

Discrimination of different quartz sources in a Rhine sediment based on IR spectra

R. STALDER

University Innsbruck, roland.stalder@uibk.ac.at

Infrared spectra of 60 detrital quartz grains from the 500-1000 μ m fraction of a quartz-rich fluvial sediment from Rhöndorf/Middle Rhine were analyzed by IR spectroscopy and evaluated with respect to their OH-defect concentration. Prior to analysis, all measured grains were manually oriented parallel to the crystallographic c-axis and prepared as double polished sections. IR measurements were performed with polarized radiation parallel to both main refractive indices and the spectrum measured parallel to n_e was subtracted to the spectrum measured parallel n_o in order to minimize the contribution of fluid inclusions.

OH-defect contents show a polymodal distribution with maxima around 10, 20 and 50 wt ppm water, reflecting the provenance from different major sources. Furthermore, IR spectra of many crystals reveal a significant contribution of Li-specific and B-specific OH defects, pointing to granitic pegmatites (or hydrothermal quartzes) in the source region. Approximately 20% of all grains from the 500-1000 μ m fraction turned out to be lithic fragments (mostly quartzites) consisting of more fine-grained quartz crystals that are generally poor in OH-defects. If these crystals are not counted for the 500-1000 μ m fraction, quartz grains with very low OH-defect contents (corresponding to < 5 wt ppm water) are very rare.

In the next step it will be tested, whether OH-defect contents can be related to other parameters such as grain shape and grain size. In addition, quartz grains from rocks from the upstream source area will be analyzed and compared to the detrital grains, in order to identify distinct provenance regions.