

## Reconstruction of paleo-volcanoes in the back-arc region of northeast Japan that formed during the opening phase of the Japan Sea

Jun Hosoi<sup>1</sup>, Kazuo Amano<sup>2</sup>

<sup>1</sup>Graduate School of Science and Engineering, Ibaraki University, Japan, <sup>2</sup>Department of Earth and Environmental Sciences, Ibaraki University, Japan

E-mail: 12nd404l@mcs.ibaraki.ac.jp

In northeast Japan, many basaltic volcanic rocks that formed during the opening of the Japan Sea in the Early Miocene are widely distributed. Most of basaltic rocks are found on the Japan Sea side of northeast Japan. They are thought to be related to back-arc rifting during the opening of the Japan Sea (Sato and Amano, 1991). Although the magma geneses of these basalts have been studied (Tsuchiya, 1988; Yagi et al. 2001), the precise location of the paleo-volcanic edifices and a detailed description of the type of volcanism is lacking. In this study, we identified the paleo-volcanic edifices and reconstructed the subaqueous volcanoes themselves based on detailed facies analysis of outcrops in the Dewa Mountains in Sakata, Yamagata Prefecture. The paleo-submarine volcanoes were found to be about several kilometers in diameter, over one hundred kilometers high and mainly composed of resedimented hyaloclastites including fluidal-clast breccias, with minor amounts of massive and pillow lavas. The rising velocity of the magma determines the intensity of the eruption if the tectonic setting and magma composition are same (Mangan and Cashman, 1996). We estimate that the hyaloclastites that make up the main part of these volcanoes were formed when the rising velocity of the magma was high, whereas, massive lavas and pillow lavas were formed when the rising velocity was low. The characteristics of the paleo-submarine volcanoes identified in this study are very similar to volcanic deposits formed by submarine fire fountains (Fujibayashi and Sakai, 2003; Head and Wilson, 2003; Simpson and McPhie, 2001). Many dikes that were feeders of these basaltic rocks intrude the study area. Since the palaeo-stress field during the eruption stage was tensional (Sato and Amano, 1991) the reconstructed submarine volcanoes probably formed by fissure eruptions during the opening of the Japan Sea.

### References

- Fujibayashi, N. and Sakai, U., 2003, Explosive Subaqueous Volcanism, AGU, 259-272.  
Head, J.M. and Wilson, L., 2003, Jour. Volcano. Geotherm. Res., 203, 155-193.  
Mangan, M.T. and Cashman, K.V., 1996, Jour. Volcano. Geotherm. Res., 73, 1-18.  
Sato, H. and Amano, K., 1991, Sedimentary Geology, 74, 323-343.  
Simpson, K. and McPhie, J., 2001, Jour. Volcano. Geotherm. Res., 109, 339-355.  
Tsuchiya, N., 1988, Jour. Geol. Soc. Japan, 94, 591-608.  
Yagi, M. et al., 2001, Jour. Japan. Assoc. Mineral. Petrol. Econ. Geol., 30, 265-287.