FAIR Prehistoric Mining Archaeology Data in the Light of ARIADNE and SEADDA

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Introduction

For the round table, a use case will be presented related to prehistoric mining. Data from various research projects are made available applying the FAIR data principles, which state that data should be (F)indable, (A)ccessible, (I)nteroperable and (R)e-useable (Force 11, 2019). As it is an archaeological project with archaeological resources the aim is to apply the methodologies, guidelines and infrastructures created within ARIADNE, the Advanced Research Infrastructure for Archaeological Data Networking in Europe, an European Union Infrastructure for archaeological resources (Niccolucci and Richards, 2013). In particular CIDOC CRM and CRMextensions will be used as conceptual models (CIDOC CRM, 2019). The research is integrated into the COST Action SEADDA (Saving European Archaeology from the Digital Dark Age, https://www.seadda.eu/) and benefits from the international exchange on the topic of archaeological archiving.

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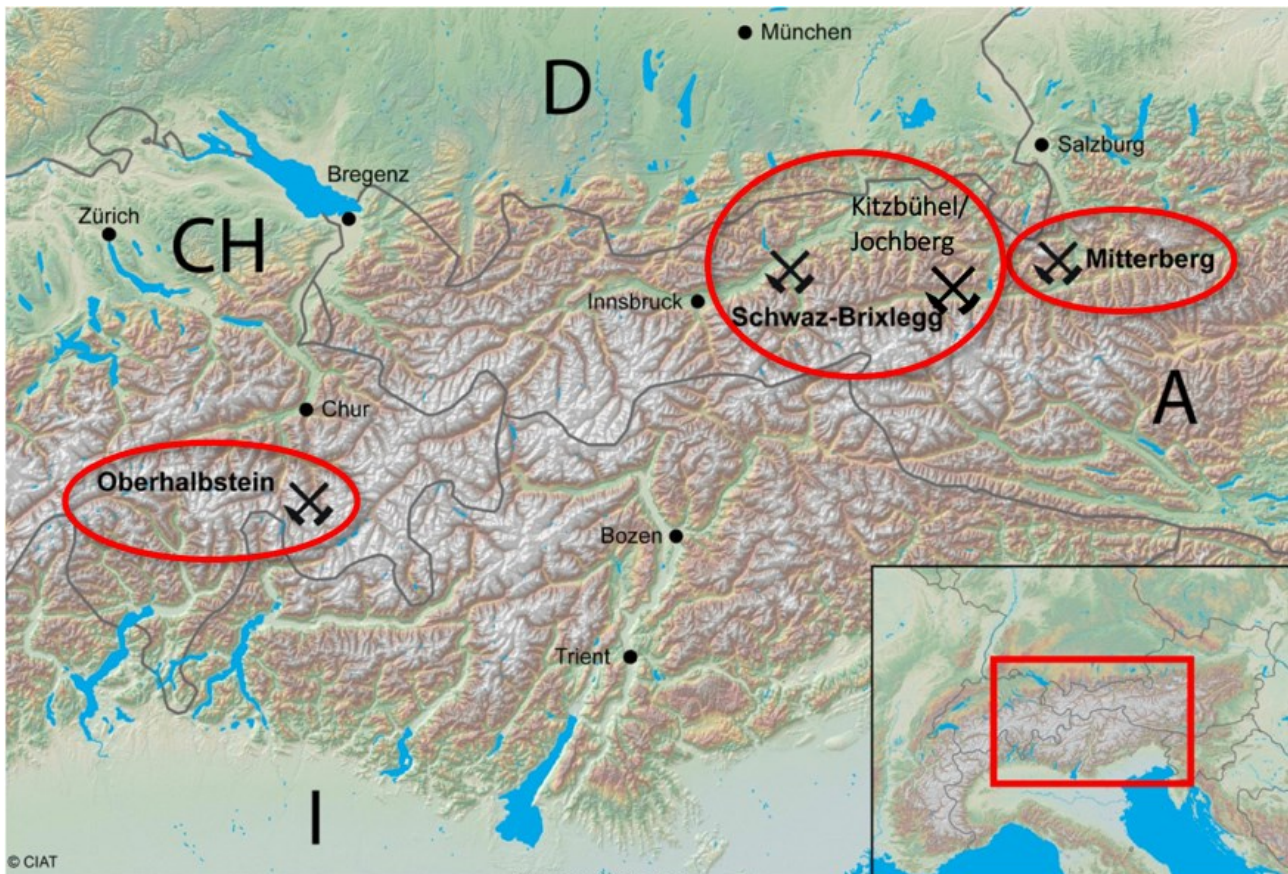
Fig. 1. Investigation areas of the DACH Project

Research Data

From 2015 to 2018 four institutions from Germany (D), Austria (A), and Switzerland (CH) investigated mining, technology transfer and trade connections during the Bronze Age and Early Iron Age within the multinational DACH project "Prehistoric copper production in the eastern and central Alps—technical, social and economic dynamics in space and time". The project had the goal to reconstruct the development and influence of three mining districts of supra regional significance—Mitterberg, Schwaz-Brixlegg and Oberhalbstein—,their economic dynamics and the manifold interrelations within the network of alpine metal producers. The Austrian part of the project investigated the mining area of Schwaz-Brixlegg and is extended with a separate Open Research Data Pilot project of the Austrian Science fund. For all these sites data was created based on archaeological field survey and excavations as well as archaeometric analysis on physical remains and relevant materials and structures of prehistoric mining and metallurgical activities. Excavations and field surveys were documented according to the guidelines for archaeological investigations of the Federal Monuments Office (Bundesdenkmalamt), which define in detail which reports, lists, photos and plans have to be created for prospections, excavations, stratigraphic units, finds, archaeological objects and groups (Bundesdenkmalamt, 2018).
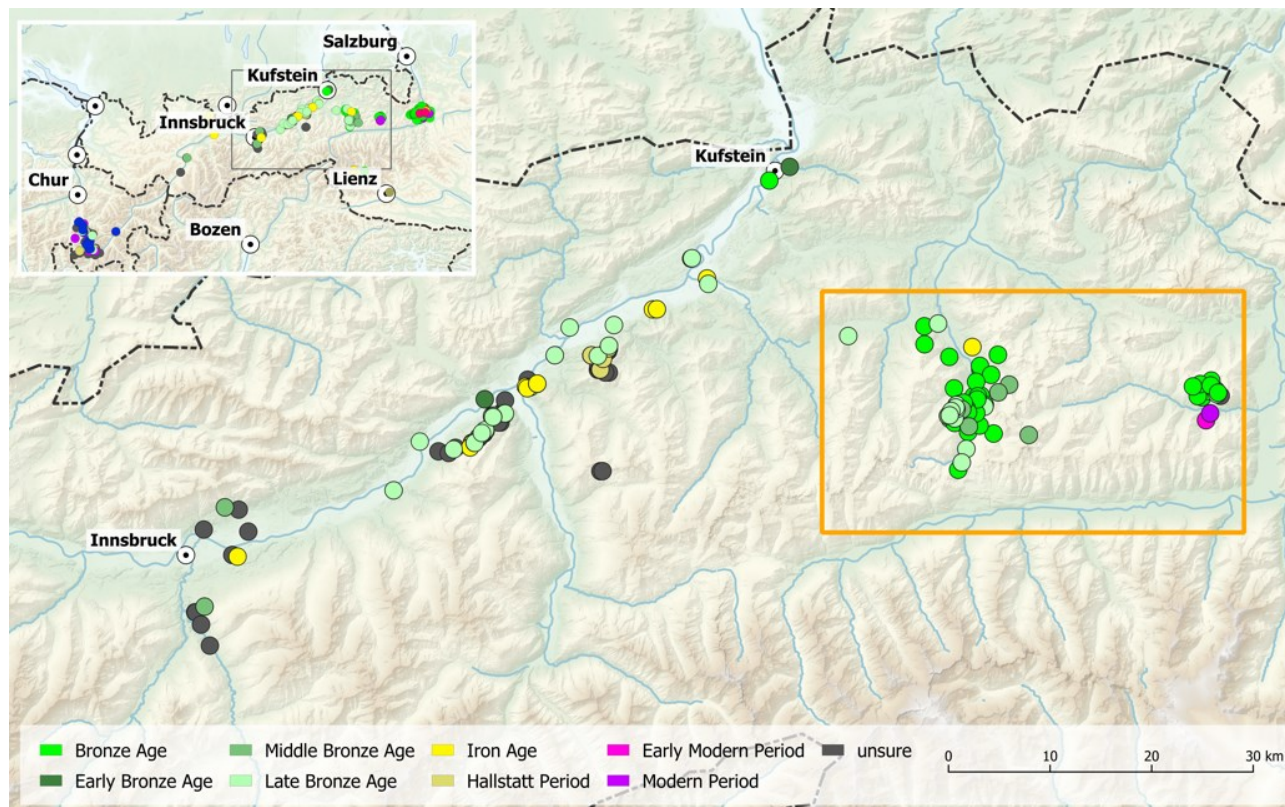
Fig. 2. Excavation and field survey data for which FAIR data are created

Archaeometric analysis was made on 175 axes from Western and Central Austria. The goal was to increase knowledge about the type of copper that was used and the chronological development of the use of these copper types and alloying techniques from the Early Bronze Age to the Early Iron Age in mainly Western Austria by combining archaeological with geochemical data. These analysis as well as dendrochronological and ^{14}C analysis are documented in different reports and statistics.

Methodology to create FAIR data

All research data were first revisited and converted, if necessary, in the respective standard formats. These digital resources are then deposited in the Zenodo repository (https://zenodo.org/) located at the CERN Data Center which has experience in long-term archiving. Zenodo assigns Digital Object Identifiers (DOIs) which are globally unique and persistent identifier according to the (F)indable data principle and makes the resources accessible and citeable according to the (A)ccessible data principle.

In order to fulfil the FAIR principles (I)nteroperable and (R)e-usable, metadata is encoded with the CIDOC CRM ontology to satisfy the FAIR guiding principles to use shared vocabularies and/or ontologies and describe data with rich metadata. CIDOC CRM can model the semantics of the relations between research objects, the activities and actors investigating them and the data that document the results of the investigations. Explicitly stating the research activities with their methodologies and linking them with the investigating persons and institutions will create data which is associated with detailed provenance.
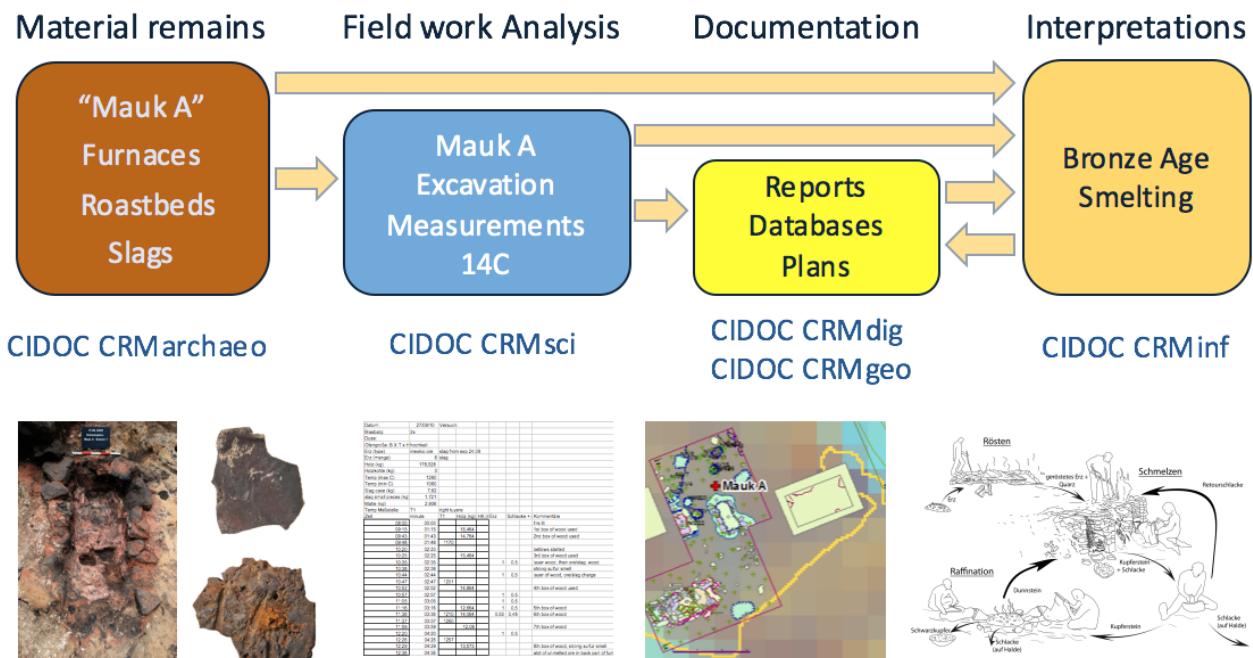
Fig. 3. Using CIDOC CRM extensions for material remains, field work&analysis, documentation and interpretations

Importance of the Research

The aim was to develop an approach how to create FAIR data for prehistoric mining archaeology derived from the Federal Monuments Office documentation which is obligatory in Austria. This means that most parts of this approach is generic and can be applied for any archaeological investigation conducted in Austria as they have to produce documentation in the same way. The methodology is based on semantic web standards to guarantee (F)indability and (A)ccessibility. To make data (I)nteroperable und (R)e-useable, data is mapped to the CIDOC CRM ontology which has been adopted by the ARIADNE EU-Infrastructure for Archaeological Resources as preferred metadata schema for Archaeology. One of the CIDOC CRM extensions used in this context is CRMarchaeo which was build based on the official documentation requirements of different countries including the Austrian Federal Monuments Office. Therefore, the metadata standard employed here is adequate for the documentation at hand and in addition a consensus on a European level. The creation of the metadata and the deposition of the data at Zenodo is in progress and for the CHNT we will provide a DOI to access the data. The methodology was applied to specific data of the German and Swiss project partners as well to create an integrated data set based on CIDOC CRM and encoded in RDF. It depends on them which of the data they want to provide as FAIR data. Once the metadata for the Austrian part is completely created it will be transformed and integrated in the ARIADNE portal. In addition, the RDF data will be available through a SPARQL Endpoint, but this first has to be organized with the IT services of the University of Innsbruck, in order to provide a service that will be accessible even after the project is finished.

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