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OH-defects in quartz as a provenance tool: application to sediments from SW Japan

Dominik Jaeger, Michael Strasser, and Roland Stalder
University of Innsbruck, Geology, Austria (fabian.jaeger@student.uibk.ac.at)

OH-defect content in quartz can serve as an archive for its host rock's formation. Thus, detrital quartz derived from different sources can show distinctive distributions of OH defect contents, which can be quantified using IR-spectroscopy. High abundance of detrital quartz in most sediments combined with the quick and easy sample analysis make it a potentially very attractive tool for provenance analysis.
Application of this novel technique indicate that recent river sands from southwestern Japan can be separated into two large scale provenances according to the OH-defect content of detrital quartz grains: Samples from central Honshu exclusively show OH-defect poor quartz; samples from Shikoku to the southwest exhibit a much wider range of OH-defect contents.
We hypothesize that the lower OH-defect contents in central Honshu are a result of erosion of rock from lower crustal levels following the collision of the Izu- and Honshu arcs. This is in good agreement with previous studies on regional exhumation rates.
Furthermore, broad OH-defect content distribution (similar to recent sediments west of the collision zone) is found in sediments from the accretionary prism offshore Honshu dated at ca 6 Ma. At ca 1 Ma, defect poor grains, as found in the Izu-Honshu collision zone today, are dominant. This indicates that the OH-defect signal is indeed traceable throughout the sediment record and therefore a legitimate tool for provenance analysis.