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Simplifying LA-ICP-MS data processing and interference correction using the non-commercial G.O.Joe software tool

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Since the coupling of laser ablation systems with inductively coupled plasma-mass spectrometers (LA-ICP-MS) in the 1980s, this technique has become indispensable for rapid, in-situ trace element and isotopic analysis of both natural and synthetic solid samples. Its application extends across various fields, including chemistry, material science, geosciences as well as biological and environmental analysis, bioimaging and forensic investigations. However, analytical advances are still needed to overcome problems in trace element analysis using LA-ICP-MS caused by interferences that cannot be solved instrumentally.

G.O.Joe is a non-commercial software tool designed to calculate trace element concentrations in solid samples obtained by LA-ICP-MS analysis, incorporating several types of optional interference corrections. The software is written in the Dart programming language within the Flutter programming framework and operates web-based without the need of any installation, allowing access from any location with an internet connection. This facilitates immediate data evaluation and the efficient processing of large datasets. The web-based nature of G.O.Joe assures that the user always works with the most recent version of the software.

G.O.Joe features an intuitive user interface that simplifies the data evaluation process. This includes straightforward selections of peak- and background signals, importing instrument settings and reference material compositions to convert the measured raw signals into element concentrations. To ensure a transparent data processing, the results file (.xlsx) includes the calculated element concentrations, associated statistical parameters as well as input data alongside instrument settings. Major advantages of the software are the implemented correction measures for isobaric interferences and abundance sensitivity.

We present G.O.Joe's key features by processing the mineral chemical datasets of two case studies. These include trace element analyses of tungstates (e.g., scheelite) and silicates (e.g., garnet) to demonstrate the a time-efficient, transparent and easy-to-use handling of the software, appealing for both experienced LA-ICP-MS users as well as newcomers to LA-ICP-MS data analysis. More details and the latest version of G.O.Joe will be available at <https://www.gojoe.software>.

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