



Climatic changes and anthropogenic pollution as evidenced by two Alpine lacustrine records, Switzerland.

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This study aims to provide high-resolution records of climatic changes and human impacts on two different Alpine environments: Lake Lucerne is a large (114 km²) lake located at 434 m asl in Central Switzerland, whereas Meidsee is a small (<1 km²) remote lake located at 2661 m asl in the Southern Alps. Two short gravity cores (1.2 and 1.6 m) recovering the industrial history and the last millennia were sampled with a resolution of 1 cm, and investigated for organic (¹³C, ¹⁵N, C/N) and/or inorganic (¹³C, ¹⁸O) matter contents, and elemental composition (REE compositions, trace elements, and heavy metals).

Both sites exhibit 1) rapid hydrological changes related to variations in winter precipitations, and 2) increases in atmospheric pollution due to human activities. Lead enrichment factors combined to changes in lead isotopic composition (²⁰⁶Pb/²⁰⁷Pb ratio) are used to distinguish natural from anthropogenic sources. The greatest mercury and lead atmospheric emissions occurred during the twentieth century, resulting from the extensive combustion of fossil coal and petroleum in Europe. Although the highest heavy metals fluxes are synchronous with major anthropogenic changes (e.g. Roman mining, industrial revolution), proxies show that in absence of such events, the heavy metals deposition in the sedimentary records is primarily influenced by sedimentological processes linked to climate variations (i.e. runoff and erosion processes).