Improved quantification of glass corrosion

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Presently, the corrosion of glass is determined with standardized tests including their large error potential.

Here, we present a new approach for the time- and spatially resolved determination of glass dissolution.

Predefined spots of the pristine surfaces were analyzed using vertical-scanning-interferometry. Experiments were conducted in a flow-through cell using a solution of 1 M NaOH and 0.5 M Na_2CO_3 at 80°C. Parts of the samples were masked by a polymer material. After cleansing, the samples were measured at the exact same surface locations. The use of a mask generated an absolute reference height. The resulting datasets represent material flux maps that allow for spatial- and time-resolved statistical analyses. Frequency analysis of flux maps results in a quantification of rate distribution according to our new rate spectra concept [1]. A deconvolution of the rate spectra allows for detection of contributing rate components. The results suggest several surface defects have significant impact on the initial glass corrosion rate. The new approach provides important information about the varying spatial and temporal impact of multiple contributors to the overall rate [2]. Consequently, the method allows for a quantitatively improved and mechanistically based prediction of glass corrosion.

[1] Fischer et al. (2012), *GCA* **98**, 177-185. [2] Fischer et al. (2014), *Appl Geoch* **43**, 132-157.