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Faulting at depth revealed by the borehole core penetrating the Median Tectonic Line

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The Median Tectonic Line (MTL) is the Japan's largest onshore exposed fault, has a long history of displacement, and the fault rocks deformed under variable conditions are exposed at the surface. The analysis of the internal structure of the MTL, therefore, helps to improve our understandings of variable fault behaviour depend on the physical conditions.
Here we outline the project in which we analyze the borehole core penetrating the MTL (the Iitaka Ako core) to address fault zone evolution. The borehole was drilled by the Geological Survey of Japan, AIST as a part of the observation network to predict the forthcoming Tonanka and Nankai earthquake.
(i) Borehole site
The fault rocks which were formed close to the brittle-plastic transition of the crust are exposed in the vicinity of the borehole site (the Iitaka Ako observatory).
(ii) Stress history during the exhumation
Stress history during the exhumation is being revealed by the multiple inverse method.
(iii) Transitions from ductile to brittle behavior
The microstructure and the CPO are changed in the mylonite, suggesting the different temperature condition during the ductile deformation. The borehole core close to the lithologic boundary consists of ultramylonite which characteristically contains muscovite and chlorite.
(iv) Displacement rate
The ultramylonite samples were also obtained at surface exposures. The altitude difference from bottom of the borehole to the surface exposures is about 1000m. This altitude difference may enable us to estimate the displacement rate.
(v) Frictional property of the fault rocks
Raman spectrometry of carbon within the fault gouge of the MTL may allow us to estimate the frictional heating during the faulting.
It is expected that these help to improve our understandings of variable fault behaviour depend on the physical conditions.

Keywords: Median Tectonic Line, Fault, Borehole core