Model construction of heterogeneous fault deformation at depth: Fault zone architecture along the Median Tectonic Line, eastern Kii peninsula, SW Japan.

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The heterogeneous deformation along a fault within the seismogenic zone and its deep ductile extension can significantly affect the fault behavior including the generation of earthquakes. However, no realistic models exist to evaluate the effects as the direct observation of the rock deformation at depth along current active faults is difficult. Thus, we examine to construct a model of heterogeneous fault deformation based on the field data along an exhumed fault, the Median Tectonic Line[1][2], eastern Kii peninsula, SW Japan. In this presentation, we examined to construct a detailed 3 D model of fault zone derived from the Ryoke granitoids around the Awano-Tabiki outcrop[3][4].

The 3D model is based on the accurate description of outcrop. Previously the accurate description of outcrop is time-consuming works. In this study to describe the outcrops efficiently, we adopted a recently advanced technology of 3D topographic measurement using image analyses combined with GNSS (Global Navigation Satellite System) surveying.

During the field studies, ground control points (GCP) were first deployed and their locations were determined by GNSS surveying. Then images require for 3D topographic measurements were acquired using an UAV (Unmanned Aerial Vehicles) or a remote controllable digital camera. After that, SfM (Structure from Motion) and MVS (Multi-View Stereo) processing were applied, and the 3D shapes of outcrops were obtained as point clouds including the coordinates of the locations, color (RGB), and normal vectors of surfaces. For the locations where we didn’ t measure the topography, we generate the point clouds based on the numerical topographic information presented by the GSI (Geospatial Information Authority of Japan).

Cataclastes and mylonites are exposed around the Awano-Tabiki outcrop. For these fault rocks, geological information was acquired based on the field and microstructural analyses and the geological information are add to the point clouds. These point clouds including the geological information will be the basic data to construct the 3 D fault zone architecture model. We still need to overcome how to construct the 3D model numerically. Because the 3D model in this study will be constructed numerically, it can easily be used in the numerical modelling to evaluate the fault behaviors.

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