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鍾乳石の年代決定のための蛍光縞の観察とＵ－Ｔｈ年代結果の考察
Observation of fluorescent laminae structure in stalagmites for lamina counting and results of U-Th dating

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Stalagmites are recognized as a powerful tool to reconstruct paleoclimate. However, it is difficult to date stalagmites. Dating methods of stalagmites are mainly U-Th dating and laminae counting. U-Th dating sometimes shows stratigraphic inverted results, whereas laminae counting has a problem that we have little information about the annual laminae (for example, when and how they are formed? or what they look like?). In this study, I analyzed stalagmite samples collected at Taga Mine, Shiga Prefecture, Japan. I try to reveal the characteristics of laminae in stalagmites and investigate U-Th age.

Stalagmite samples have fluorescent laminae, which can be divided into three types: lamina A, lamina B and wavy lamina. Lamina A is normal type, lamina B is relatively ambiguous lamina and wavy lamina is of wavy shaped. According to FE-SEM image, both lamina A and wavy lamina consist of small particles (diameter is several 10˜100nm). Lamina B can not be observed by FE-SEM probably because particles smaller than 10nm can not be resolved due to polishing scratches. Wavy lamina has many gaps filled with mud. This indicates that wavy lamina is formed when mud covers the stalagmites and prevents calcite growing.

In previous researches, main component of fluorescent laminae may be fulvic acid. Thus the small particles of FE-SEM images may be fluvic acid. To confirm this, I use micro-Raman spectroscopy, micro-FT-IR, SEM-EDX. However, all analyses can not reveal what the small particles are, probably because the small particles are too small to analyze. The result of EPMA indicates that laminae A contains mud. However, the strength of laminae A is not proportional to that of Si and Al peaks, hence Si and Al are not Principal component of lamina A.

I dated stalagmite samples by U-Th dating and I got stratigraphic inverted results: the upper parts of stalagmites are older than the lower parts of them. I calculate the quantity of contamination substance in stalagmite which can influence the U-Th age. In consequence, the stratigraphic inverted results of U-Th dating are probably because of contaminations by mud. On the other hand, humic substances in stalagmites possibly influence U-Th dating.

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