

# IODP<sup>3</sup> Expedition 505S – ENIGMA: Exploration into a Global Early Miocene Anomaly

**Co-Chief Scientists: Adam Woodhouse (Cardiff University, UK), Jennifer Kasbohm (Carnegie Institution for Science, USA)**

## Abstract

The Miocene Epoch (23.03–5.33 Ma) was a pivotal period of climate and biosphere evolution, yet the early Miocene (23–17 Ma) remains poorly understood due to a scarcity of high-resolution records. Recent studies suggest that around 19 Ma, a major but enigmatic biotic and environmental shift occurred, marked by significant declines in shark diversity, restructuring of marine vertebrate communities, and widespread planktonic and benthic ecosystem changes across trophic levels. These shifts coincided with geochemical anomalies, including a contraction of tropical oxygen-deficient zones, disruptions in primary productivity, and isotopic signals indicative of climate perturbations. The underlying mechanisms driving these changes remain unclear, as do their broader implications for oceanic ecosystem evolution as a whole. The ENIGMA project aims to resolve the causes and consequences of this early Miocene anomaly by analyzing comprehensive marine sediment records. By integrating micropaleontological, geochemical, and sedimentological data from legacy scientific ocean drilling cores, we will assess how paleoceanographic changes influenced primary productivity, nutrient cycling, and marine biodiversity. A focus on complete early Miocene sequences, particularly in the Atlantic sector, will provide a basin-wide perspective on these transformations. Our findings will enhance understanding of the early Miocene's role in shaping the modern ocean system and contribute critical insights into ecosystem resilience and climate change dynamics over geological timescales.

To help the IODP<sup>3</sup> Science Office provide the best possible support to scientists interested in joining this expedition, we invite potential applicants to complete our **Expression of Interest (Eoi)** form.

☆☆☆ [CLICK HERE](#) ☆☆☆

Submission of an expression of interest is entirely optional and does not commit you to applying. Likewise, not submitting an Eoi will not affect the evaluation of any future application.

However, we strongly encourage completion — it takes **less than two minutes** and will help us support you more effectively if you decide to apply.