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SilicH_2O: a graphical user interface for quantifying H_2O in volcanic glasses and melt inclusions by Raman spectroscopy

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The H_2O content of magmas strongly impacts the explosivity of volcanic eruptions, as well as their rheological properties and crystallisation behaviour. Accurate analyses of H_2O in magmatic liquids is therefore vital for our understanding of the dynamics of magmatic processes and eruptions. Raman spectroscopy provides an accessible, affordable and high spatial resolution technique for estimating H_2O contents of magmas that have been quenched to a glass during eruption. However, calculating H_2O concentrations from Raman spectra involves manual data processing and results are therefore sensitive to the specific treatment used. SilicH_2O is an open source Python software package that uniformises and streamlines this process by providing an interactive graphical user-interface (fig. 1). It can be used to: (a) process Raman spectra of glasses, (b) set up H_2O calibrations with reference materials and (c) quantify H_2O contents of unknown samples.

The software has an interactive and flexible approach for subtracting background baseline signal, where results can be monitored in real time. Additionally, Silic-H_2O provides tools for removing unwanted peaks from Raman spectra, which is particularly useful for imperfectly quenched natural volcanic glasses where nanocrystals might be present, or for crystal hosted melt inclusions where signal of the host may bleed into the glass signal (fig. 2).

The software is capable of bulk-processing any number of spectra and has automated functions for batch exporting results and process settings. Overall, Silic-H_2O provides the tools for consistent and precise processing of Raman spectra in order to produce the most accurate H_2O quantifications. The software is available for download at https://github.com/TDGerve/silicH2O

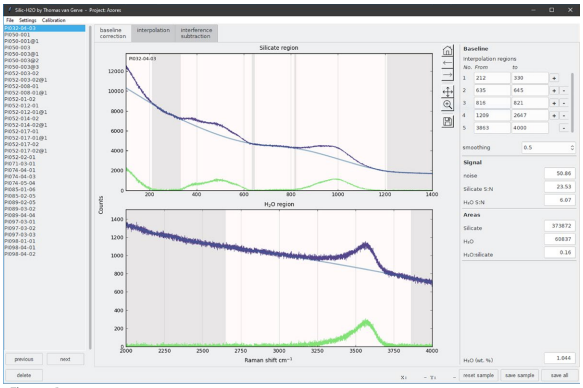

Figure 1

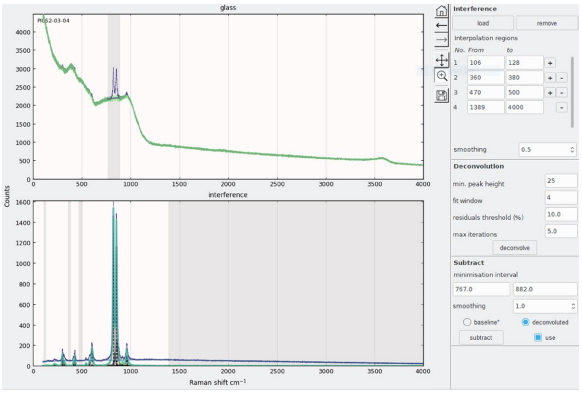

Figure 2