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## Stalagmite geochemical proxy-inferred precipitation records over the past 800 years in northern Italy

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We here present new <sup>230</sup>Th-dated stalagmite multi-proxy records from Toirano cave (44° N, 8° E), northern Italy, characterized by a semi-arid Mediterranean climate with humid winters and dry summers. Eleven U-Th ages was used to build the regional hydroclimate evolution over the past 800 years. Sr/Ca and Ba/Ca records show a similar pattern with an increasing trend at the end of Medieval Warm Period (MWP; 950-1250 C.E.) and a decreasing trend at the inception of Little Ice Age (LIA; 1300 to 1800 C.E). The temperature effect on the Sr partition coefficient in calcite is negligible and no significant influence of deposition rate on Sr/Ca and Ba/Ca is observed. The high degree of co-variation between the two records ( $r = 0.91$ ;  $n = 212$ ) suggest the variation should be mainly governed by prior calcite precipitation (PCP). Dry conditions lead to a longer water residence time in the epikarst, enhanced CO<sub>2</sub> degassing and decreasing drip rate, resulting in high Sr/Ca and Ba/Ca ratios due to the preferential removal of Ca during PCP. Our results suggest a dry period during the transition of MCA and LIA in our region.