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Snapshots of Ireland's Holocene climate and fauna from stalagmites

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Stalagmites are well-known as paleoclimatic archives, but recent work [e.g., 1,2] has also demonstrated their paleobiological potential as archives of ancient animal and plant DNA. Because of this property, stalagmites have the potential to provide information on how past climatic fluctuations have impacted land fauna, specifically cave fauna of which bats are key ecosystem services providers. The aim of this work is to use stalagmites to gain precisely such knowledge. With this endeavour, we acquired geochemical data (Sr/Ca, $\delta^{18}\text{O}$, $\delta^{13}\text{C}$) along the growth axis of three early Holocene stalagmites from Ireland, which we used for climatic and environmental reconstruction. In addition, we acquired ancient DNA data in stalagmite laminae, including those where climatic and environmental shifts were observed. Results of these analyses are presented here and include new U-Th-dated stable isotopic curves and ancient DNA data chronologically anchored to stalagmite-derived climatic records. We also discuss our analytical workflow and the pros and cons we faced while combining geological and biological data on stalagmites such as data acquisition resolution, stalagmite chemistry, and DNA data quality.

[1] Stahlschmidt et al. (2019) *Scientific Reports*, 9, 6628. [2] Marchesini et al. (2023) *Quaternary Research*, 112, 180-188