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SEMINÁRIO DO DEPARTAMENTO DE GEOFÍSICA

Speleothem magnetism and soil's short term dynamics

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Doutorando do Depto. de Geofísica IAG/USP

Speleothem magnetism has experienced a revival in the last decade, mostly due to improvements in dating techniques and in the sensitivity of rock magnetometers. Presently, high-resolution magnetic screening of stalagmites down to decadal timescales is possible. Together with isotopic data, magnetic proxies have the potential to unveil the soil dynamics above the cave, which is intrinsically connected to changes in vegetation cover, precipitation, and soil thickness. But the main processes controlling the fluctuations in magnetic mineral content of stalagmites are still not fully understood. In this respect, we can benefit from systematic cave monitoring programs (monthly to trimester) that constrain geochemical, isotopic and physical parameters, including temperature, humidity, atmospheric CO_2 , precipitation, pH, dripwater $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ inside and outside the karst system and combine them with soil profiles above the cave to refine the comprehension of the mechanisms involved in iron-oxide formation and evolution at decadal to millennial timescales. We will report a case study in the Pau d'Alho cave stalagmite #6, Midwest Brazil that encompasses the past 1355 years with a mean growth rate of ~ 168 mm/ka. The main magnetic carriers in the stalagmite are magnetite and goethite with a nearly constant relative proportion. Joint interpretation of $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ data and magnetic data indicate that dry (wet) periods are marked by higher (lower) concentrations of magnetic minerals. Therefore, the concentration of magnetic minerals in the stalagmite is not controlled by precipitation alone. It is instead a result of soil dynamics above the cave. This study offers a new perspective for speleothem researchers for how rock magnetic techniques may be combined with isotope methods to arrive at a more nuanced paleoclimate reconstruction accounting for short-term variability in soil dynamics.

* Alunos com no mínimo 70% de presença nas palestras receberão um Certificado de Participação no final do ano.

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