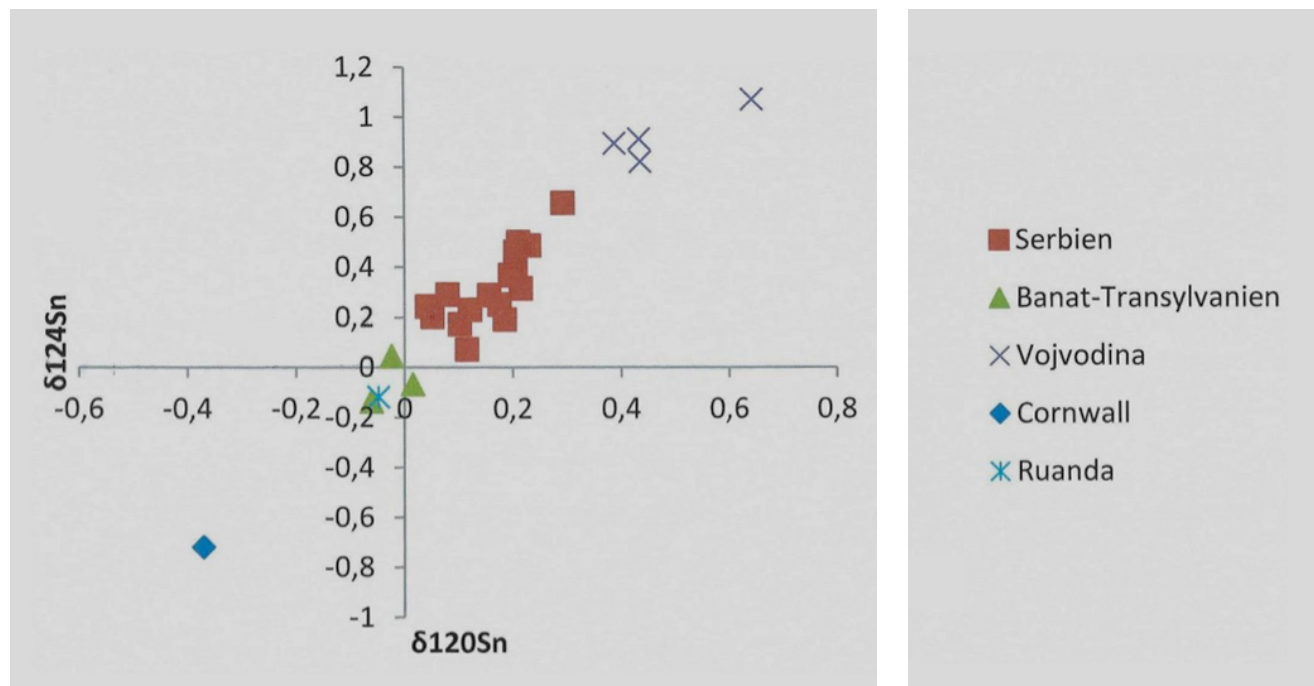


Archäologie im Spannungsfeld der Geistes- und Naturwissenschaften

Neue Möglichkeiten zur Bestimmung der Herkunft des Zinns mit Hilfe der Zinnisotopenanalyse.

Project: Institut für Archäologische Wissenschaften Universität Bern unter der Leitung von Prof. Dr. Albert Hafner

Masterarbeit: Reto Moser



Data calculated from Brüggmann et al. (2017) and Mason et al. (2016).

The aim of this work is to apply new methods adapted from natural sciences to classical archaeological research.

In the first part possible origins of tin in the Near East are discussed. For the bronzes in the 3rd millennium, sources in Afghanistan seem to be plausible. The extremely high content of tin is also found at some sites in the Harappan-culture (Indus valley culture). A lot of trade connections between Mesopotamia and the Indus valley (Meluhha) are well documented in cuneiform texts. Also the regions east of Iran (Shahr-I Sokhta) and Afghanistan (Mundigak) are associated with some near sources of tin ores and linked to the Harappan-culture and Mesopotamia in the 3rd millennium. This can be shown by comparing dated ceramic complexes and seals of this time. In the 2nd millennium is some text evidence for the import of tin from

Elam, on the western Iranian plateau. The first evidence of mine activities in Central Asia was found in the valley of Zeravshan in Usbekistan during the period of Andronovo culture (1850-1500 BC).

The second part illustrates methods originating in the natural sciences. The analysis of tin isotopes with MC-ICP-MS delivers good results in detecting limits of different tin isotopic ratios. This method aims at describing the source of tin in the bronze objects. In the last couple of years the problems of purification (with column chemistry) and measurement seemed to have been solved. Determining the origin of the minerals cassiterite and stannite is more complex than believed in the past. The formation of the minerals is also connected to secondary processes like volcanism. So dating the rocks does not lead to the same results as dating the minerals.

With this new method we can now distinguish between ores from Cornwall, the Erzgebirge and the Balkan, because the orogenic formations of the regions are different. Unfortunately the data published cannot be compared in every case because scholars use different internal standards resulting in different isotopic ratios.

The finds of pure tin in Switzerland are very rare. This suggests other sources than pure tin, for example SnO_2 , found as decoration material on ceramics at Bronze D, are directly mixed with copper ores and charcoal. At Zurich "Mozartstrasse" a small fragment of pure tin accurately dated (1900 BC) was found. This shows that also in the Early Bronze Age (1900 BC) tin was traded to Switzerland from outside, because Switzerland has no natural resources of tin ores.

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