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Late Pleistocene and Holocene climatic variability in the Carpathian-Balkan region. Abstracts volume



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

ABSTRACTS VOLUME



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Alpine treeline and timberline dynamics during the Holocene in the Northern Romanian Carpathians

Anca Geantă^{*1}, Mariusz Galka², Ioan Tanțău¹, Simon M. Hutchinson³, Marcel Mîndrescu⁴ and Angelica Feurdean^{5,6}

¹ Department of Geology, Babeş-Bolyai University, Cluj-Napoca, Romania, anca.geanta@ubbcluj.ro

² Department of Biogeography and Palaeoecology, Adam Mickiewicz University, Poznań, Poland

³ School of Environment & Life Sciences, University of Salford, Salford, UK

⁴ Stefan cel Mare University, Department of Geography, Suceava, Romania

⁵ Senckenberg Research Institute and Natural History Museum and Biodiversity and Climate Research Centre (BiK-F), Senckenberganlage, 25, 60325, Frankfurt am Main, Germany, angelica.feurdean@senckenberg.de

⁶ Emil Racoviță Institute of Speleology, Cluj Napoca, Romania

High altitude environments (treeline and alpine communities) are particularly sensitive to climate changes, disturbances and land-use changes due to their limited tolerance and adaptability range, habitat fragmentation and habitat restriction. The current and future climate warming is anticipated to shift the tree- and timberlines upwards thus affecting alpine plant communities and causing land-cover change and fragmentation of alpine habitats. An upslope movement of some trees, shrubs and cold adapted alpine herbs as a response to the current climate warming has already been noted in many montane and subalpine regions.

Four Holocene peat and lacustrine sediment sequences located between 1670 and 1918 m a.s.l. (Fig.1), in the Rodna Mountains (Northern Romania, Eastern Carpathians) are used with the aim to determine: i) the sensitivity of high mountain habitats to climate, fire and land use changes; ii) tree- and timberline shifts; and iii) the influence of landscape topography on trees and shrubs.

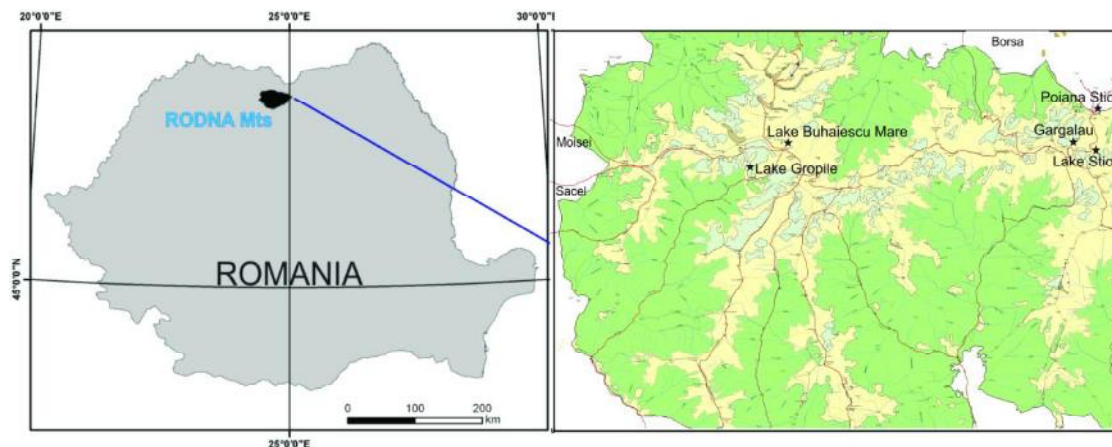


Fig. 1 Sites location within Rodna Mountains, Romania

A multi-proxy approach (pollen, spores, non-pollen palynomorphs, stomata, micro- and macro-charcoal, plant macrofossil) was employed.

The pollen records indicate that the Early Holocene regional forests at high elevation were dominated by *Pinus* and were replaced by *Picea abies* from 9800 cal yrs BP, whereas *Abies alba* and *Fagus sylvatica* developed during the Late Holocene. The plant macrofossil and stomata analysis indicate that Buhaiescu Mare site (1900 m, northern exposition) was probably situated above the treeline ecotone throughout most of the investigated period. However, the treeline ecotone (a combination of isolated tree, shrubs and herbs) may have sporadically reached the lake's elevation, especially during the early Holocene suggesting a treeline position higher than today (Fig. 2). The other high elevation sites (Gropile 1900 m facing West), and Gargalau (1810 m; North) show a treeline ecotone dominated by *Pinus mugo* in the early Holocene (Gargalau) that reached its maximum elevation approximately between 7000 and 4000 cal yr BP. Treeline ecotone declined abruptly at Gargalau and Gropile sites after 4000 cal yr BP, probably as a response to summer cooling brought by the decline in summer insolation and by human impact. The decline in timberline and treeline during the past 1000 years was associated with an increased prevalence of anthropogenic indicators (pollen, dung fungi, micro and macro-charcoal, mineral magnetic properties and lithophilous elements (Ti) contents suggesting that human-induced fires and clearance have likely depressed the treeline. It further suggests that land-use affected remote isolated mountain site. At Lake Stiol (1670 m), our lowest elevation site, the treeline composed of *Picea abies* remained located close to the site over the past 2500 years. The large difference in woody vegetation between Gropile and Buhaiescu Mare sites located at similar elevations but with different slope exposition highlights that the landscape topography played an important role in the treeline movements.

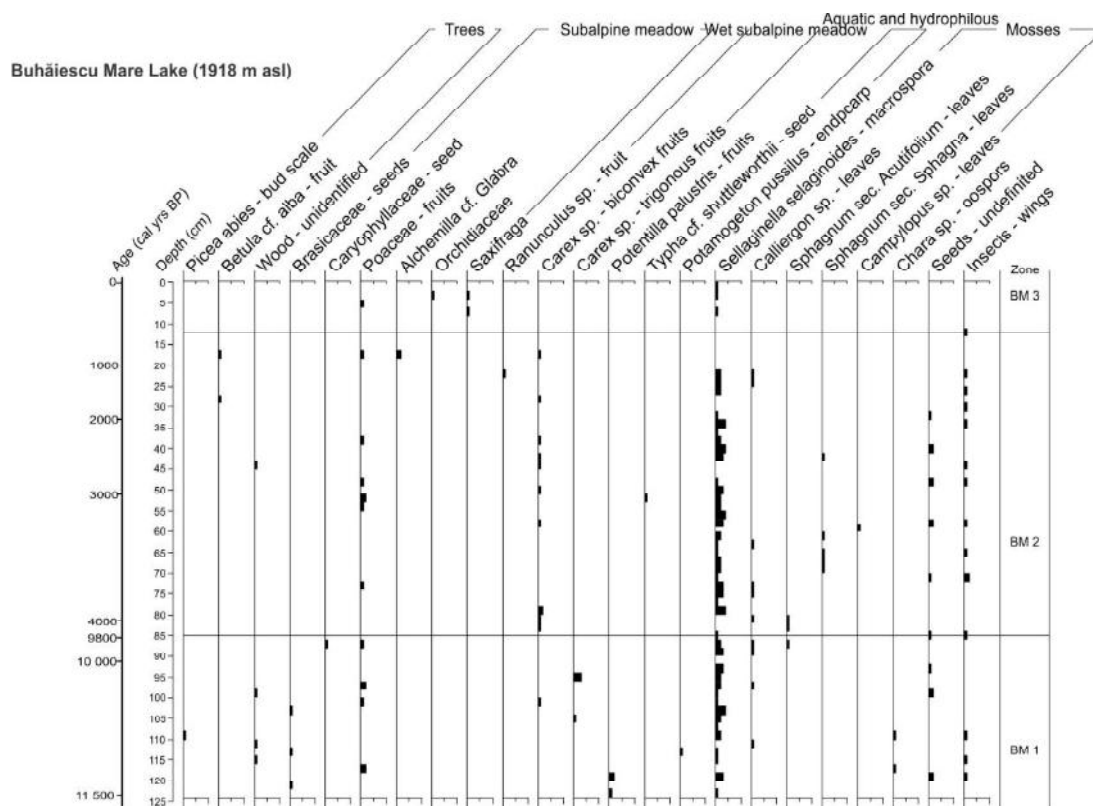


Fig. 2 Diagram of Buhaiescu Mare Lake plant macrofossils