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Micro-FTIR studies on plagioclase phenocrysts at Börzsöny Mts. (Hungary) aiming to assess the pre-eruptive magmatic water contents

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This conference paper presents a so far rarely applied, still cost efficient and simple method for constraining structural water contents of plagioclase phenocrysts at Börzsöny Mountains' different volcanostratigraphic units and thus constraining the pre-eruptive magmatic water contents. The plagioclase phenocrysts were measured with micro-FTIR spectrometry of 12 representative samples. The method makes it possible to measure the OH-content of the phenocrysts. Unpolarized infrared spectra were collected on randomly oriented plan parallel, doubly polished thin sections and the measurements were evaluated using two algorythms: the so called 'wet' algorithm used the spectra with strong bands at the region of molecular water, while the so called 'dry' algorythm excluded those. These algorythms made it possible to separate the effects of the accidentally measured nano-inclusions and the alterations possibly present in the plagioclases, thus lead to a conservative estimate of the structural OH-contents.
The structural OH- contents turned out to be between 20 ppm and 340 ppm, which are in satisfying agreement with previously published water contents of andesitic-dacitic volcanoes [1] [2] [3] [4]. The pre-eruptive magmatic water content was calculated using the melt-plagioclase partition coefficient of [1]. Magmatic water contents turned out to be from 0.26 wt% to 4.26 wt%. The work presented here has promising implications for future studies of volcanology and micro-FTIR spectroscopy and can get us to fully comprehend the volcanic-geodynamic systems and eruptive styles of volcanoes. However it must be considered, that the post-eruptive processes greatly affect the plagioclase phenocrysts, so if possible, the fast-cooled volcanological facies must be sampled and measured when targeting water content determinations, e.g. base of pyroclastic fall deposits [5].

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