Fire history and the relationship with late Holocene mining activities in the NW Romanian Carpathians reconstructed from two peat core sequences

Ancuta Petras[1*], Gabriela Florescu[1,2], Simon M. Hutchinson[3], Cécile Brun[4], Marie-Claude Bal[5], Vanessa Py-Saragaglia[6], Marcel Mindrescu[1]

[1]Department of Geography, Stefan cel Mare University, Suceava, Romania; [2]Department of Botany, Charles University, Benatska 2, CZ-128 01 Praha 2 Czech Republic; [3]School of Science, Engineering and Environment, University of Salford, Salford, UK; [4]Nantes University, 1 Quai de Tourville, 4403 Nantes Cedex 1, GEODE Laboratory, 5, Allées A. Machado, 31058 Toulouse Cedex 9, France; [5]Limoges University, 33 François Mitterrand, 87000 Limoges, Cedex 1, GEODE Laboratory, 5, Allées A. Machado, 31058 Toulouse Cedex 9, France; [6]GEODE Laboratory, 5, Allées A. Machado, 31058 Toulouse Cedex 9, France.

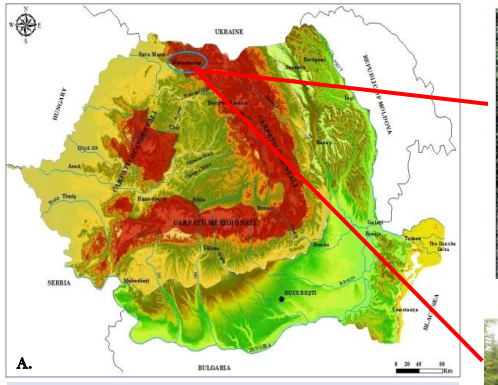
1. Introduction

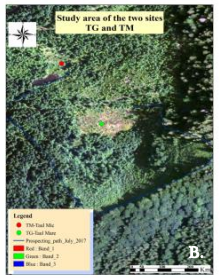
The Romanian the Eastern Carpathians are among the richest biogeographical regions in Europe in terms of biodiversity and home to the largest unmanaged old-growth forests. They are currently threatened by forest clearance and other anthropogenic land-use change, poor management practices and increased risk to wildfire. Therefore, providing a longer-term perspective of the past evolution of this area is necessary for implementing sustainable management and restoration strategies.

Research aims

1) Reconstruct late Holocene fire history and the relationship with anthropogenic disturbance, particularly mining, in a former mining area located in Eastern Carpathians, based on two peat sequences.
2) Use sedimentary macroscopic charcoal abundance and morphologies to determine the type of material burnt (wood, grass, forbs).

2. Study area





This is the study area is located in the northern part of Eastern Carpathians (Maramureş region; north of Băiuț village). It is a former mining area, where precious metals were mostly extracted (gold, silver, selenium, etc.) from the 17th century.

Fig. 2. A. *Location of study area in NE Romania,* ***B.*** *Air photo view of the peat bogs studied; Tăul Mare and Tăul Mic and* ***C.*** *vegetation cover at the study site*

3. Methodology

Two main methods for macroscopic charcoal analysis:

- Quantification of the abundance (number) of charred particles

- Quantification of charcoal morphology

Methods for physical and geochemical analyses:

Geochemistry – using X-ray fluorescence

Mineral magnetic properties – susceptibility and remanence

Organic matter content – using loss on ignition (LOI $_{550\ °C}$)

Particle size – via automated laser scattering

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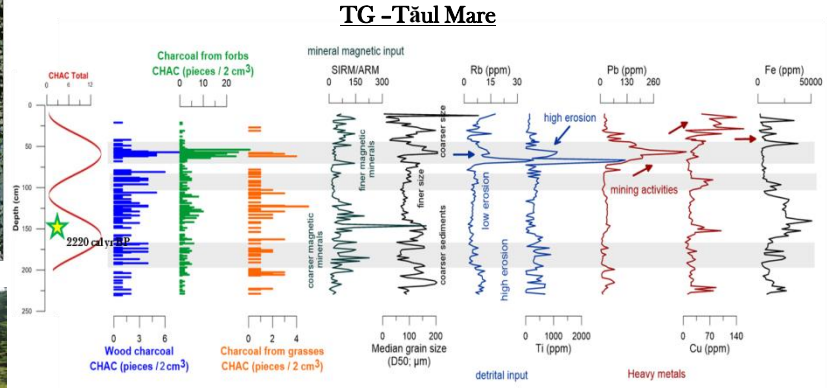
4. Results and discussion

TG –Tăul Mare



TM –Tăul Mic

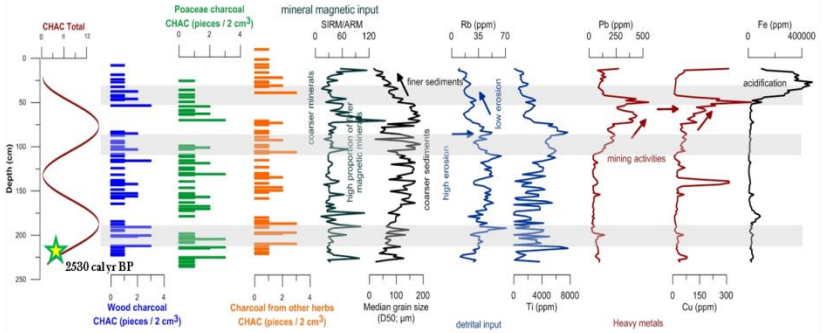


Fig. 4 *Comparison of multi-proxy results for Tăul Mare (top) and Tăul Mic (bottom) peat records; shaded bars mark intervals with high wood charcoal content.*

- Simultaneous increases in heavy metals, erosion proxies and macrocharcoal abundance in the top part of the profiles.
- Magnetic proxies and grain size show that there was both soil and bedrock erosion, and a lot of disturbance around the sites.
- Successive increases in the proportion of burned wood suggest episodes with higher fire severity, when surrounding forests likely burned.
- The intervals with lower abundance of wood charcoal might suggest that mostly surface fires, of low severity, occurred.

5. Conclusion

Increases in macro-charcoal concentration, particularly the wood charcoal morphotype, were rapidly followed in both cores by marked increases in heavy metal concentration and by enhanced soil and bedrock erosion, as inferred from geochemical, magnetic and grain-size proxies.

This suggests increased local disturbance during intervals with mining activities and indicates the likelihood that humans used fire to clear the forests and open the access to the mining sites.

References

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