Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

ACG034-04 Room:102 Time:May 27 09:15-09:30

Oxygen isotope record of the stalagmites from Itoigawa and intensity of the Holocene Asian monsoon

Akihiro Kano[1*], Morio Takahashi[1], Kenji Kashiwagi[2]

[1]Kyushu University, [2]Toyama University

A stalagmite has been recognized valuable in terms of a paleoclimatic archive. Especially, oxygen isotopic records in stalagmites have provided information on short/long-term shifts in moisture source, temperature changes, and rainfall amount.

We analyzed two stalagmites (FG-01 and FG-02) collected from a cave, in Itoigawa city, SW Niigata Prefecture. Both have transparent appearance and a relatively straight growth center. U-Th dates were provided only for FG-01 and indicated that the uppermost 19.5 cm was deposited since 10.5 ka (thousands years ago). However, in terms of isotopic disequilibrium, FG-O1 is less suitable for the climatic archive than FG-02, for which The U-Th dates were not obtained yet. Then, the correlation based on the carbon isotope profiles provided the age model for FF-02 indicating that the uppermost 19.8 cm have been deposited since 8,500 year B.P.

The oxygen isotopic values of FG-02 change in a range from -7.6 to -10.0 permil. The relationship between the values of the uppermost sub-specimen and dripwater is nearly consistent with cave temperature. In terms of the isotopic trend, the oxygen profile was divided at 3.3 ka. The values mildly fluctuate from -8.3 to -9.2 permil in the lower part. Whereas the upper stalagmite records distinct trends consisting of decrease from -8.3 (3.3 ka) to -9.5 permil (2.0 ka), stable interval until 0.3 ka, and steep increasing to the present. This upper oxygen isotopic profile overall appears the opposite trend of the late Holocene records the Chinese caves, which have been considered reflecting intensity of the Asian Summer Monsoon (ASM). Oppositional trend likely resulted from the difference in dominant source and season of rainfall. As commonly in East Asia, it rains more in summer due to the ASM in south China. Whereas in Niigata Prefecture located in the Japan Sea climatic zone, it rains (and snow) more in winter than in summer. This unique rainfall seasonality is definitely the influence from the Asian Winter Monsoon (AWM) that is initially cold and dry wind in the continent, but becomes wet from moisture uptake from relatively warm water mass in the Japan Sea, and brings rain and snow to the Japan Sea side of Honshu and Hokkaido Islands. Therefore, the oxygen profile of FG-02 is unique in terms of a potential archive of the AWM intensity. This assumption is probably true, because the recent shift (from -9.0 to -7.6 permil) is consistent with the recent decreasing trend in the annual rainfall observed in Takada, ˜40 km NE from the cave. However, the lower part does not appear the oppositional trend with the Chinese records. In early-middle Holocene, rainfall pattern in Itoigawa might be different from the present seasonality and the oxygen isotopic value was substantially influenced by the summer rainfall fraction.

Keywords: Stalagminte, Holocene, Paleoclimate