

## **Mid- and late Holocene human impact recorded by the Coltrondo peat bog (NE Italian Alps)**

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Peat bogs are ideal archives for the study of environmental changes, whether these are natural or human induced. Indeed, receiving water and nutrients exclusively from dry and wet atmospheric depositions, they are among the most suitable matrices for palaeoenvironmental reconstruction.

The present study is focused on the Eastern sector of the Italian Alps, where we sampled the Coltrondo peat bog, in the Comelico area (ca. 1800 m a.s.l.) The knowledge of the human history in this area is rather scarce: the only pieces of archaeological evidence found in this area dates back to the Mesolithic and the absence of later archaeological finds makes it difficult to reconstruct the human settlement in the valley. With the main aim to obtain information about the human settlement in that area we selected a multi-proxy approach, combining the study of biotic and abiotic sedimentary components archived in the 7900 years-peat bog record.

Pollen analysis is performed along the core registering human impacts on the area from ca. 2500 cal BP, when land-use changes are well evidenced by the presence of human-related pollen and non-pollen palynomorphs (NPPs), as well as by the increase in micro-charcoal particles. Periods of increased human impact are recorded at the end of the Middle Ages and later, at the end of the 19th century. The analysis of trace elements, such as lead, is performed by means of ICP-MS technique and its enrichment factor (EF) is calculated. A first slight increase of Pb EF during Roman Times is possibly related to mining activities carried out by the Romans. Mining activities carried out in the area are registered during the Middle Ages, while the advent of the industrialization in the 20th century is marked by the highest EF values registered on the top of the core. To help and support the interpretation of geochemical data, lead isotopes ratios are also measured using ICP-MS to discriminate between natural and anthropogenic sources of lead. The  $^{206}\text{Pb}/^{207}\text{Pb}$  ratio clearly records a pre-anthropogenic period from 7800 to 2500 cal BP, followed by a period in which humans impacted on the environment. During the Middle Ages the  $^{206}\text{Pb}/^{207}\text{Pb}$  ratio values are attributable to mining activities, while during Modern Times they are mostly linked to industrial activities and to the introduction of leaded gasoline in Italy. The phasing out of leaded gasoline in the 1980s is also registered by the peat bog. Finally, the still on-going analysis of organic biomarkers in the peat seems to corroborate the results achieved, adding information about local disturbances on the bog. The multi-proxy approach selected for this study allows us to discriminate between different aspects of the past human presence, such as forest clearance, fires, agriculture, pasture, mining and industrial activities, giving new insights into the history of the Comelico area, still scarcely investigated.