Ngo 2020).

Immediate visualization of extracted structure, cross and longitudinal profiles and of geometric estimations (height or depth, width, volume, …).

A: example of ground point profile used to detect a linear structure, here a hollowway.
B: structural equivalent profile obtained in the actual structure and with its.

Time and precision performance evaluated on well controlled structures: forest roads (Even and Ngo 2021).

Usage assessed on archaeo-morphological enclosure walls and old hollowways (Even et al., 2021).

ILSD: Available open-source software for direct exploitation by soil scientists to future integration in geographical information systems (https://github.com/every/Aложение).

Landscape and geological materials

A tectonic and glacial heritage

- 3 axes of fracturing highlighted from rock outcrops and preferential feldspar orientations in thin-sections measurements.

- Tectonic fracturing guided the action of the Quaternary. Both factors structure the massif and control its triangular shape.

Geological heritage The rock descriptions (macroscopically and in thin sections) confirm that most of the Saint-Mont is composed of Remiremont granite (Vincent, 1970).

- New informations, not noted on the geological map:
  * Longer vein of aplite (supposed by the presence of aplite fragments in our studied profiles)
  * At the bottom of m 6, a lamprophyre vein (rock more basic than granitic).

Soil covers

1. Soils not clearly disturbed
- Far from any known archaeological remains, two main types of soils develop on granite:
  - Humic albroels (RIH) Corrigiére-Hameau (RIH)
  - Acridic phaeoeluv (4) in the organo-mineral horizon and desaturated soils (5/1T15%).

2. Highly anthropised soils on platform P
- Anthropised (BI) « transformed on a man made terrace » Anthropized with a prismatic horizon (BIHB)
- Black unit (0m thick) very rich in organic matter. Almost neutral pH (6.50 to 6.90) in the organo-mineral horizon and saturated soils (5T/035%).

3. Other evidence of ancient human influence on soils?
- Detachment of some anomalies:
  * Light when pH is between 4 and 5
  * More significant when pH is > 5
  * Easily related to the long-lasting human occupation on the summit.
  * More surprising on some western or southern platforms:

Conclusion and perspectives

Our results confirm:
- A very strong imprint of historical human activities on soils close to the summit part of the massif.
- An heritage on the western slope mainly from natural glacial and pedogenetic processes.
- Possible other human activities on some western or southern platforms.

We hypothesize that the weak anomalies are due to older and/or different human activities than those that took place at the top of Saint-Mont (like breeding).

Other analyses are being acquired and interpreted on soils, rocks and LiDAR images.


