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Palaeoclimate evolution over the last 10,000 years in Caumont cave in Normandy, France

Ingrid Bejarano Arias[1], Carole Nehme[1], Sebastian F.M. Breitenbach[2], Isabelle Couchoud[3], Edwige Pons-Branchu[4], James Baldini[5], and Damase Mouralis[1]

[1]UMR 6266 IDEES, University of Rouen Normandy / CNRS, Mont St-Aignan, France
[2]Department of Geography and Environmental Sciences, Northumbria University, Newcastle upon Tyne, United Kingdom
[3]Environnements, Dynamiques et Territoires de la Montagne, UMR 5204 CNRS, Universite ́ de Savoie, Bourget-du-Lac, France
[4]Laboratoire des Sciences du Climat et de l'Environnement, LSCE/IPSL, CEA-CNRS-UVSQ, Université Paris-Saclay, Gif-sur-Yvette, France
[5]Department of Earth Sciences, Durham University, Durham, United Kingdom

Speleothem-based palaeoclimate studies proliferate globally, but some regions remain poorly covered, including NW France. The cave and quarry system of Caumont, Normandy, develops in chalk limestone and contains speleothem formations that cover the Holocene. A new study on a recent stalagmite from the quarry (the last ca. 100 years) and detailed cave monitoring show that in this system speleothems form under near-equilibrium isotopic conditions (Bejarano et al. 2024). Monitoring shows that the $\delta^{13}C$ signal in speleothems reflects summer prior carbonate precipitation as a response to infiltration dynamics while speleothem $\delta^{18}O$ is mostly a signal of precipitation composition (with a bias towards winter). Thus, detailed study of stalagmite isotope records seems promising for the reconstruction of Holocene climate change in Normandy.

Here, we focus on 5 stalagmites collected from the Robots stream (SW) and La Jacqueline passages in the natural conduits of Caumont cave. All samples have been U-Th dated, yielding an age range of 10 to 0.3 ka for the two stalagmites from Robots stream, and 7 to 3 ka for the three stalagmites from La Jacqueline. We find several hiatuses and growth changes in the tested samples. All 5 stalagmites were sampled for stable isotopes (SI, $\delta^{18}O$ and $\delta^{13}C$). In addition, and from one stalagmite from Robots was analysed for trace elements using laser ablation. We complement the SI and trace element data and discuss the evolution of the stalagmites growing periods and hiatuses for the last 10 ka. The stable isotope records reflect variations in palaeoclimate conditions that follow global patterns such as, increasing humid conditions during the Holocene optimum. The carbon isotope profile indicates drier conditions during early Holocene and wetter conditions between 8 and 5 ka. The oxygen isotope record also suggests more rain/snow infiltration during the mid-Holocene, with more negative values than in the early Holocene. These inferred changes are corroborated by Sr, Ba, Mg and Ca. We compare the new multi-proxy dataset with independent local studies and speleothem reconstructions from NW Europe to contextualise

climate dynamics in Normandy within the broader Holocene development in Central Europe.