Eruption process of pyroclastic flows in Ikezuki Tuff

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Ikezuki Tuff (Onikobe-Ikezuki tephra), which was erupted during 0.2-0.3 Ma from Onikobe caldera, is a voluminous pyroclastic flow deposit with pumice fallouts, over 18 km^3 in volume. The distribution and stratigraphy of Ikezuki Tuff is well investigated in the eastern area from the source caldera. Pyrocalstic flow deposits consist of two parts, lower and upper parts, for the difference of degree of welding. The lower part, within 20 km from caldera, has flowed distance shorter than one of upper part. Because upper current flowed on the flat plane after lower flows buried all the topographical obstacles, this difference was caused (Sakaguchi and Yamada, 1988). On the other hand, the distribution of pyroclastic flow is restricted because the western area of Onikobe caldera is topographically high. Although outcrops of Ikezuki Tuff are reported in Mukaimachi and Shinjo basins (Yagi and Soda, 2002; Matsuura, 2003), the details are still not clear as compared with eastern area. In this report we investigate the distribution in Mukaimachi and Shinjo basins based on the field survey and the major compositions analysis of volcanic glass in pyroclasts by FE-SEM-EDS, and we discuss the eruption process at Ikezuki Tuff eruption.
As a result of glass composition analysis to all products collected from the type locality of Ikezuki Tuff in eastern area, glass type from their composition in pyroclastic flow deposits was divided into two groups. These two groups are corresponding to the two flow parts, lower part (K_2O-poor, FeO-rich) and upper part (K_2O-rich, FeO-poor), classified by lithofacies. Therefore the distribution of both parts in pyroclastic flows can be reconstructed by using glass compositions. The ditribution of pyroclastic flow in Mukaimachi basin is in contrast to one in Shinjo basin. At the northwestern area in Mukaimachi basin a thick welded tuff over 100 m in thickness forms the plateau by accumulating pyroclastic flows. At the northern area in the basin two thin (a few meters in thickness) pyroclastic deposits, which is Ikezuki Tuff and Shimoyamasato Tuff in ascending order, cover on the older terrace composed of the conglomerate. An elevation, where Ikezuki Tuff can be observed on the terrace, is same as a height of the top of pyroclastic plateau. In addition, all of pyroclastic flow deposits correlated into Ikezuki Tuff in Mukaimachi basin are lower part, and upper part is not observed in this basin. On the other hand all of pyroclastic flow deposits in Ikezuki Tuff within Shinjo basin is non-welding and under 60 m in thickness. From their glass compositions, both lower and upper parts in Ikezuki Tuff co-exist within Shinjo basin in contrast to Mukaimachi basin. The large quantity of upper part in Ikezuki Tuff has achieved to Shinjo basin. Although it is estimated that the pyroclastic flow initiating from Onikobe caldera has achieved to Shinjo area through Mukaimachi basin to avoid the topographical obstacle in northwest, upper part is not deposited within Mukaimachi basin. Such as the strathigraphy in eastern area from caldera, however, an upper part overlies thickly the lower part on the way to the pathway, when following flow pass through on the plateau formed by the precede flows. Therefore it is difficult to consider that upper part has flowed on the surface of plateau formed by lower part, given lack of upper part in Mukaimachi area. It is possible to explain the distribution of Ikezuki Tuff in western area if upper part passes through a channel carved in thick lower part pyroclastic flow deposit, not over the plateau in Mukaimachi area. Consideration to the existence of the large quantity of upper part in Shinjo basin, this channel needs to be deeper for passing without over the channel. This indicates that the transition from lower part activity to upper part one has a short quiescence to form deep channel, and eruption of Ikezuki Tuff was not continuous.

Keywords: Ikezuki Tuff, Onikobe Ikezuki tephra, Mukaimachi and Shinjo basins, Onikobe caldera

