Internal structure of obsidian lavas in the south of Kamchatka Peninsula

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In the south of Kamchatka Peninsula (53.04N, 157.78E), obsidian lavas are exposed from north-northeast to south-southwest direction over 400 m. The cross-section of the obsidian lavas is divided into upper and lower parts. Each part is about 15 m thick. The internal structure of the upper part is divided into two parts: the top part is composed of rhyolite and the interior comprises alternating pumiceous and massive obsidian layers. The massive obsidian layers are classified into three layers (B, D, and E). On the other hand, the internal structure of the lower part consists of alternating pumiceous and obsidian layers. The obsidian layers are classified into at least three layers. Typical structure of obsidian lava is thought to consist of an outer obsidian region and an interior rhyolite region (Cas and Wright, 1987; Stevenson et al., 1994; Sano et al., 2015; Wada and Sano, 2015). In general, the rhyolite has perlitic cracks in the glass and contains some amounts of crystalline materials, namely, spherulite and lithophysae, whereas the obsidian contains none of such features and materials. In the study area, however, the internal structure of the obsidian lavas is complex and different from the typical structure.

The obsidian rock samples were collected from the three massive obsidian layers (B, D, and E) in the upper part and from one obsidian layer (F) in the lower part. We estimated glass compositions and water contents of the four obsidian samples (B, D, E, and F). The glass compositions of B, D, and E are divided into three regions according to FeO contents and that of F shows the intermediate compositions between D and E. Water contents in the four obsidian samples are following; 0.52-0.54 [wt.%] in E, 0.33-0.37 [wt.%] in F, 0.04-0.18 [wt.%] in B, and 0.04-0.10 [wt.%] in D. The four obsidian samples are different in the glass compositions and water contents. Thus these obsidian lavas may be formed from different magmas in chemical compositions and/or heterogeneous magmas in water contents (Seaman et al., 2009).

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