Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS25-P05 Room:Poster Time:April 28 18:15-19:30

Deformational features of Permian-Triassic boundary preserved within an on-land accretionary complex

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Pelagic siliceous sediment covering on oceanic crust is one of the components in subduction plate boundaries where old oceanic plate subduct. Its mechanical, frictional and fluid transport properties are key to understand faulting and earthquake mechanics in such settings (Kimura et al., 2012; Yamaguchi et al., this meeting). Plate boundary deformations are strongly affected by inhomogeneity of incoming sediments: in the case of Jurassic accretionary complex in Japan (Mino-Tanba belt), siliceous/black claystone at Permian-Triassic boundary horizon within bedded chert functioned as plate boundary decollement, and only Triassic-Jurassic chert is preserved in the complex, whereas Carboniferous-Permian chert is lacking (Nakae, 1993). However, few outcrops in the Jurassic accretionary complex comprise continuous sections across Permian-Triassic boundary. To understand the limitation of lithology-controlled deformations, we investigated structural analysis of the Permian-Triassic boundary section in the North Kitakami Belt (Akkamori-2 section; Takahashi et al., 2009), where the most continuous Permian-Triassic boundary is observed.

Permian gray-color siliceous claystone to Triassic gray-color siliceous claystone through black claystone is successively observed in this outcrop (lithology detail: see Takahashi et al., this session). Orientations of 36 bedding dips, 90 low-angle cleavages, 17 high-angle cleavages, and 22 faults are measured from the outcrop. Strikes of bedding and low-angle cleavage vary NW-SE to NE-SW, gently dip eastward. Faults have two populations: one is subparallel to bedding and low-angle cleavage; the other is dipping gently to the north. Shear sense of the faults is unclear because of the lack of shear sense indicators due to intense development of overprinting high-angle cleavage.

In contrast to the scattered orientations of low-angle cleavage, strike of high-angle cleavage is limited to N40-70E with subvertical dip. The high-angle cleavages are recognized as axial plane cleavage of map-scale Hiraniwa-dake Syncline (Sugimoto, 1974) striking NW-SE and plunging southeastward, since the studied section is located nearby the axis of the syncline. Orientations of bedding, low-angle cleavage, and fault would be also rotated by secondary-order outcrop-scale open folds.

Hiraniwa-dake syncline involves several chert-clastics sequences in this region (Ehiro, 2008). Substracting fold-related deformations, bedding-parallel cleavages and low-angle faults (likely to be thrust) are only initial deformations observed in the studied outcrop. Those deformational features are also typical in off-scraped and underthrusted accretionary complex (Kimura and Hori, 1993, Raimbourg et al., 2009). Lack of intense deformation in the black claystone suggests that not only lithology-controlled physical properties but other factors (e.g. topographic and thermal effects) would be also important to constrain the position where decollement develops.

Keywords: Permian-Triassic Boundary, subduction zone, accretionary complex, Deformation structure