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First steps towards a Sr isoscape of Austria for the provenance determination of prehistoric wood

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Wood artefacts from a prehistoric salt mine in Hallstatt, Austria, present a unique archive of information on Bronze and Iron Age mining. For instance, they have stored the geochemical signatures of their growth location, though masked by contaminating salts due to the storage conditions. Trade is assumed for certain archaeological finds. Therefore, $^{87}Sr/^{86}Sr$ isotope ratio analysis has been applied to investigate the geographic origin of these artefacts, in order to allow conclusions on trade routes.

In order to reveal the biogenic signatures of the prehistoric finds, a decontamination method based on acid leaching was developed. We could successfully separate biogenic from secondary Sr and adopted a mixing model to account for possibly incomplete removal of the latter. In addition to Hallstatt, seven regions in Austria were selected for sampling of modern trees based on known settlements in the time period of interest. The geological bedrock variability was considered within all regions for the definition of sampling spots, which resulted in a total of 26 locations. Four tree species represented in the archaeological finds (i.e. *Picea abies*, *Abies alba*, *Fagus sylvatica* and *Quercus* sp.) were sampled upon availability by drilling. Sr isotope ratios were measured in wood digests using multicollector-inductively coupled plasma-mass spectrometry (MC-ICP-MS).

The (bioavailable) Sr isotope ratios obtained from modern trees reflect the geological heterogeneity in Austria, which challenges the creation of an isoscape and its applicability to distinct provenance determination. Different geologic bedrock types can be distinguished by their $^{87}Sr/^{86}Sr$. Furthermore, the data indicate that the spread of Sr isotope ratios within one geological substrate also varies strongly depending on its type. The results highlight the importance to consider even small scale geological variability in a comprehensive sampling strategy for a reliable application of Sr isotope ratio analysis to the determination of origin of biogenic material.