

Heinrich events in a stalagmite record from central Mie, Japan

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Well-dated stalagmite KA03

Stalagmite records from Japanese caves based on U-Th dating have demonstrate latest Pleistocene-Holocene change in East Asian summer and winter monsoons [1-3]. Here, we present a new oxygen isotope record of well dated 10-cm-long stalagmite KA03 collected from Kiriana cave in central Mie Prefecture. This stalagmite has extremely high uranium concentration and provides accurate U-Th ages. Results of dating show that the stalagmite has been growing during the last 80 kyr almost continuously.

Oxygen isotopic profile and climatic events

The oxygen isotopic profile of KA03 generally follows the records from the Chinese caves [4] and Greenland ice-sheets [5] in terms of 1) drastic decrease at the B/A warming, and 2) high isotopic intervals corresponding to the Heinrich events. However, KA03 lacks the millennium changes of Dansgaard-Oeschger cycles, which have been reported in a stalagmite from Gifu Prefecture. A distinct feature of KA03 oxygen isotope is a linear increase from 37 ka to the Last Glacial Maximum (LGM).

Oxygen isotope of meteoric water collected near the cave shows a seasonal pattern (lower in summer) and an amount effect. Because the locality is generally dry in winter season, we can assume that the stalagmite oxygen isotope is a proxy of humidity in summer. the amount of rainfall had been decreasing gradually from 37 ka to LGM, and then sharply increased at the onset of B/A warming. During the Heinrich events, summer in central Mie Prefecture was relatively dry. The stalagmite KA03 is a novel and significant record of the East Asian summer monsoon.

[1] Shen *et al.* (2010) *Quatern. Sci. Rev.* **29**, 3327-3335. [2] Hori *et al.* (2013) *Chem. Geol.* **347**, 190-198. [3] Sone *et al.* (2013) *Quatern. Sci. Rev.* **75**, 150-160. [4] Wang *et al.* (2001) *Science*. **294**, 2345-2348. [5] Bond *et al.* (1993) *Nature*. **365**,143