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PhD project: Palaeoclimate variability in the tropical Indian Ocean during glacial and interglacial periods

Supervisors: Dr. Gianluca Marino (Universidade de Vigo)  
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Summary: The PhD project addresses the need for compelling, quantitative, proxy-based reconstructions of the seasonal/interannual climate variability in the tropical Indian Ocean during different climate states. It centres on the Indian Ocean because ongoing surface warming of its tropical sector is progressing faster than in any other ocean basin, while preliminary evidence shows that changing climate state the underlying climate “state” can impact the nature and amplitude of its short-term variability. These observations call for an in-depth analysis of the relationship between climate states and variability, by exploiting the recurring glacial and interglacial states archived in the palaeoclimate record of the last 500,000 years. Analytically, this PhD project will employ a full suite of traditional and novel geochemical techniques in planktic foraminifera that allow deciphering both climate variability and the underlying climate change. Results will undergo a rigorous statistical assessment to quantitatively evaluate the various sources of uncertainties inherent in the proxy-based reconstructions and quantitatively characterise the amplitude and mode of climate variability in the tropical Indian Ocean in relation to the mean state of regional and global climate. Results will deliver a documentation of the seasonal/interannual climate variability of the tropical Indian Ocean under boundary conditions both colder and warmer than pre-industrial, including politically agreed global warming targets 1.5°C to 2°C warmer than pre-industrial.

