



## **A detrital garnet fingerprint of the Central Swiss Alps**

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Detrital garnet is a promising candidate to reliably fingerprint sediment sources in the Alps, which has so far been complicated by the wide range and similarity of some of the lithologies. Garnet is present in most Alpine sediments, is easy to identify, is fairly stable and, most importantly, reflects the type and the metamorphic grade of its source rock in its chemical composition. This study aims to establish fingerprints based on detrital garnet composition for the most important tectonic units of the Central Alps, including European, Penninic and Adriatic basement rocks and their respective meta-sedimentary cover. Sediments collected from modern rivers, which drain representative portions of the individual tectonic units, contain a natural mixture of the various garnet populations present in each unit. We selected six catchments in southwestern Switzerland draining the External Massifs, Helvetic sediments and the Penninic nappe stack at the transition of Alpine greenschist- to amphibolite-facies metamorphism in order to test the variability of Alpine garnets and the role of inherited (pre-Alpine) garnets. Extraordinary grossular- and spessartine-rich garnets of the External massifs, which experienced greenschist facies metamorphism, are clearly distinguishable from generally almandine-rich garnets supplied by the higher-grade metamorphic Penninic nappe stack. The variable pyrope-, grossular- and spessartine-components of these almandine-rich garnets can be used to further distinguish pre-Alpine, Alpine eclogite-facies and low-grade metasedimentary garnets. This fingerprint has the potential to be used for reconstructing sediment sources, transport and dispersal patterns in a variety of settings throughout the Alpine sedimentary record.