# Origin of the gypsum flower in the Okgye Cave, Kangwondo, Korea

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## Abstract for poster presentation

Okgye Cave contains a variety of speleothems such as stalactite, soda straw, stalagmite, flowstone, cave corals, and draperies, etc. Most of the speleothems are composed of aragonite and/or calcite, however the cave flower composed of gypsum was discovered recently. This is the first report of the gypsum speleothem in the limestone caves of Korea. Okgye Cave has been developed by corrosion/erosion of groundwater along the joints and bedding planes of the Ordovician limestone (Seokbyeongsan Formation, Joseon Supergroup).

XRD analysis revealed that the gypsum flower is entirely composed of gypsum. and this speleothem are present only in the small part of the dry passage. The speleothem occurs on the surface of the fallen rocks or the walls as crusts, and sometimes it is included as wedge-shaped parallel to the bedding plane form within the fallen rocks.

The pH value of the meteoric water, stream water, and cave water ranges from 6.4 to 6.8, however, that of the stream and cave waters higher (7.7 ~ 8.1). The $\delta 34S$ of the dissolved $SO_4^{2-}$ in the cave water and meteoric water range from 3.5 to 5.8 ‰ (CDT). The $\delta 34S$ of the dissolved $SO_4^{2-}$ in the stream water show narrower range (4.4 ~ 4.5 ‰). The $\delta 34S$ values of the pyrite present in the surrounding limestone range from -13.5 to -2.9 ‰. Therefore, the $\delta 34S$ compositions of the gypsum flower (2.6 ~ 4.5 ‰) are more depleted than those of meteoric water and cave water, but more enriched than that of the pyrite. A simple mass balance suggests that most sulfur of the gypsum flower was supplied from meteoric water. Also the inverse relationship between dissolved sulfate and its $\delta 34S$ values support that the sulfur was mostly supplied from meteoric water.