

# IODP Proposal Cover Sheet

801 - Pre

Brazil Argentina Margin

Title	Brazil Argentina Margin, Black Shales and Microbiology
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Keywords	Brazil, Argentina, black shales, microbiology	Area	western South Atlantic
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## Abstract:

We propose a unique joint microbiology/paleoceanography expedition that will access Mesozoic and Paleogene age sediments following a north-south transect of the Brazilian and Argentine Margins. This drilling area is of great paleoceanographic interest because it contains record of the opening of the South Atlantic Ocean basin, important geologic events such as Cretaceous Oceanic Anoxic Events and the opening of oceanic gateways during intervals of extreme global warmth. The area is also of interest for subsurface microbiology for two broad reasons. First, subsurface microbiology of the South Atlantic is presently unexplored, and second, deeply-buried organic-rich horizons may fuel a unique subsurface habitat. Organic rich margins have previously been shown to contain abundant subsurface Archaea, and recent results have suggested that archaeal signatures are correlated to total organic carbon content of sediments. However, this result is under scrutiny and new methods are available to use for the examination of new areas of seafloor. The Eastern Margin of South America has been relatively underexplored in the Ocean Drilling Era and has yet to be revisited during the ODP-IODP programs. We propose four sites, 2 new sites in the Argentine Basin and Margin and reoccupations of successful DSDP Sites in the Brazil Basin and Sao Paulo Plateau. In a departure from standard IODP practice we propose that each site be quadruple cored to ensure recovery sufficient for a complete stratigraphy and extensive sampling for microbiology. This proposal addresses Climate and Ocean Change and Biosphere Frontiers of the 2013-2023 IODP Science Plan.

### Scientific Objectives

- 1) Determine whether subsurface life is active or preserved through lipid, molecular and activity studies.
- 2) Understand the usage of carbon by subsurface microbial communities, including organic rich layers of shale to understand how burial and usage coexist and if breakdown of shale influences the deep biosphere
- 3) Enhance the understanding of the mechanisms and biogeochemical impacts of Oceanic Anoxic Events and deposition of organic matter-rich black shales.
- 4) Reconstruct the evolution of the incipient South Atlantic basin from the perspective of the Brazil and Argentina margins.

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

### Proposed Sites

Site Name	Position	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
BAM-2A	-40.088' E, -28.287' N	4500	1000	10	1010	Recovery of organic-rich mid-to-late Cretaceous sediments (Coniacian, Cenomanian-Turonian OAE 2, Albian and potentially Aptian OAE 1a) and an expanded Paleocene-Eocene intervals of climatic change. Cenozoic intervals of time north of the Brazil-Malvinas Confluence.
BAM-3A	-56.50' E, -44.50' N	5100	1500		1500	Goals include: recovery of organic-rich mid-to-late Cretaceous sediments, Paleogene intervals of extreme warmth and recovery of late Eocene to recent sediment drift deposits associated with the initiation of bottom currents and initiation of Antarctic glaciation, Cenozoic intervals of time south of the Brazil-Malvinas Confluence.
BAM-4A	-58.50' E, -43.33' N	1500	1500		1500	Goals include: recovery of organic-rich mid-to-late Cretaceous sediments, Paleogene intervals of extreme warmth and recovery of late Eocene to recent sediment drift deposits associated with the initiation of bottom currents and initiation of Antarctic glaciation, Cenozoic intervals of time south of the

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BAM-1A	-36.50136' E, -26.2386' N	4265	1200		1200	Recovery of clay rich Paleogene and organic-rich Cretaceous sediments to the Cenomanian.