

## **Study of the geochemical variability of the archaeological hammerscale found in Switzerland according to their morphology and chronology, 450 BCE to 500 CE.**

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Hammerscale is the waste formed by hammering hot iron during forging. It is made of iron oxides (hematite, wüstite and magnetite) reacting with sand and ashes to produce iron silicate minerals (fayalite) and iron-rich silicate glasses. Spectacular textures similar to quenched volcanic rocks are observed. The variabilities of the morphology, of the mineralogical texture and of the geochemical composition, reflect differences in the formation processes. Deciphering these variations would be a powerful tool for the understanding of archeological remains related to iron smithing activities. More than 250 particles of hammerscale from several Swiss archaeological sites spread over a period of more than 1000 years (from the Iron Age to the Merovingian period) have been studied by SEM/EDS and SEM/EBSD. These data allow to compare the hammerscale assemblages at the level of a single site first and then at multi-sites comparison level. The results seem at first to show a variability in the chemical composition of the glasses between the different morphologies of hammerscale from the same archeological site. This difference in the chemical signature of the liquid can be interpreted as a source difference which can be due to (1) a different external addition during the smithing process or (2) a variable contribution of smelting slag included in the worked iron.