EGU25-11593, updated on 21 May 2025
https://doi.org/10.5194/egusphere-egu25-11593
EGU General Assembly 2025


# Structural Geological Characterization of Active Fault Zones in the Frontal Bavarian Forest and Implications for Large-Scale Cause-Effect Relationships of Tectonic Activity in the Bavarian Crystalline Basement (StruCtiv)

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The StruCtiv project, funded by and in collaboration with the Geological Survey of Bavaria (Bayerisches Landesamt für Umwelt, Hof), focuses on the structural geological characterization of active fault zones in the Frontal Bavarian Forest and explores their implications for large-scale cause-effect relationships of tectonic activity within the crystalline basement of the Bavarian Forest. Our findings provide new insights into the tectonic, petrological, structural, and geomorphological processes shaping the region while highlighting the need for further investigations to refine our understanding of these complex systems. Preliminary U–Pb and K–Ar dating of minor faults exposed in granite quarries reveal a multiphase tectonic evolution spanning the Eocene to the Pleistocene, with possible indications of recent activity. U–Pb dating of calcite has proven especially promising, though additional sampling and structural characterization are required to address variability in ages within quarry outcrops. Complementary geomorphological analyses and cosmogenic nuclide measurements of river sediments show regional differences in erosion rates (21–40 m/Myr) and topographic variations, reflecting differential uplift rates. We used high-resolution TanDEM-X data and cosmogenic nuclide dating of older fluvial terraces to explore the long-term interactions between tectonics, climate, and erosion. Deliverables from the first project phase include ten high-resolution 3D models of quarries in the Bavarian Forest, structural measurements, dating of fault surfaces, and geomorphological analyses. These results have identified episodic fault reactivation from the post-Variscan to late Cenozoic periods. Landscape analyses based on chi-index and knickpoint studies and cosmogenic nuclide dating provide a consistent picture of the region's landscape evolution. Together, these findings suggest differential tectonic uplift across the Bavarian Forest. The ongoing project aims to build on these results through expanded structural and geochronological studies, the development of 3D models in additional quarries, and further digital mapping of structural inventories. The outcomes will deepen our understanding of fault-system evolution in continental intraplate settings and their role in understanding the long-wavelength vertical motion of the Earth's surface.