Origin of OIB like geochemical signature in alkali basalts of South West Japan

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Cenozoic alkali basalts of South west (SW) Japan show OIB like geochemical signature, especially in trace element composition. High field strength elements (HFSE) (e.g. Nb, Ta, Hf, Zr) show relatively high concentration (e.g. Nb upto 55 ppm) with respect to similar rocks from North East (NE) Japan arc (Shibata et al, 1997). This type of signature is prominent in most volcanoes of North West Kyushu, which is in the rear-arc side of the Philippine Sea plate (PSP) subduction zone, including Unzen, Kita matsuura, Higashi Matsuura, Goto Islands and Abu of SW Honshu. Similar signature is also reported from Cenozoic volcanoes of NE China and Korea such as Changbaishan (Kuritani et al., 2009), Chugaryeong (Sakuyama et al., 2014) etc., and the origin of these basalts have been explained by plume component from the lower mantle (Nakamura et al., 1985; Sakuyama et al.,2014), hydrous plume component from the upper mantle (Kuritani et al., 2017), fluid or melt contribution from the stagnant Pacific slab (Kuritani et al., 2011). High Nb basalts (HNB) described by Castillo et al., (2011) associated with adakite magmatism, are very similar to the alkali basalts under study. The presence of adakite in north Kyushu arc (Shibata et al., 2014), i.e. the same geodynamic setting, suggests possible similarity in the processes of magma generation.

In this work, we combine various published geochemical data from the region along with NW Kyushu, to determine the spatial and temporal variations of trace element and Sr-Nd-Pb isotopic compositions. The recent developments in subduction dynamics and age of the subducted plates of Pacific plate and PSP (Wu et al., 2016; Liu et al., 2017) provide another aspect in modeling the geochemical data. We compare the compiled and analyzed geochemical data to the existing models and discuss the viability of any unified model for the whole area over the stagnant pacific slab.

Keywords: SW Japan, Alkali basalt, High Nb basalt, Stagnant Pacific slab

