Estimation of paleo-stress field, alteration and diagenetic environment using deformed conglomerate in trench fill sediment -As an example of Izu-Bonin arc multiple collision zone-

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The South Fossa Magna is known as the multiple collision zone of the Izu-Bonin arc (Amano, 1986 etc.), sedimentary rocks (Middle Miocene to Pleistocene) are widely distributed. Among them, conglomerate excellence layer (trough filling sediment) were observed, and they are thought to clearly monitor the timing of collision phenomena (Amano・Ito, 1990). In this study, we focused on the deformed and altered structure in the Hamaishidake Formation (Late Miocene-Pliocene) of the Fujikawa Group, to restore the paleo-stress field and to estimate the diagenesis environment of sedimentary rocks in the collision zone.

[Foliated cataclasite in Hamaishidake Formation]
Maruyama (2008) has reported foliated cataclasite outcrop in Hamaishidake.F., and Suzuki・Kobayashi (2017MS) has reported it is different from the surrounding Hamaishidake.F. (=Fujikawa shear zone). The basic trend of the shear zone is N40W, and there is a gap in the geological structure from the Hamaishidake.F. on the south side and the north side across the shear zone.
In the shear zone, gravels showing various deformation modes are observed, and they are coexisting. In this study, we classified them into five types.
(a type)-non deformation, (b type)-fissure not cutting matrix, (c type)-brittle deformation and observation of separation, (d type)-Cataclastic flow, (e type)-Cutting deformation shear zone
On the micro observation, alteration structure due to calcite vein and laumontite vein is frequently observed in d type gravel with brittle fracture of the texture. And they are cross-cutting relationships. In addition, most of the faults of the e type is observed with stilbite and chabazite vein.

[Paleo-stress analysis used by multiple inverse method]
We tried to restore the paleo-stress for each type of gravel using multiple inverse method Yamaji (2011). As a result, we got normal fault stress with $\sigma 1$ axis in the vertical direction from b type, lateral stress in NE-SW~ENE-WSW direction from c-d type, and reverse fault stress in NW-SE direction from e type.

[Study on maximum heating temperature using CM raman spectrum]
In order to estimate the maxim heating temperature of sedimentary rock, we conducted a raman spectrum measurement of carbonaceous matter (CM) in interstitial mudstone. The raman spectrum of CM is characterized by D1 band around 1350 cm^{-1} and D2 band around 1600 cm^{-1}. And maximum heating temperature has good correlation with their FWHM and intensity (Kouketsu, 2014). As a result, we got 180℃~230℃ from Hamaishidake.F., 130~180℃ from Kogouchi.F. (relationship between simultaneous layer with Hamaishidake.F.), 100~150℃ from Manzawa.F. (Middle Miocene), and 300℃ from Fujikawa shear zone.

From the results of stress analysis in the Fujikawa shear zone, it was suggested that there were at least three stage deformation in this area. But there is high possibility that the normal fault stress field (stage 1) and the NE-SW~ENE-WSW lateral stress field (stage 2) partially overlapped, and foliated cataclasite is formed at these stages. Maximum heating temperature 300℃ was detected only at the Fujikawa shear zone. Considering that the surrounding Hamaishidake.F. is not foliated cataclasite, it is thought that the forming temperature is 230℃ or more and less than 300℃. This is also supported by the fact that the texture of deformed conglomerate undergoes brittle fracture and alteration by high temperature minerals such as calcite and laumontite. After that, NW-SE reverse stress field (stage 3) and e type deformation occurred accompanied by low temperature altered minerals (around 100℃, stilbite, etc.). Its stress is harmonious with the direction of movement of the current PHS plate (Seno, 1977). From such data, we will discuss stress transitions and diagenetic environment at the collision zone.

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