

EGU22-8385

<https://doi.org/10.5194/egusphere-egu22-8385>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Mineral inclusions in detrital garnet – A complementary tool in ultrahigh-pressure research

Jan Schönig¹, Hilmar von Eynatten¹, Guido Meinhold², N. Keno Lünsdorf¹, and Suzanne L. Baldwin

¹Geoscience Center, Georg-August-University Göttingen, Göttingen, Germany (jan.schoenig@uni-goettingen.de)

²Institute of Geology, TU Bergakademie Freiberg, Freiberg, Germany

Documenting ultrahigh-pressure (UHP) metamorphism in the geologic record is a key for understanding the evolution of plate tectonics on Earth. Characteristic UHP minerals like coesite and diamond that form during deep subduction are frequently replaced by their low-pressure polymorphs during exhumation. However, when entrapped as inclusions in resistant host minerals like garnet, coesite and diamond are shielded from external metamorphic fluids and may be preserved. Finding evidence for deep subduction processes in host garnets of large volumes of (partially) re-equilibrated crystalline rocks is challenging, time consuming, and often hampered by poor outcrop conditions due to weathering and soil formation. In contrast, by analyzing detrital garnet, natural processes such as erosion and sedimentary transport can sample garnet grains sourced from fresh as well as altered crystalline rocks located in the drainage area, enabling large crustal volumes to be screened using a comparatively low number of samples. Case-studies from the Western Gneiss Region of Norway (Schönig et al. 2018), the Saxonian Erzgebirge of Germany (Schönig et al. 2019, 2020), and the (U)HP terrane of eastern Papua New Guinea (Baldwin et al. 2021) demonstrate mineral inclusion analysis of detrital garnet to be a complementary and efficient tool in UHP research. This contribution gives a synopsis of the main findings from the three spatially, chronologically, and tectonically distinct UHP terranes studied, putting emphasis on the spatial extent of UHP metamorphism and lithologies involved.