

# IODP Proposal Cover Sheet

929 - Full

Blake Nose Subseafloor Life

Received for: 2018-04-02

Title	Blake Nose Drilling: Effects on Subseafloor Life of a Major Lithologic Unconformity and Past Oceanic Events		
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Keywords	subseafloor life, unconformity, PETM, OAEs	Area	Western North Atlantic (Blake Nose)

## Proponent Information

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## Abstract

We propose a 60-day drilling expedition focused on the Blake Nose. Here, a near-seafloor unconformable contact between Holocene/Pleistocene carbonate ooze and Eocene carbonate ooze will allow us to test the extent to which subseafloor microorganisms vertically migrate through sediment. It will also allow us to determine how diffusion of chemicals between the present ocean and ancient sediment across an unconformable contact affects present habitability and communities in the ancient sediment. Finally, these sites provide a great opportunity to test the influence of past major oceanic events on extant subseafloor communities. Previous drilling expeditions (DSDP Leg 44 and ODP Leg 171B) recovered and studied detailed sedimentary records of some of the most significant oceanic events of the past 113 million years, including the Paleocene/Eocene Thermal Maximum (PETM), the Cretaceous/Paleogene impact event, and Cretaceous Oceanic Anoxic Events (OAEs) 1b, 1d and 2.

## Scientific Objectives

1. To determine the extent to which seafloor microbes vertically migrate through sediment.
2. To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.
3. To test the influence of major ocean historical events on extant seafloor communities and their metabolic activities.

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

measurement of potential sulfate reduction rates using  $^{35}\text{S}$ , optodes to measure dissolved  $\text{O}_2$  and dissolved  $\text{Fe}^{2+}$ , bench-top CAS freezers, and instruments for shipboard measurement of dissolved inorganic carbon and nitrate.

## Proposed Sites (Total proposed sites: 8; pri: 4; alt: 4; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
BN-01A (Primary)	30.1424 -76.1122	2656	210	0	210	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> <li>To test the influence of major ocean historical events (K/Pg impact, OAE 1b) on present-day subseafloor communities.</li> </ol>
BN-02A (Primary)	30.1000 -76.2350	2300	610	0	610	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> <li>To test the influence of major ocean historical events (OAE 2 and OAE 1d) on present-day subseafloor communities.</li> </ol>
BN-03A (Primary)	30.0529 -76.3576	1983	650	0	650	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> <li>To test the influence of major ocean historical events (PETM) on present-day subseafloor communities.</li> </ol>
BN-04A (Primary)	30.7595 -74.4665	3481	175	0	175	<p>Comparison to Blake Nose sites:</p> <ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> </ol>
BN-05A (Alternate)	29.9105 -76.1780	2601	350	0	350	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> </ol>
BN-06A (Alternate)	29.9923 -76.5236	1630	200	0	200	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> </ol>
BN-07A (Alternate)	29.8858 -76.7441	2424	330	0	330	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> </ol>
BN-08A (Alternate)	29.9515 -76.6266	1344	700	0	700	<ol style="list-style-type: none"> <li>To determine the extent to which subseafloor microbes vertically migrate through sediment.</li> <li>To discover how chemical diffusion across a major unconformity affects microbial communities in ancient sediment.</li> <li>To test the influence of major ocean historical events (OAE 1d) on present-day subseafloor communities.</li> </ol>