# Neogene tectonics in the Rhenish Massif in special consideration of earthquake-relevant fault zones and their indication by hill-building forest ants (Formicinae)

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Young tectonics of the Rhenish Massif is characterized by recent uplift and seismically active fractures. These subrecent to recent features originate from continental rifting (Central European rift system). According to this model the V-shaped opening of the Lower Rhenish basin takes place in a clockwise rotation of the eastern Rhenish Massif and demands for a multiplicity of dextral strike slip faults balancing the crustal movements [1]. The results of the crustal movements are NE-SW sinistral strike slip faults in the eastern Rhenish Massif and WNW-ESE dextral strike slip faults in the western Rhenish Massif. Recent faults are accompanied by ascending gases, ore zones and quartz zones.

Several field works are intended for acquiring the complex fault system of the Rhenish Massif. For the verification of the model it will be necessary to take up structural data, ore and quartz zones and historical mine shafts. Up to now field works suggest the postulate WNW-ESE structures being dominant main fracture zones. In addition to the main direction, conjugate riedel shears occur in NE-SW, NNW-SSE and NW-SE direction.

In order to detect a supposed fracture zone covered by quaternary sediments and tuffs close to Koblenz (southwards Waldesch), soil gas measurements along a section perpendicular the fault were accomplished. It was shown that the helium concentration of the taken soil gas samples close to the fracture lay above the helium concentration prevailing in the atmosphere. In addition the helium concentrations in the soil gas decreased with increasing distance from the fracture. The increased helium concentrations indicate gas permeability in the underground, which is interpreted as open fractures [2].

During the investigations of neogen tectonics of the Rhenish Massif in several hundred places, a distinct enhancement of nests of hill-building forest ants (*Formica rufa, Formica polyctena, Formica pratensis*) was observed. These locations were bound to fault zones, which were mapped as strike slip faults. Preliminary investigations of inter fault zones in the areas examined so far confirm the occurrence of the nests predominantly on fault zones. There the remarkable coincidence of nests of Formicinae and recent shear zones is supposed to be a causal coherence and not only a stochastically accumulation. Therefore ascending soil gases were discussed to be a potential cause of habitat selection. It is assumed that the soil gases have a lasting effect on the habitat. If those fault zones are really the reason for habitat selection will be proved by statistical analyses.

The aim of this research project is to combine interdisciplinary aspects for better understanding of the postvariscian tectogenesis and the related issues of recent shear systems and earthquakes in the Rhenish Massif.

**References**

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