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The Eruption Age of 31 Tephras Intercalated in the Late Pleistocene Sediments off Joetsu, Japan

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Introduction

The Age is necessary for the paleoenvironmental studies. The tephras spreaded and deposited in wide area by volcanic explosive eruption play the important role of the time marker in Japan (Machida and Arai 2003). In previous studies, B-Tm, K-Ah, To-H, As-K, NJ2, KsP, AT, B-J, SAN1, U-Ym, Aso-4 and Toya tephra were found in Japan Sea (Ikehara et al., 2004 etc.). Most of these tephras were found from the core extracted offshore in Japan Sea. On the other hand, since sedimentation rate is high in the near coast of Japan Sea, previous studies revealed environmental changes only since about 60,000 years ago. There is almost nothing that was established as a means to acquire the age value before 50,000 years ago. Therefore, it is very important to know the tephra stratigraphy before 50,000 years ago in Japan Sea and to presume the eruption age of tephras. Based on the distributions of each tephra in precedence research, many tephras will be found off Joetsu. This study asked for the eruption age of 95 tephras obtained from 9 core samples extracted in the Joetsu basin circumference region.

Study Area

The Joetsu basin which is located in the east of the Toyama trough has various geographical feature places such as Umitaka spur, Joetsu knoll, submarine canyon. Most core samples extracted there consist of muddy sediments. The core extracted at the lower part of a slope or a submarine canyon contains the slump sediments and the landslide sediments. When depositional environment is calm, TL layer peculiar to Japan Sea (Tada et al., 1999) is formed. Into such a core, tephra with a coarse size is inserted.

Methods

For each individual samples, mud was removed for the samples using sieve, and the remainder was placed inside the ultrasonic washing machine. Then, the mineral composition and volcanic glass shape was indicated using the microscope, and the chemical composition of volcanic glass was analyzed by SEM-EDS. Based on the feature of each tephra, tephra was correlated.

Results

95 samples were classified into 31 kinds, and 11 kinds of them were identified by the tephra the age is presumed to be by precedence researches. As-K(15-17.5ka; Machida and Arai 2003), AT(29.24ka; Kitagawa and Plicht 1998a), Spfa-1(42-44ka; Machida and Arai 2003), DKP(62ka; Nagahashi et al. 2007), On-Ng(85.1ka; Nagahashi et al. 2007), Aso-4(88ka; Oba 1991), On-Kt(94.9ka; Nagahashi et al. 2007), K-Tz(95.2ka; Nagahashi et al. 2007), On-Pm1(97.6ka; Nagahashi et al. 2007), SK(99.9ka; Nagahashi et al. 2007) and Toya(106ka; Shirai et al. 1997) were correlated. On the other hand, the eruption ages of 20 kinds of tephra were not clear. Then, we estimated the eruption ages on the assumption that depositional environment has been calm.

95 samples were classified into 31 different kind of tephras, and 11 of them were identified by the tephras whose ages have been established by precedence researches. Each eruption age of unknown tephras was estimated based on depth of those identified tephras. The 31 eruption age were inserted in sediment of Japan Sea after 120,000 years ago.

Acknowledgements

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Keywords: Tephra, Japan Sea, Chronology, Late Pleistocene, Eruption age, SEM-EDS