

Rock magnetic fabrics and tectonics of the Nordschwarzwald Granite Complex

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The crystalline basement of the northern Schwarzwald predominantly consists of high-grade migmatitic paragneiss-orthogneiss complexes (Central Schwarzwald Gneiss Complex, CSGC) intruded by the huge Nordschwarzwald Granite Complex (NGC). Although they are considered broadly as post-tectonic these granites and a northerly trending gneissic roof pendant display mylonitic to brittle fabrics which document a tens of kilometers long and several hundred meters thick W-dipping shear zone with top-to-W kinematics (i.e. normal-sense of shear). Magnetic fabrics of these generally paramagnetic granites are predominantly controlled by biotite. An E-W-trending magnetic lineation is interpreted to result from E-W oriented hypersolidus flow. Magnetic foliations and field evidence show moderately inclined contact surfaces between granite varieties suggesting that the NGC was essentially built up by subhorizontal sheets. Rapid emplacement and exhumation of the NGC in the footwall of a NNE-trending lithospheric shear zone is indicated by both radiometric ages ranging from 325 to 309 Ma and granitic pebbles in nearby late Carboniferous sedimentary basins. Since footwall and hanging wall of the shear zone were intruded by northerly trending granitic dykes E-W-extension apparently continued to be active during and after cooling of granitic plutons. E-W-extension probably continued during exhumation into the brittle crust as indicated by N-S-striking mesoscale normal faults. Segments of late Variscan, <325 Ma, W-dipping detachments with top-to-W kinematics were also documented in the Odenwald and the southernmost Schwarzwald possibly localizing lithosphere scale reactivation of the Cenozoic Upper Rhinegraben.