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Moment tensor and stress tensor inversions for the region Vogtland/NW-Bohemia

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The region Vogtland/NW-Bohemia is well known for the periodic occurence of weak to moderate earthquake swarms with magnitudes up to $M_L = 3.0-4.5$. Recent studies show evidence that swarms are triggered or induced by magmatic fluids or gas coming up from the upper mantle. We analyse the Vogtland swarm of 1997 with several automated procedures: First a coherence analysis of waveforms is applied, followed by a relocation of 729 events from arrival time differences (hypoDD), and finally an inversion for 522 relative moment tensors. 14 multiplets of events with similar waveforms and similar mechanisms have been identified. We were also able to determine the correct fault plane for the focal mechanisms of at least 58 events.

Additionally, stress indicators like focal mechanisms of earthquakes, in-situ stress direction measurements taken from the World Stress Map, and the vertical stress profile at the KTB drilling site have been compiled into a single database. From the focal mechanisms, we calculate homogeneous deviatoric stress tensors with different inversion techniques. Regional and local inhomogeneities of the stress field will be studied by building subsets in time and space.