

A web-based, open tool for the preparation and data reduction of electron microprobe measurements.

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The time-consuming set-up of protocols for electron microprobe measurements as well as the data reduction after the measurements often cost valuable machine time. To minimise this issue, we developed a number of both small and extensive online tools. We converted all these into web-applications with a simple and intuitive graphical user interface (GUI), with which each work-flow is completed within minutes to at maximum a few hours – e.g., for complex data reduction tools. Their use is independent of the type of electron microprobe.

The first set of tools allow developing a measurement program by assigning elements to the available spectrometers, choosing the appropriate analyser crystals, setting backgrounds, identifying, eliminating or accounting for interferences, and optimising measurement time. All of this is done online in a browser that not only allows easy access to these tools, but also their use in a teaching environment. The developed measurement programs can be stored intermediate for later use.

The second set of tools optimises data reduction. An example for an already developed, extensive data reduction tool is the flank method [1] that allows the in-situ determination of $\text{Fe}^{2+}/\text{Fe}^{3+}$ in garnet. The flank method is based on the accurate intensity measurement at two positions on the flanks of the FeLa and FeLb emission lines and makes use of the systematic change of their intensities and wavelength shifts. Data reduction of the obtained data so far required a complex combination of Excel spreadsheets, and, for multiple linear regression, the additional conversion to text files in combination with the Matlab clone Octave. The new web-application provides results within minutes, and allows the visual examination of all data using a large variety of plots for in-depth data inspection.

All tools are published and available following the FAIR (Findable, Accessible, Interoperable, Reproducible) criteria. The web-applications are available through the free and open geoplatform.de website. The entire web-application is facilitated using Python, Quarto, Streamlit and a public GitHub repository, which is all documented on the geoplatform.de website.