

Tectonic History of Hiroo Complex and its implication in paleo-Kuril Arc evolution

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Melanges records information about deformation history and tectonic events in plate margins and orogens and hence they are important in evolution of accretionary complexes [1]. Mélange facies rocks and broken formations distributed in Nakanogawa Group of Hidaka Belt in Central Hokkaido is known as Hiroo Complex. We carried out detailed field mapping and structural studies on melange facies rocks distributed around Tachiiwa, Kamitoyoni and Daimaruyama region of Hiroo Complex. Four different deformation processes (D1, D2, D3 and D4) are identified from field to micro-scale observations. D1 event shear zones are wide and considered as penetrative but D2, D3 and D4 shear zones observed in narrow deformation zones and considered as less penetrative local events. D1 shear zones are identified as scaly fabric in mudstone and asymmetrically sheared sandstone clast distributed in it. This is similar to 'block in matrix' structure, typical of tectonic melange developed in accretionary complexes. D1 foliation trends in N-NNW direction. Tectonic evolution of these rocks confirmed by pressure solution cleavage, composite planar fabrics (P-Y-R shear), asymmetrical folds and dip-parallel stretching lineation. P-Y-R shear relation and other asymmetrical structures in both field and microscale observation shows east-side-up sense of movement. This shear sense suggests that major penetrative deformation phase in melange was connected to accretionary complex development in paleo-Kuril-Arc region, where initial subduction was directed in N-S direction and later it rotated clockwise and attained its present position. D2, D3 and D4 events were recognized as dextral strike-slip movement, sinistral-strike-slip to oblique-slip movement and west-side-down movement sense respectively. Mega-micro scale observation of D2 and D3 events show the properties of cataclastic deformation and D4 event is that of fault gouge. Based on this D2, D3 and D4 events are considered as upper crustal or local deformation processes. We consider these are linked to post-melange deformation processes and related to final stages of development of Hidaka Metamorphic Belt (HMB). Recent geochemical studies from Daimaruyama region and geochronological studies from Nakanogawa Group region points that Hiroo Complex was part of initially northward subducting Paleo-Kuril Arc region [2]. Through detailed structural analysis, this study also confirms that Hiroo Complex was developed in accretionary complex of paleo-Kuril-Arc by an offscraping mode of evolution. Later Hiroo Complex became part of Nakanogawa Group through a series of deformation processes associated with arc-arc collision between paleo-Kuril Arc and paleo-Japan Arc.

[1] A. Festa et al., 2012. *Tectonophysics*, 568, 7-24 [2] T. Yamasaki, F. Nanayama, 2018. *Lithos*. 302, 224-241

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