IODP Proposal Cover Sheet

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Tore Seamount Paleoenvironment

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Title	DRILLING THE TORE SEAMOUNT - ARCHIVE OF A NATURAL OCEANIC SEDIMENT-TRAP
Proponents	Susana Lebreiro, Silvia Nave, Laura Antón, Catherine Kissel, Claire Waelbroeck, Nick McCave, Francisca Martinez-Ruiz, Cristina Roque, Luke Skinner, Pedro Terrinha, Guy Cornen, Abel Flores, Elisabeth Michel, Belén Martrat, Francisco Sierro, David Hodell, Alex Pietrowski
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Area	Tore seamount

Proponent Information

Proponent	Susana Lebreiro
Affiliation	Geological Survey of Spain
Country	Spain

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Abstract

The Tore Seamount is a peculiar morpho-structure integrated in a cluster of seamounts connected to the northern end of the Madeira-Tore Rise. It shows a NE-SW elongated elliptic depression of about 120 km long, 90 km wide, and 5.5 km deep, surrounded by coalescent seamounts, constituting a natural sediment trap representative of the North-Atlantic subtropical gyre productivity, amid a semi-isolated environment for deep-water circulation, and an open ocean environment for the dynamics of downslope processes. Thus, the singularity of the Tore seamount combines a) a giant sediment trap for vertical fluxes, b) a natural laboratory to examine carbonate dissolution at ~5 km depth with restricted bottom-water circulation, and c) a deep, open ocean setting to test sediment processes distant from continental margins.

We propose to drill one site on the Tore seamount basin that will provide a reference sediment section from ~5,5 km depth of: 1) North-Atlantic subtropical gyre productivity; 2) North-Atlantic deep-water hydrography during past glacials at the Iberian latitude, without AABW influence; and 3) A unique record of turbidite frequency in the deep, open ocean.

This material will allow 1) to question about the supply of nutrients in oligotrophic zones, 2) to investigate the role of past ocean circulation changes in oxygenating the ocean interior, and sequestering CO2, often hampered by an inability to isolate contributions from different convection centers and water masses, especially in the deep Atlantic - by isolating the evolution of North Atlantic 'end-member' hydrography, we will be able to shed new light on the character and impacts of biogeochemical and physical changes originating in the North Atlantic basin, or 3) to approach the mechanisms, and causes, triggering turbidity currents in the pure deep open ocean, far from paradigmatic effects of sea-level changes or deep currents.

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Scientific Objectives

Recovery of a Quaternary sequence in the Tore seamount interior basin will provide the material needed to:
1: Assess ocean productivity of the subtropical NE Atlantic gyre, at times of most rapid CO2 changes (G/I transitions), and millennial timescales.
2: Examine the limited exchange of NE Atlantic deep (NADW) and Antarctic Bottom Waters (AABW) into the Tore.
3:Test the link between climate and glacioeustatic sea level (ice volume) changes and the frequency of turbidity currents in the open deep-ocean.

Non-standard measurements technology needed to achieve the proposed scientific objectives

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Proposed Sites (Total proposed sites: 1; pri: 1; alt: 0; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
TORE-01A (Primary)	39.4098 -12.7597	5486	176	0	176	Objetive 1: Assess ocean productivity of the subtropical NE Atlantic gyre, at times of most rapid CO2 changes (G/I transitions), and millennial timescales. Objetive 2: Examine the limited exchange of NE Atlantic deep (NADW) and Antarctic Bottom Waters (AABW) into the Tore. Objetive 3:Test the link between climate and glacioeustatic sea level (ice volume) changes and the frequency of turbidity currents in the open deep-ocean.