

The history of volcanic eruption based on widespread tephra correlation at Pliocene and early Pleistocene in Japan

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The frequency and the scale of the large volcanic eruption in the Japanese Islands are one of the important problems in the forecast of the long-term geological features change. The restoration of the history of the large volcanic eruption in the late Pleistocene has been examined by the correlation with the pyroclastic flow deposit and the distal fine ash (For example, the Ito pyroclastic flow deposit and the comparison with the AT volcanic ash of 30ka: Machida, Arai, and 1974, etc). The eruption of VEI 6 was generated eight times and the VEI 7 was generated nine times for the past 125,000 years (Machida, Arai, and 2003). It is clarified that the extremely large volcanic eruption in the Japanese Islands is the frequency once about 7000-8000 year. However, an older age, the volcanic edifice and geographical features in the caldera etc. disappear, a lot of source volcano cannot be specified, and the evaluation at the scale and age of a volcanic eruption are difficult.

In tephrochronology, identification and the comparison of the tephra based on the chemical composition analysis of major element (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, P) of the volcanic glass from the 1990's. As a result, the comparison accuracy of an older pyroclastic flow deposit and the tephra in the remote place improves. The Ebs-Fukuda tephra (1.75Ma: Yoshikawa et al., 1996) and the Omn-Sk110 tephra (1.65Ma: Nagahashi, 1998), etc. were found. It has come to obtain information on the large volcanic eruption the widespread tephra correlation before early Pleistocene. Moreover, Kikkawa (1990) showed that trace element such as La, Ba, Sr, and Y was identified from the difference of the element characteristic even by the tephra to which the major elemental composition of the volcanic glass was similar. In addition, Mizuno (2001) showed that the source volcano area of the widespread tephra was definable to Chubu Sangaku, Kyushu, and Tohoku region from the element characteristic of a trace element of volcanic glass of the pyroclastic flow deposit to some degree. We do trace elemental chemical composition analyses of the volcanic glass of the index tephra in around 2000, and have been examining the comparison and tephrochronology of the index tephra of central Japan based on the characteristic. It has reported on a petrology feature, the eruption scale, the source and the age of the tephra about 36 widespread tephra layers of 5Ma-1Ma that did trace analyses.

Among 36 tephra layers, Tohoku type ($La/Y < 0.5$, $Ba/La > 30$) are eight tephra layers, i.e. the In1-B25 tephra (3.1Ma : Tamura et al., 2014), the TmgR4-HSC tephra (2Ma : Shimogama and Suzuki, 2006), the Kry1-HAS tephra (1.9Ma : Tamura et al., 2006), the Kd44-Nk tephra (1.9Ma : Nakayama and Suzuki, 2007 ; Tamura et al., 2008), the Kumado-Kd22Utephra (Murata and Suzuki, 2011), the Akai-Kd18 tephra(Murata and Suzuki, 2011), the Ashino-Kd8-CH13 tephra (1.3Ma : Murata and Suzuki, 2011 ; Tamura et al.) and the Ysm-CH3 tephra (1Ma : Tamura et al). It concentrates on 2Ma-1Ma. Tephra layers presumed to be a Kyushu origin are the Hbt1-MT2 tephra (2.8-2.9Ma: Tomita, Kurokawa, 1999), the Ass-Tmd2 tephra (2.6Ma : Tamura et al., 2008), the Skt-Kd16 tephra (1.4Ma: Mizuno, 2007), and the Ss-Pnk tephra (1.02Ma: Machida and Arai, 2003). As for the Trb1-Ya4 tephra (4.2Ma: Tamura and Yamazaki, 2004) and the Ksg-An77 tephra (4Ma: Tamura and Yamazaki, 2004) have the possibility of the Ryohaku mountain origin from the grain degree tendency to the tephra particle. Tephra layers of the Chubu Sangaku origin are 20 layers. The tephra of the Chubu Sangaku origin begins to appear because of Hgs-An129 tephra (Satoguchi and Nagahashi, 2012) of about 3.6Ma. Moreover, it concentrates between 3Ma-1.5Ma with 16 tephra.

The Tohoku origin tephra layers are concentrated on 2Ma-1Ma and the Chubu Sangaku origin tephra concentrates on 3Ma-1.5Ma.

Keywords: Widespread tephra correlation, Pliocene, early Pleistocene, History of volcanic eruption, Japanese Islands