



Past and recent human activities impacts on Northern Vosges Mountains ecosystems during the last 3 millennia

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Human activities have left marks in the environment, modelling the landscapes. As an example, the Vosges Mountains are one of the oldest anthropized massifs in Europe, where humans and their environment closely interacted each other throughout the ages (Parmentier, 2007). In the Northern Vosges Mountains, people have extensively used the forest as a resource for their daily use as well as to supply industries (Jehin, 2005; Parmentier, 2007). Several archaeological remains and archives highlight the occurrence of many human activities: old agro-pastoral or semi-industrial activities like glass-making, mines, metalworking, and more recent military activities (Bitcherland). The semi-industrial activities required abundant resources –wood, fern, sand, ore– which were taken in forests (Jehin, 2005). In our present state of knowledge, the beginning of these activities, as well as the first human impacts on the Northern Vosges Mountains ecosystems, have not yet been clearly identified or dated. For example, in the Vosges Mountains, pollen analyses have been mostly conducted previous to 1990s and rarely in the Northern Vosges Mountains (De Klerk, 2014). Moreover, the resolution of these pollen analyses does not allow the study of human/environment interactions. Nevertheless, it seems that this forest was used since the Gallo-Roman period as shown by several archaeological remains discovered in the Bas-Rhin department.

To attempt to identify the beginning of human impact in the Northern Vosges Mountains, a multiproxy analysis, with palynological, charcoals and geochemical analyses, is led on three cores sampled in peat bogs situated close to industrial areas. The first results of pollen and non-palynomorph pollen analysis allow to reconstitute the vegetation history and to reveal the first appearance of crops and plants associated as well as other anthropogenic indicators (i.e. ruderal and pastoral taxa). In addition to palynology, the micro-charcoal counting reveals two principal phases of anthropogenic activities.

Identification and evolution of pollutions in sediments and soil, linked to industrial activities, are conducted by geochemical analyses (XRF). These analyses highlight different phases of activities, which are correlated with vegetation modification and with results of micro-charcoal studies led on pedologic pits and ancient slag heaps.

In the long term, results of these analyses will be used by the Northern Vosges Regional Natural Park in order to increase the status of the natural heritage in the Northern Vosges Mountains.

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Jehin, P., 2005. *Les forêts des Vosges du Nord du Moyen-Age à la Révolution: Milieux, usages, exploitations*, Presses universitaires de Strasbourg. ed. Strasbourg.

Parmentier, D., 2007. *Vosges: Massif d'histoire, terre de liberté.*, La Nuée Bleue. ed. Strasbourg.