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Reconstructing Past Climate Using Speleothems from Cueva de las Perlas, Northern Spain.

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Abrupt and severe oscillations in climate, termed Heinrich events, are documented in North Atlantic Ocean sediments between 85,000 – 30,000 years ago [1]. This time period also encapsulates the Neanderthal demise, a key transition in human evolution which is proposed to be driven at least in part by changing climate. The Iberian Peninsula represents the last known refuge of the Neanderthals. However, due to a scarcity of palaeoclimate archives from Iberia during this time period, the expression of these cooling events in the terrestrial realm remains poorly understood. As the extinction of the Neanderthal population seems to broadly coincide with the timing of Heinrich event 4, it is therefore critical to understand the terrestrial expression of these changes in ocean circulation. Speleothems from Cueva de las Perlas, northern Spain are being used to reconstruct past climatic and environmental change spanning this period of Neanderthal demise. U-Th dating has identified three suitable speleothems, allowing a precise chronology to be established. Through contemporary monitoring, the oxygen isotope composition of speleothem carbonate has been interpreted to carry a primary environmental signal of rainfall amount. The oxygen isotope values indicate a drying climate across the period of the Neanderthal population demise. Additionally, the carbon isotope record, interpreted to represent shifts in vegetation dynamics, indicates an overall drying during the studied time period. A high degree of climatic instability is superimposed on the overall drying trend, suggesting the prevailing climatic conditions could have been adding environmental pressure to an already marginalised hominin population. Further U-Th dating and high-resolution stable isotope analysis aims to constrain the magnitude and timing of these events.

[1] Bond, G., Broecker, W., Johnsen, S.J., McManus, J., Labeyrie, L., Jouzel, J., Bonani, G., 1993. Correlations between North Atlantic sediments and Greenland ice. Nature 365, 143-147.