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Geomagnetic Secular Variation record from a mid-latitude Brazilian speleothem: Preliminary results

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The magnetic study of speleothems is a new way to investigate the continuous record of the geomagnetic field. Recent improvements in magnetic instrumentation and analytical techniques provide the means to accurately measure the magnetic signal of the weakly magnetic speleothems and better characterize their magnetic mineralogy. At the same time, this material is suitable for high-precision U-Th dating and can also be easily correlated through stable isotopes. Continuous geomagnetic records in South America are rare, and the systematic paleomagnetic study of stalagmites could contribute significantly to improve the continent's database. As part of this effort, here we report preliminary magnetic results from a stalagmite located at 14.8°S, 56.4°W, in Mato Grosso State, (Brazil) with ages varying from 500 AD to 1900 AD. Magnetic properties, obtained with Magnetic Property Measurement System (MPMS) and Alternating Gradient Magnetometer (AGM), are very homogeneous throughout the stalagmite comprising partly oxidized PSD magnetite. Magnetic inclinations were obtained after stepwise alternating field (AF) demagnetization with a resolution of 0.5 cm (temporal resolution of ~30 yrs). Our preliminary results agree within error with models CALS3k.3 and SED3K for the well-defined 1700-1900 AD period. For older periods, when models are much less constrained, our data does not match CALS3k.3 and SED3K inclinations. The agreement between our data and the well-constrained recent sector of the model suggests the speleothem is likely recording the geomagnetic field throughout its whole extension. From these preliminary tests we expect the continental record from stalagmites to provide a more refined picture of the spatial and temporal variations of the magnetic field over South America. We are currently working in order to improve the age model of the speleothem through the comparison of its δ^{180} record with well-dated "sister" speleothems from the same cave.

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