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Stalagmite high resolution local paleoclimatic proxies for Late Holocene in Mesoamerica: Exploring role of moisture upon the development of Mesoamerican cultures.

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The relationship between climate change and culture development in Mesoamerica is complex to unravel since many written archives were destroyed during natural disasters and cultural conflicts such as Spanish conquest. Local paleoclimate records offer a way to reconstruct this relationship. Stalagmites are amongst the most reliable records of past climate variability, due to their evolution in closed-system conditions, ease of dating, and inclusion of several geochemical proxies (such as calcite oxygen and carbon isotopic composition, trace element concentration and/or elemental ratios, color and grey-tone scale). Recently, stalagmites have been used as records to explore the climatic change during Holocene and its cultural relation in Mediterranean, Asian, North American and east African cultures. Only few works were made, however, for Mesoamerican cultures. We study here a banded stalagmite belonging to Jalpan, Queretaro, central Mexico. This stalagmite was found actively growing, with its base dated at 6.85 +/- 0.3 Ka B.P. A high resolution LA-ICP-MS Mg/Ca analysis as well as grey tone analysis were obtained in order to create annual resolution time series. The proxies were correlated with local and north Atlantic paleoclimate records. Such proxies also show signals associated with volcanic eruptions (Tacana, el Chichon, Popocatepetl and Ceboruco) during the Classic period. Other signals are associated with Maya civilization collapse. These results portray the relationship between the agricultural and population patterns with moisture variability for the center of Mexico (Teotihuacan influence zone) during late Formative and Classic period. Finally, we observe patterns such as the corresponding to the little ice age and the anthropogenic climate warming, the latter correlated with local precipitation data.