



## **Magnetic minerals preserved in Chinese speleothem and their paleoclimate implication**

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Speleothems are attractive archives for reconstructing paleoclimate change for their high-resolution and continuous records. Advances in measurement sensitivity have made speleothems as viable archives of magnetic information, few researches had found the magnetic minerals preserved in stalagmite could record meaningful climate variations. Here, we collected 115 cubic samples from a 2.5-m-tall stalagmite (HS4) from Heshang Cave in central China for magnetic measurement. U-Th dating, combined with layer-counting, indicated that the stalagmite grew continuously over the last 9.0 ka. Low temperature behavior shows that the magnetic minerals in stalagmite HS4 are dominated by soil originated magnetite together with small and variable amount of goethite. The flux of soil originate magnetic minerals in stalagmite HS4 indicated by the soft components and the proportion of fine magnetic particle indicated by ARM/SIRM are both well consistent with the regional paleo-hydrological records, implying they are reliable precipitation indexes. The most possible mechanism is the strength of precipitation affects the energy of groundwater, and then controls the concentration and particle size of magnetic minerals which are transported by groundwater from soil and preserved in stalagmites. Furthermore, concentration of superparamagnetic (SP) minerals preserved in HS4 exhibits a 1500-years cycle with confidence level more than 99%, and the peaks of SP concentration are perfectly correspond to those of the North Atlantic's ice drifts happened at the past 9.0ka, indicating the magnetic minerals in speleothem can also respond the temperature variance induced by polar area.