

---

# Testing the Multi Layered Chert Sourcing Approach: How reproducible are geochemical chert provenance analyses?

Michael Brandl\*<sup>1</sup>, Christoph Hauzenberger<sup>2</sup>, Peter Filzmoser<sup>3</sup>, and Maria M. Martinez<sup>4,5</sup>

<sup>1</sup>Austrian Academy of Sciences, Austrian Archaeological Institute, Hollandstrasse 11-13 1020 Vienna – Austria

<sup>2</sup>Karl-Franzens-Universität Graz, Institute for Earth Sciences (KFG) – Universitätsplatz 3, 8010 Graz, Austria

<sup>3</sup>Technical University of Vienna, Institute for Stochastics and Economic Mathematics (TU WIEN) – Wiedner Hauptstraße 8-10, Austria

<sup>4</sup>The University of Texas at Austin, Dept. of Anthropology – United States

<sup>5</sup>Smithsonian Institution, National Museum of the American Indian, Washington DC – United States

## Abstract

There exist only few materials that allow for a comprehensive study of prehistoric resource management and consequently past human behaviour. Amongst these materials are chipped stone tools, which are an excellent means for this endeavour due to their durability and abundance predominantly at Stone Age sites. Reconstructing the complex processes underlying lithic economy requires the investigation of mechanisms involved in the procurement, use and distribution of lithic raw materials. The first and indispensable step in studying lithic economy however concerns the starting point of this continuum, the aspect of procurement, which crucially depends on the ability to trace these materials back to their original sources. During the past decade, we employed the Multi Layered Chert Sourcing Approach (MLA) combining petrography, microfacies analysis and geochemistry for sourcing chert materials in archaeological contexts. Since the beginning of our studies, we use Laser Ablation-Inductively Coupled-Mass Spectrometry (LA-ICP-MS) for trace element detection. Following the Provenance Postulate, the elemental composition within the material of a particular source or source region needs to be characteristic enough to enable a clear differentiation from other, visually similar geological deposits. In order to assess the reliability of our approach, we re-analysed samples from previous sourcing studies in a blind test. This is the only secure way to determine the reproducibility of results from geochemical chert provenance analyses in archaeology, and to validate socio-economic interpretations based on such outcomes. Our test study is one of the first of this kind, and provides future perspectives for lithic raw material sourcing.

**Keywords:** lithic economy, chert procurement, chert sourcing, geochemistry, blind test

---

\*Speaker