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Combination of 3D visualisation techniques and nuclear analysis methods

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Non-destructive analysis has become more and more important for archaeology, especially in the case of ELD (extra-long distance) trade items in prehistory. One of the potential highlights for such objects is high pressure metamorphites („jadeites") and related rocks playing a crucial part in European prehistoric long distance trade networks. The extremely rare, attractive and prestigious objects were spread all over the western half of Europe (D'Amico et al. 2003) and recently the eastern borderline is seemingly shifted essentially (Szakmány et al. 2013, Petrequin et al. 2011). These rocks can be optimally studied in petrographic thin section, but as they are invaluable proofs of prehistoric communication networks and trade, any invasive analytical treatment for their studies is beyond question.
A combination of non-destructive techniques might be useful in this case. Non-destructive SEM-EDS of high-polished surfaces can be a good choice (Bendő et al. 2012, 2013). In this paper we use geochemical fingerprinting by PGAA (Szakmány et al 2011) coupled with density measurements derived from 3D scanning models. Density is a characteristic feature of the HP/HT rocks being very high (3300-3500 kg/m3). It has been used for characterisation of jade axes already using traditional laboratory techniques. 3D scanning and calculation of volume on the basis of geometrical shape might extent the applicability of this non-destructive and highly informative technique to very small objects where traditional laboratory techniques are hard to control.

References

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Summary

Non-destructive PGAA and SEM-EDS measurements coupled with density measurements derived from 3D scanning have been used to characterise high pressure metamorphic rocks, often called 'jadeites'. The aim was to study their role in European prehistoric long distance trade networks.

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