Study discovers link between climate change and ocean currents over six million years

June 12 2014

Research vessel (RV) JOIDES Resolution. Credit: IODP/TAMU

Scientists have discovered a relationship between climate change and ocean currents over the past six million years after analysing an area of the Atlantic near the Strait of Gibraltar, according to research published today in the journal *Science*.

An expedition of scientists, jointly led by Dr Javier Hernandez-Molina, from the Department of Earth Sciences at Royal Holloway, University of London, examined core samples from the seabed off the coast of Spain and Portugal which provided proof of shifts of climate change over millions of years.

The team also discovered new evidence of a deep-earth tectonic pulse in the region, as well as thick layers of sand within mountains of mud in a vast sheet, spreading out nearly 100km into the Atlantic from the Gibraltar gateway. The quantity of sand is far more than was expected and has been caused by the strength, speed and long duration of bottom currents flowing through the Strait of Gibraltar from the Mediterranean.

"The sediments we examined show various shifts of climate change over millions of years", Dr Hernandez-Molina said. "In addition, our findings could herald a significant shift in future targets for oil and gas exploration in deep-water settings. The thickness, extent and properties of these sands make them an ideal target in places where they are buried deep enough to allow for the trapping of hydrocarbons. The sand is especially clean and well sorted and therefore very porous and permeable."

The expedition, carrying an international team of 35 scientists from 14 countries, recovered 5km of core samples from an area along the Gulf of Cadiz and west of Portugal.

This image depicts the research vessel JOIDES Resolution arriving Lisbon after the IODP Expedition 339. Credit: Prof. F. Barriga

The research found that a powerful cascade of Mediterranean water spilling into the Atlantic was scouring the rocky seafloor, carving deep-sea channels and building up mountains of mud. This is due to Mediterranean water being saltier than the Atlantic and therefore denser, causing it to plunge downwards.

Dr Hernandez-Molina added: "We set out to understand how the Strait of Gibraltar acted first as a barrier and then a gateway over the past six million years. The fascinating results we came back with have hugely increased our understanding of the Mediterranean Outflow Water (MOW) that flows through the Gibraltar gateway and have led to some key discoveries about the relationship between climatic shifts, deep-water circulation and plate tectonic events over a huge timescale."

More information: "Onset of Mediterranean Outflow into the North Atlantic" *Science*: www.sciencemag.org/lookup/doi/ … 1126/science.1251306

Provided by Royal Holloway, University of London