

## **THE ORIGIN OF GREY GNEISSES IN THE EASTERN ERZGEBIRGE (GERMANY): IMPLICATIONS FROM GEOLOGICAL, GEOCHEMICAL AND GEOCHRONOLOGICAL DATA**

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Grey gneisses in the Eastern Erzgebirge have traditionally been subdivided into two main groups: (1) a coarse-grained biotite gneiss with porphyroblastic K-feldspar and lens-shaped quartz aggregates, and (2) an equigranular fine-grained biotite gneiss. The central zone of the Freiberg anticline consists mainly of coarse-grained gneiss with granitoid appearance (“Inner Gneiss”, also known as Freiberg Gneiss). Towards the peripheral zone, the gneiss becomes medium- to fine-grained, and often contains inclusions of dense gneiss (“xenoliths”) and is intercalated with layers of dense gneisses, quartzites and amphibolites. The peripheral zone is built by a typical fine-grained biotite gneiss (“Outer Gneiss”, also known as Pressnitz Group) with intercalations of dense gneisses, muscovite gneisses, metacarbonates, amphibolites and quartzites.

The origin of grey gneisses in the Erzgebirge has been a matter of a long-lasting debate. Our results indicate a clearly different genesis of the coarse- and medium-grained Inner Gneiss on the one hand, and the fine-grained Outer Gneiss on the other. The Inner Gneiss, like all its structural variations, is of igneous origin with a S-type granitic protolith. The Outer Gneiss is of sedimentary origin with greywackes as its main source. At the time of the intrusion (ca. 540 Ma ago), the greywackes (now transformed into the Outer Gneiss) probably formed the wall rocks of the granite. Several observations (gradual transition in gneiss structures, continuous outward increase in the number of metasedimentary enclaves and intercalations in the Freiberg anticline, decreasing abundance of long-prismatic, magmatic zircons dated at 540 Ma) as well as similar geochemical and isotope data are in correspondence with this interpretation.