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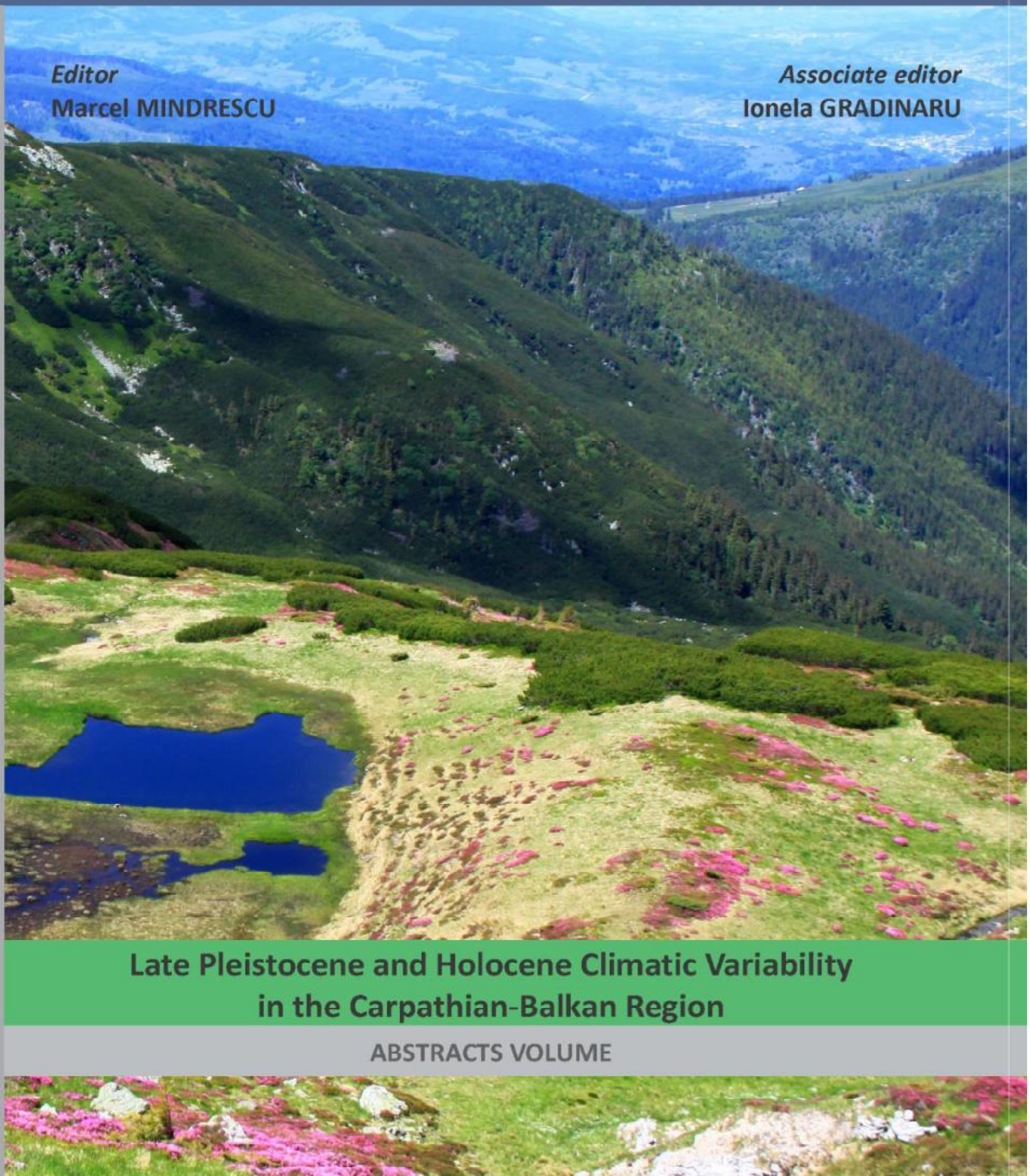
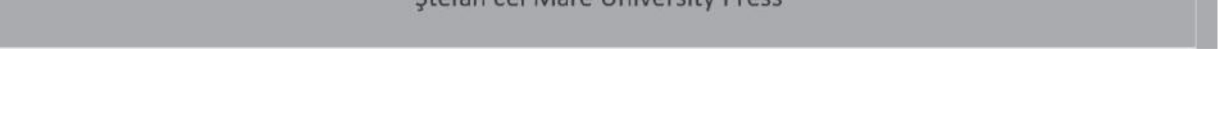


Late Pleistocene and Holocene Climatic Variability in the Carpathian-Balkan Region

ABSTRACTS VOLUME



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The effect of past fire activity on soil erosional processes in two subalpine sediment records from Rodna Mountains, Northern Romanian Carpathians

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Fire is an important disturbance factor across a variety of vegetation zones and one of the major causes of geomorphological and ecological changes (Shakesby&Doerr, 2006). In the context of current and anticipated climate change, fire severity and frequency is expected to increase. The impact of fire in shaping the physical, chemical, biological characteristics of a soil surface is mediated by the interaction between climate factors, vegetation attributes and human activities. Depending on the size, duration and temperature reached, fire usually consumes the litter and vegetation cover. It consequently changes soil stability by enhancing rain-splash detachment, modifying infiltration and promoting soil erosion. Nonetheless, the long-term geomorphological effects of fire activity revealed by lake sediment records have been sparsely investigated in terms of both geographical coverage and range of environmental characteristics. Therefore, a better understanding of fire activity in a future warmer climate will be crucial in assessing and predicting landscape dynamics, feedback mechanisms and sensitivity to soil erosion with different fire behaviour.

This study focuses on lacustrine sediment sequences from two subalpine lakes – Buhaiescu Mare (1918 m a.s.l.) and Stiol (1670m a.s.l.) located in the northern part of the Romanian Carpathians within the Rodna National Park and Biosphere Reserve. Employing a suite of physical (loss-on-ignition, mineral magnetic), geochemical (XRF derived elemental data), biological (micro- and macro-charcoal, pollen) proxies and dating measurements (AMS ^{14}C and Pb^{210}), we aim to examine the relationship between fire activity, the sedimentary magnetic and geochemical signal and geomorphological change in two slightly different catchments covering Early and Late Holocene time spans.

In Lake Buhaiescu Mare, the Early Holocene is characterised by a moderate charcoal input, increasing lake productivity and a decreasing trend in catchment minerogenic input. The correlation between fire events and ultra-fine magnetic grains (SP; 0 - 0,02 µm) suggest that some burning took place in the catchment and enriched the soil with fine grained magnetic particles. However, burning was probably insufficiently strong to remove the vegetation cover and consequently lead to erosion. The Late Holocene, 4000 - 0 cal yr BP, was characterised by intermittently variable fire activity with an insignificant catchment supply of magnetic minerals. Generally, the high macro-charcoal values are coupled with an increase in terrigenous element concentrations and a change in magnetic assemblages to fine-grained magnetic material (SSD;

0,02 - 0,1 µm). An intensification of human activities, as inferred from the pollen record, may have caused catchment erosion.

The Lake Stiol sediment record only covers the last 2,600 cal yr BP, but offers a higher resolution archive of recent fire activity and links with geomorphological processes. Periods of burning activity as inferred from a high macro-charcoal input generally match those of pollen and indicate increase in herbaceous communities and the decline in the main forest taxa (Tantau et al., 2011, 2014). Erratic fire peaks appear to be associated with erosion but, overall, our proxies suggest that soil instability occurred due to a combination of biomass burning and anthropogenic pressures.

Our results highlight that fire activity has a magnetic signal characterised by fine grained mineral magnetic assemblages, a trend that is consistent with previous studies on burning and magnetic proprieties (Gedye et al., 2000, Oldfield&Crowther, 2007) but, in the studied catchments the fire–erosion linkage varies over time. Overall, our results indicate that increased erosion is not solely the effect of burning, but is coupled with intensification in anthropogenic activity.

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