Stalagmite growth and farming by Jomon Man in mid-Holocene

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Stalagmite study based on U-Th dating in my laboratory has represented new aspects on the Late Pleistocene-Holocene paleo-moisture in Japanese Islands. In turn, results of the U-Th dating imply that growth of many studied stalagmites slowed or stopped in 4000-6000 years ago although dripwater are still active on these stalagmites. This is clearly due to low Ca concentration of the dripwater, and only a few stalagmites are fed by enough Ca concentration for calcite precipitation. Thus, Ca concentration of dripwaters in Japan decreased in mid-Holocene.
Dripwater Ca concentration is primary controlled by pCO_2 at soil/limestone interface where limestone is dissolved. Then, temperature, moisture, and vegetation abundance are main factor for soil CO_2 produced by root respiration and microbial decomposition of organic matter. If the soil CO_2 in the limestone areas decreased in 4000-6000 years ago, at least one of the factors drastically changed at this period.
Considering relatively stable climate during Holocene, the most likely factor was declined vegetation. In addition, inferring from the age of 4000-6000 years ago, a fundamental cause was farming by Jomon Man that had expanded in Honshu in mid-Holocene. It is well known that they preferred to live in limestone areas because they could hide from rain. Their burnt farming may have destroyed thick forest vegetation and resulted in decreasing soil pCO_2 and dripwater Ca, and ultimately in the declined stalagmite growth. We have only little supporting evidence for this hypothesis, but the mid-Holocene peak of fine-grained charcoal in lake deposits implies active farming by Jomon Man. Further examination is required to study detailed charcoal-pollen occurrence in lake deposits, as well to perform radiocarbon dating for burnt wood from the Holocene archeological sites.

Keywords: stalagmite, Holocene, Jomon

