

## **Geomagnetic prospection and archaeomagnetic dating of Roman and Medieval iron smelting sites in Hüttenberg (Austria)**

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The mining district ‘Ferrum Noricum’ in Austria can be proven to look back on a 2500 year old tradition of iron production which only ended in the second half of the 20<sup>th</sup> century. The current investigations in the frame of FWF funded research projects comprise geomagnetic prospection of the smelting sites at Hüttenberg, archaeological research and archaeomagnetic dating of excavated furnaces.

In contrast to archaeological prospection in smooth terrain which is based on aerial photography and geophysical raster surveys, archaeometric prospection in rough alpine terrain requires a more complex methodological approach. Geophysical ground mapping by high resolution magnetic measurements is applied in order to delineate the borders of the area of interest for archaeological investigations and successive detailed prospection on the survey areas. At the same time, systematic archaeological/geophysical field surveys of find sites which are known from bibliographical data, but not yet scientifically investigated are performed. Accompanying petrophysical investigations support the geophysical modelling and interpretation as well as archaeology (e.g. mining specific finds).

First results from the geophysical surveys carried out in different phases and scales (searching/localisation to structuring/details) in the current FWF-project P20688 “2000 years of iron production in Hüttenberg - archaeometry” are presented together with results originating from a recently concluded preceding project P16071 „Ferrum Noricum in Hüttenberg – archaeoprospection“ (2003-2006). A geomagnetic survey of the searching phase covering an area of about 20 hectare yields insights about the extension of the Roman industrial area (furnaces) and the dissemination of slag deposits at the site Semlach/Eisner. Several geomagnetic structures including known and previously excavated slag deposits and furnaces, as well as so far unidentified structures could be detected at the scale of a 0,5 x 0,5m grid survey performed in April 2008. The magnetic anomaly map shows the effects of 3 lightning strikes in the investigation area. The resolution and reproducibility of the non invasive geophysical exploration methods applied for the location of soil monuments will be discussed.

Archaeomagnetic dating is based on the well established paleomagnetic field and laboratory methods, which allow determining the vector of the ancient Earth’s magnetic field. A newly established archaeomagnetic reference curve for Austria serves as a base for the dating. 6 furnaces at the smelting site Semlach/Eisner have been sampled and four of them gave results which allow dating. Together with dendrochronological dating, the archaeomagnetic directions serve as new data points for the Austrian reference curve.