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| **DEPARTMENT**  | **Geography** |  |
| Supervisors | Supervisor 1 | Ian Candy |
| Supervisor 2 | Celia Martin-Puertas |
| Supervisor 3 |  |
| Supervisor 4 |  |
| Your Project ID | n/a |  |
| Funding Status | Competition Funded Project |  |
| Application Deadline | 19/06/2023 | Or applications accepted all year round | n/a |
| Project Title | Early Warning Signs of Abrupt Climate Change: Annual-scale isotopic analysis of Holocene climate events |
| Project Description (Max 700 words) | There is increasing concern that as the world warms the climate system may move across a series of thresholds and tipping points and experience abrupt change. There is also an increasing awareness that early warning signs of these changes may occur in the form of changes in variance in climate variability. Testing these important concepts is difficult because although abundant abrupt climate events have occurred in the Holocene and Pleistocene it is rare that these events are preserved in archives that have the chronology, resolution or proxy sensitivity to test changes in climate variance prior to, during and after these events. This project aims to test these ideas by carrying out annual scale oxygen and carbon analysis of carbonate varves (annual laminations in lake sediments) from a sequence in eastern England (Diss Mere) that records clear evidence for the major abrupt events that are known to have occurred during the Holocene (those occurring at 8,200, 4,200 and 2,800 yrs BP). The existing chronology allows annual change to be tied to an absolute timescale and patterns of changing variance to be quantified. Diss Mere is ideally suited to this work as, being situated on the seaboard of the Northeastern Atlantic, it is highly sensitive to changes in surface and deep ocean circulation, changes in the operation of which are often cited as drivers of abrupt change. The project will involve training in the sampling, analysis and interpretation of carbonate sediments and stable isotopic data along with quantified time-series analysis. The project will also require the comparison of the results of this data analysis with the outputs of climate models to understand the mechanistic link between climate/ocean forcing and proxy response/ |
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| Funding Notes - (Max 100 words) – Optional See below |  |
| References – Optional see below | Brovkin, V., Brook, E., Williams, J.W., Bathiany, S., Lenton, T.M., Barton, M., DeConto, R.M., Donges, J.F., Ganopolski, A., McManus, J. and Praetorius, S., 2021. Past abrupt changes, tipping points and cascading impacts in the Earth system. *Nature Geoscience*, *14*(8), pp.550-558.Martin-Puertas, C., Walsh, A.A., Blockley, S.P., Harding, P., Biddulph, G.E., Palmer, A., Ramisch, A. and Brauer, A., 2021. The first Holocene varve chronology for the UK: Based on the integration of varve counting, radiocarbon dating and tephrostratigraphy from Diss Mere (UK). *Quaternary Geochronology*, *61*, p.101134. |
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| Application link |  |
| REF2021 Results | Link | [REF 2021: Geography and environmental studies | Times Higher Education (THE)](https://www.timeshighereducation.com/news/ref-2021-geography-and-environmental-studies) |