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横ずれ活断層沿いに発達した断層破砕帯の空間分布と構造特徴:有馬ー高槻構造線活断層帯を例に
Spatial variations in fault zone structures along strike-slip faults: an example from active faults in southwest Japan

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最近、福井県大飯と敦賀, 新潟県柏崎刈羽および青森県東原原子力発電所の敷地に活断層破砕帯が存在する可能性があることが指摘され、大きな社会的・経済的な問題となっている。地表に現れている活断層が地殻深部の震源断層と繋がっているため、地震の際、震源断層の破壊が地表にまで伝播し、地表の断層も一緒に動く。そのため、断層破砕帯の真上の建物は岩盤のずれとともに破壊される。地表地震断層のほとんどは既存の活断層とその周辺域に現れるため、活断層破砕帯の調査は、地震発生メカニズムの解明や防災上においては非常重要である。本講演では、有馬ー高槻構造線活断層沿いに発達する断層破砕帯の空間分布と断層岩特徴を報告するとともに、活断層破砕帯の形成メカニズムを考察する。

Active faults and related fault-zone structures that form at shallow depths within the upper crust are closely related to the long-term seismic faulting history of seismogenic faults (e.g., Lin, 1999, 2008; Sibson, 2003; Lin et al., 2010). Accordingly, the analysis of deformation structures along active fault zones provides important information in reconstructing the long-term seismic faulting behavior of active faults and in understanding the tectonic environment and history of such faults.

This study presents a case study on the structures of strike-slip fault zones of the Arima-Takatsuki Tectonic Line (ATTL) and Rokko-Awaji Fault Zone (RAFZ), which consist of multiple right-lateral strike-slip active faults in southwest Japan. The formation mechanisms of damage zone and their tectonic implications are discussed.

Field investigations reveal spatial variations in fault zone structures along strike-slip active faults of the ATTL and the Rokko?Awaji Fault Zone (RAFZ) of southwest Japan, which together form a left-stepping geometric pattern. The fault zones are composed of damage zones dominated by fractured host rocks, non-foliated and foliated cataclasites, and a fault core zone that consists of cataclastic rocks including fault gouge and fault breccia. The fault damage zones of the ATTL are characterized by subsidiary faults and fractures that are asymmetrically developed on each side of the main fault. The width of the damage zone varies along faults developed within granitic rocks of the ATTL and RAFZ, from ˜50 to ˜1000 m. In contrast, the width of the damage zone within rhyolitic tuff on the northwestern side of the ATTL varies from ˜30 to ˜100 m. The fault core zone is generally concentrated in a narrow zone of ˜0.5 to ˜5 m in width, consisting mainly of pulverized cataclastic rocks that lack the primary cohesion of the host rocks, including a narrow zone of fault gouge (<0.5 m) and fault-breccia zones either side of the fault. The present results indicate that spatial variations in the width of the damage zone and the asymmetric distribution of damage zones across the studied strike-slip faults are caused by local concentrations in compressive stress within an overstep area between left-stepping strike-slip faults of the ATTL and RAFZ. The findings demonstrate that fault zone structures and the spatial distribution of damage zone are strongly affected by the geometric patterns of strike-slip faults.

References:

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