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Geochemical analyses of a minerotrophic peat core (Hallstatt, Austria) to detect and reconstruct periods of mining activity in prehistoric (early Anthropocene) times

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A geochemical study of a peat core collected in the minerotrophic fen Siegmoos in Hallstatt (Upper Austria) reveals periods of intense anthropogenic activity in prehistoric times. As analyses (ICP-MS, XRF, SEM, FTIR) of anthropogenic tracer (Sb, Pb, Cu, Sn) and main elements, mineral particles and the sorption capacity of organic material imply, a first persistent period of relatively moderate anthropogenic activity, dated by 14C, associated with salt mining in Hallstatt started around 1850 BC. Increased anthropogenic activity in the period from Late Bronze Age to Early Iron Age is indicated by rising concentrations of trace elements, culminating around 800 BC in an absolute Cu concentration that exceeds concentrations from recent surface samples by a factor of ∼7. A combined assessment of obtained XRF and ICP-MS results points towards a decrease of mining activity in Hallstatt during the medieval period. An interpretation of calculated Pearson‘s correlation coefficients does not suggest a significant influence of humic substance on the enrichment of anthropogenic tracer elements. Lower sections of the core show considerably higher concentrations of main and trace elements and higher ash contents attributed to stronger groundwater influence.