David Hodell
Woodwardian Professor of Geology
Director - Godwin Laboratory for Palaeoclimate Research
Fellow - Clare College
University of Cambridge

Triple oxygen and hydrogen isotopes of gypsum hydration water: A resurrected proxy of hydrologic change

Many minerals incorporate water directly into their structure as molecular water (H_2O) or hydroxyl (OH). The oxygen (^{16}O,^{17}O,^{18}O) and hydrogen (H,D) isotopes of hydrated minerals are a potentially rich source of information about the environmental conditions under which hydrated minerals form and/or interact with fluids after deposition. As part of a 5-year European Research Council project, my group has been developing the use of triple oxygen and hydrogen isotopes of structural water contained in hydrated minerals as a paleoclimate proxy. We are pioneering new methods for measuring $d^{18}O$, $d^{17}O$ and dD in hydrated minerals by combining thermal gravimetric analysis and cavity ring-down laser spectroscopy. I will specifically discuss the merits and uncertainties in combining measurements of $d^{18}O$ of biogenic carbonates and triple oxygen and hydrogen isotopes of hydration water in gypsum ($CaSO_4 \cdot H_2O$) in lake sediments cores to estimate past changes in temperature, rainfall and relative humidity on the Yucatan Peninsula, Mexico.