IODP Proposal Cover Sheet

☐ **New** ☐ **Revised** ☐ **Addendum**

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Title:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England		
Proponent(s):	M. Person, B. Dugan, R. Evans, D. Lizarralde, D. Hutchinson, H. Kooi, J.K. Groen, B. van Breukelen, W.F.M Röling, J. McIntosh, P. Sauer, K. Licht		
Keywords: *(5 or less)*	Pleistocene, Hydrogeology, Submarine Groundwater Discharge	Area:	New England Continental Shelf

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Permission to post abstract on IODP Web site: ■ Yes ☐ No

Abstract: (*400 words or less)*

In many coastal settings worldwide, the distribution of freshwater within continental shelf sediments is far out of equilibrium with modern sea-level. One of the most remarkable examples is found on the Atlantic continental shelf off New England where groundwater within shallow Pliocene-Pleistocene sand aquifers over 100 km offshore has low salinity (3000 mg/l or less). On Nantucket Island, a 514m deep borehole penetrating the entire Cretaceous-Tertiary sedimentary package shows considerable variations in salinity with extremely fresh (<1000 mg/l) water in sand aquifers, higher salinity (30-70% of seawater) in thick clay/silt layers, and intermediate-to-low salinity in thin confining units. IODP Exp. 313 also showed abrupt freshwater-saltwater boundaries linked to lithology. This demonstrates the disequilibrium nature of such systems; diffusion tends to eliminate such patterns. Pore fluid within Pleistocene to upper Cretaceous sands beneath Nantucket Island is also found to be modestly overpressured, ~4m relative to the local water table.

We hypothesize that the rapid incursion of freshwater on the continental shelf in New England could have been caused by one or more of the following mechanisms: (1) meteoric recharge during Pleistocene sea-level lowstands including vertical infiltration of freshwater associated with local flow cells on the shelf; (2) sub-ice-sheet recharge during the last glacial maximum; and (3) recharge from pro-glacial lakes. We further hypothesize that the overpressures could be due to: (1) Pleistocene sediment loading; or (2) fluid density differences associated with emplacement of a thick freshwater lens over saltwater (analogous to excess pressures in the gas legs of petroleum reservoirs). We argue these different recharge mechanisms and overpressure models can be distinguished through drilling, coring, logging, and fluid sampling. Noble gas and environmental isotope data will be necessary to completely evaluate recharge models.

This work will extend our understanding of the current and past states of fluid composition, pressure, and temperature in continental shelf environments. It will help better constrain rates, directions, and mechanisms of groundwater flow and chemical fluxes in continental shelf systems. It will contribute to the development of new tools for measuring freshwater resources in marine environments. The apparent transient nature of continental shelf salinity patterns could have important implications for microbial processes and long-term fluxes of carbon, nitrogen, and other nutrients to the ocean. Successful drilling will test process-based models for shelf freshwater off New England. These models can then be applied to other shelf freshwater systems around the world.

Scientific Objectives: (*250 words or less*)

We argue that targeted drilling and coring including hydrogeochemical, microbiological, isotopic, and noble gas analysis and measurement of hydraulic properties and fluid pressures will permit us to develop a process-based understanding for the origin and volumes of offshore freshwater, how these fluids could influence local and global biogeochemical cycles, and how they record climate cycles.

We propose a four site, shallow-water drilling campaign on the Atlantic continental shelf off Martha's Vineyard, MA, USA to test our hypotheses and map the distribution of freshwater resources. Our transect takes advantage of existing boreholes on Martha's Vineyard (ENW-05) and Nantucket (6001) and builds on previous AMCOR and IODP analyses. Our transect will provide samples from the freshwater, freshwater-saltwater transition, and saltwater zones allowing complete characterization of the system. Based on paleohydrologic reconstructions, we have a 2D model of the freshwater distribution and predict the freshwater-saltwater transition is approximately 50km offshore. Drilling will directly test this model and provide additional constraints for future 3D transport models.

Our planned drilling campaign will require one MSP. We propose a drilling program similar to IODP Exp. 313 to increase recovery in unconsolidated sand units and a casing/screening program to facilitate collection of pristine pore fluid samples for geochemical and microbiological analyses. Post-expedition numerical models will include simulation of groundwater residence time and noble gas transport for comparison with field measurements. This highly interdisciplinary work will be one of the first focused hydrogeological-biogeochemical-microbiological studies of shelf systems.

Please describe below any non-standard measurements technology needed to achieve the proposed scientific objectives.

LWD, well tests in cased/screened sites, collection of noble gas samples

Proposed Sites:

Site Name	Position	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
MV-01B (Alternate)	41.3033 N 70.5673 W	21	350		350	Characterize freshwater-dominated zone
MV-02B (Primary)	41.1171 N 70.3953 W	37	550		550	Characterize freshwater-dominated zone
MV-03C (Primary)	40.8746 N 70.2697 W	42	650		650	Characterize freshwater-saltwater transition
MV-04B (Primary)	40.6206 N 70.1381 W	52	750		750	Characterize freshwater-saltwater transition
MV-05B (Primary)	40.3771 N 70.0119 W	79	775		775	Characterize saltwater zone

IODP 637-Add3 Proponents

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IODP 637-Full2 Updates

This addendum to IODP 637-Full2 (New England Margin Hydrogeology) includes three primary advancements supporting our proposal to characterize and to understand the distribution and emplacement mechanisms of submarine freshwater resources, and associated nutrient and biogeochemical cycles, along the New England continental shelf: (1) we completed a high resolution seismic survey of the study region allowing more detailed characterization of the stratigraphic architecture and providing site survey data; (2) IODP Expedition 313 documented separate advection- and diffusion-dominated freshwater-saltwater systems offshore New Jersey; and (3) IODP Expedition 313 established safe and viable drilling practices for unconsolidated shelf sediments. In addition, we provide an overview of the scientific goals and motivation for the program and an overview for each proposed site.

Introduction

In coastal settings worldwide, large freshwater volumes are sequestered in permeable continental shelf sediments. Freshwater storage and discharge have been documented off N. America, S. America, Europe, and Asia [*Hathaway et al.*, 1979; *Kooi and Groen*, 2000; *Taniguchi et al.*, 2006; *Weinstein et al.*, 2007; *Mottl and Hayashi*, 2009]. In Europe, the PALAEAUX collaboration characterized coastal freshwater to evaluate climatic fluctuations and to develop management strategies [*Edmunds and Milne*, 2001]. In other studies, submarine groundwater discharge has been evaluated as it impacts nutrient fluxes to the ocean [*Moore*, 1996; *Li et al.*, 1999; *Michael et al.*, 2005] and as an agent of erosion [*Robb*, 1984]. We propose to study the Atlantic continental shelf off New England where freshwater extends up to 100 km offshore. Using high-resolution mathematical models and existing well data, we estimate that ~1300 km^3 of freshwater is sequestered from New York to Maine, and up to $3x10^5$ km^3 may be sequestered along passive margins worldwide [*Cohen et al.*, 2010]. These worldwide, vast quantities of freshwater represent a resource to urban coastal centers, if accurately characterized and managed [*Custodio et al.*, 2001].

In IODP 637-Full2, we propose four primary sites (MV-02B, MV-03C, MV-04B, and MV-05B) off Martha's Vineyard (New England, USA) to determine source, volume, and emplacement of this freshwater. The emplacement hypotheses are: (1) meteoric recharge during sea-level lowstands; and (2) sub-ice sheet meltwater recharge during

glaciations. These different mechanisms can be distinguished using environmental isotope and noble gas data. Our study builds on data from seismic and coring ventures from the 1970s. Site survey data collected in 2009 provide new, high-resolution constraints on the stratigraphic architecture of the study region. Our proposed sites will obtain focused hydrogeochemical and microbiological samples across the freshwater-saltwater zone and will characterize the hydrological properties of the shelf. These samples and data will help us define the hydrogeological, geochemical, and biological processes within the shelf and what drives them.

Preliminary Models

Dip models based on USGS Line 5 examine the impacts that aquiclude (silt) connectivity has on freshwater distribution. The models invoke two stratigraphic architectures that are not differentiable with the vintage seismic and well data (**Figs. 1a,b**) [*Kohout et al*., 1977; *Hathaway et al*., 1979; *Valentine*, 1981; *Poag*, 1982; *Schlee and Fritsch*, 1982; *Klitgord et al*., 1994; *Person et al*., 1998; *Person et al*., 2003]. The differences between the models are the connectivity of the Cretaceous-Tertiary silt and the termination of the Cretaceous carbonate (**Figs. 1a,b**). We simulated sea-level variations for 1.8 million years using a 120-m amplitude, 100,000-year period and included one cycle of ice sheet loading (glaciation). Details of the modeling methods and sediment properties can be found in *Marksammer et al.* [2007], *Person et al.* [2007], and *Cohen et al.*, [2010].

These simulations show that freshwater volume is greatly affected by silt connectivity. When continuous silt aquicludes separate aquifers (**Fig. 1a**), we predict freshwater 50 km offshore to 200 m below seafloor (**Fig. 1c**). This freshwater is pervasive in the shallowest sediments and fingers into deeper sediments. When the silt is discontinuous (**Fig. 1b**), the freshwater volume decreases by 50%, but still exists far offshore (**Fig. 1d**). Recently acquired site survey data are being used to update the stratigraphic geometry and numerical model predictions of freshwater distribution. IODP *drilling will provide additional constraints on lithology and hydrogeological parameters and direct measurements of fluid composition* to test the models.

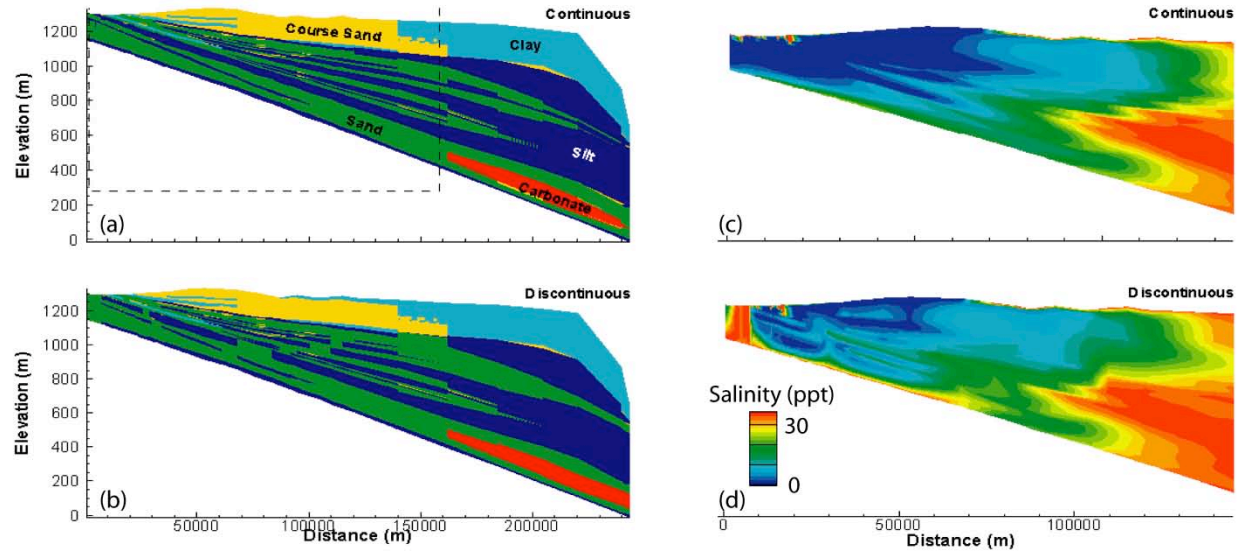

Fig. 1*. (a) Stratigraphic framework for the preliminary model with continuous silt aquicludes. (b) Stratigraphic framework for the preliminary model with discontinuous silt aquicludes. (c) Simulated salinity for the continuous-aquiclude model a. (d) Simulated salinity for the discontinuous-aquiclude model b.*

Recent drilling offshore New Jersey in IODP Expedition 313 provided new information on the freshwater-saltwater transition within the continental shelf. Drilling and porewater sampling documented a complex distribution of freshwater and saltwater 45-65 km offshore New Jersey [*Mountain et al.*, 2009]. The shallow sedimentary section had sharp freshwater-saltwater boundaries that were closely linked with stratigraphy; in the deeper section, and farther offshore, a gradual increase in salinity with depth was observed with salinity exceeding that of modern seawater [*Mottl and Hayashi*, 2009]. These distinct and different (sharp boundary vs. gradual transition) trends in porewater chemistry suggest that advective and diffusive systems are active along within the continental shelf. These systems operate at different spatial and temporal scales. With these data and the additional sample and data from the focused approach of IODP 637-Full2, we will enhance our knowledge of fluid and chemical fluxes and their variation in continental shelf sediments.

Successful drilling of IODP 637-Full2 combined with high-resolution stratigraphic data, two-dimensional electromagnetic surveys, and numerical modeling will provide process-based understanding of global, offshore freshwater. This project

will have *broad, interdisciplinary, scientific impact* because of the role this freshwater plays in nutrient fluxes to the ocean, geochemical and deep-biosphere processes in shelf sediments, and long-term, episodic greenhouse gas emissions. A better understanding of these large freshwater reservoirs will have *broad, societal impacts,* as these waters are a potential source available for increasing global freshwater demands.

Site Survey

In August 2009, we completed an NSF-funded survey (NSF 0824263) that collected >1000 km of high-resolution, multi-channel seismic (MCS) data in the proposed study region (**Fig. 2**). The seismic data, including crossing lines at proposed sites MV-02B, MV-03C, MV-04B, and MV-05B, have been submitted to the IODP SSDB for evaluation by the SSP and EPSP. In addition, a complete environmental and safety report will be submitted to EPSP before their next meeting (~June 2010).

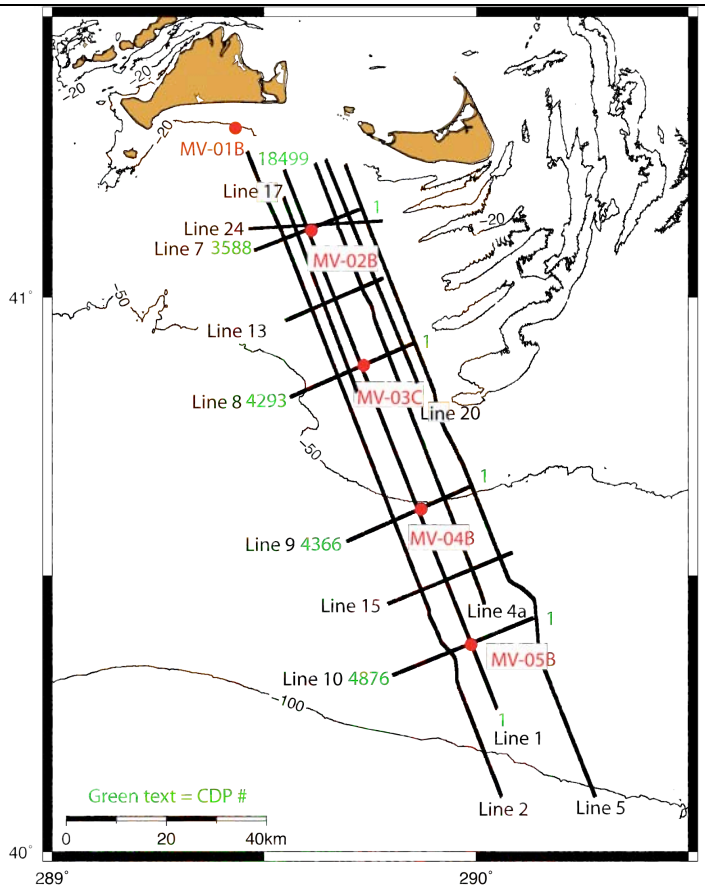

Fig. 2. *Trackmap for high-resolution MCS data (black lines) collected in August 2009 on the R/V Endeavor. Each line also has 3.5 kHz echosounder profiling. Proposed IODP sites are labeled in red. Primary sites are MV-02B, MV-03C, MV-04B, and MV-05B. MV-01B is an alternate site. Contours are water depth (20m, 50m, and 100m).*

We imaged the Cretaceous-Tertiary units using Scripps's high-resolution multi-channel streamer (48-channel, 600-m) with a 45/105 in^3 generator/injector (GI) gun source. For our shallow water shelf setting, the system provided ~6 m vertical resolution and allowed imaging to ~1 km (**Fig. 3**). Each seismic line (**Fig. 2**) also has 3.5 kHz echosounder data that were collected during the survey. The MCS seismic data are being used to map and characterize the details of the capping Plio-Pleistocene section. This thin Plio-Pleistocene section is where we speculate that recharge of freshwater may have occurred during sea-level lowstands and where submarine discharge of freshwater may be active today. Ongoing mapping and better seismic constraints on stratigraphy will increase the predictive capability of our modeling efforts.

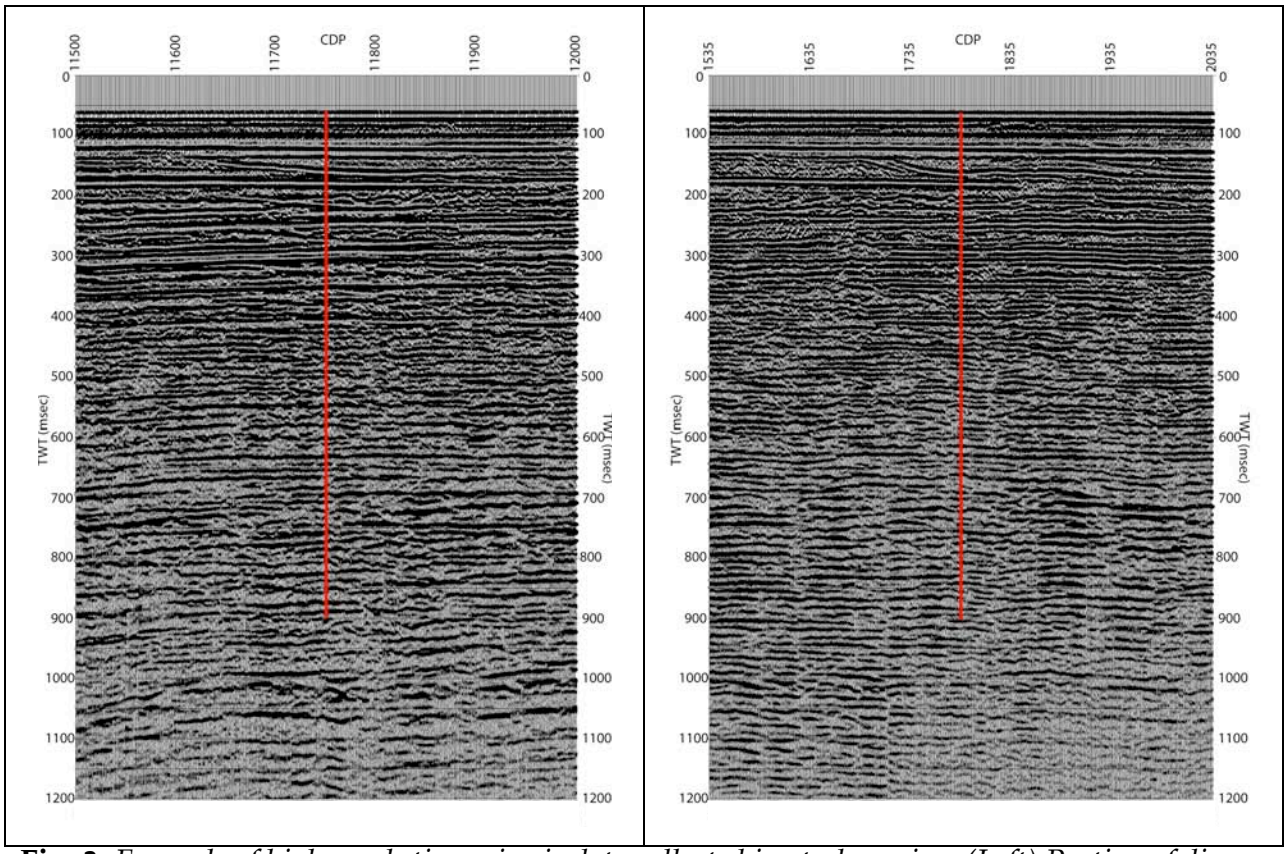

Fig. 3. *Example of high-resolution seismic data collected in study region. (Left) Portion of dip seismic line 1 (located in* ***Fig. 2****) crossing MV-03C (red line). (Right) Portion of strike seismic line 8 (located in Fig. 2) crossing line 1 at MV-03C (red line). CDP spacing is 6.25m.*

Initial processing of the seismic data included top and bottom mutes, bandpass filter (3-6-120-240 Hz), F-K filter, true amplitude recovery (7dB/s), normal moveout

correction, and CDP stacking. This processing stream focused on imaging the shallow stratigraphy (**Fig. 3**). We continue to process and to interpret the data including detailed velocity analysis, mapping key stratigraphic horizons, and making isochron/isopach maps. Our advanced processing is focusing on multiple suppression for better near-seafloor imaging and velocity analysis for hazard assessment and depth migration of the profiles. Final stacked sections will be used to define the three-dimensional stratigraphic architecture for numerical models of the study area. These models will provide estimates of *in situ* fluid chemistry and fluid age that will be tested by the drilling proposed in 637-Full2. In addition to seismic data, we anticipate collecting towed electromagnetic (EM) data to image the two-dimensional resistivity structure of the shallow subsurface near each proposed site. The EM data will be combined with logging and pore fluid data to provide an image of freshwater distribution across the region, which will serve as additional tests for the numerical models.

Drilling and Sampling

We propose four primary sites (**Fig. 2**) to assess freshwater volumes, freshwater emplacement mechanisms, the freshwater-saltwater transition, and the impact of mixed fluids on nutrient cycling and biogeochemistry. Based on our models (**Fig. 1**), we are confident that the proposed sites will allow us to characterize the freshwater, transition, and saltwater zones. This will allow us to complete the science objectives with one mission specific platform (MSP) eliminating multi-platform costs.

Our drilling campaign will use IODP drilling for an MSP based on the success of IODP Expedition 313, which had 80% core recovery for New Jersey shelf sediments [*Mountain et al.*, 2009]. Based on similar lithology between the New Jersey shelf and the shelf offshore Martha's Vineyard, MA, and similar target depths, we are confident that a similar drilling strategy will provide the data we need to achieve our science goals. In addition to drilling and coring, we propose an LWD program and detailed porewater sampling with hydrogeologic (e.g., packer) tests. The LWD data will provide high quality information on lithology and fluids through gamma ray, density, and resistivity imaging for core-log-seismic correlation and for characterizing any unrecovered intervals. It will also provide first-look data prior to coring so we can establish key horizons for hydrogeologic testing.

Hydrogeologic tests are required to collect formation fluids from permeable aquifers. These fluids are necessary to understand nutrient fluxes, fluid origin, and age. These tests also provide well-scale hydrogeologic properties (e.g., storativity, permeability) for input to numerical models and for comparison with shorebased tests on core samples. The tests are non-standard in IODP, but MSP flexibility and existing technology will facilitate these types of experiments. To assess technology options for casing and sampling shelf fluids, a project-scoping meeting was held between the proponents, IODP-MI, ESO, and Schlumberger (24 April 2007). From this meeting, we are confident that existing methods and tools (e.g., Westbay Multiport Sampler) on an MSP can overcome water/sediment sampling problems experienced by ODP and AMCOR in unconsolidated sections. Interpreted survey data will help decide which technology is best for our sites. We look forward to working with ESO to develop the best drilling and sampling strategy to maximize science with existing technology while managing operation costs.

Site Overviews

Site MV-02B (primary) is proposed for 550 m of penetration to characterize the freshwater-dominated zone of the system. We anticipate that we will sample Late Pleistocene glacial meltwater and meteoric water with increasing amounts of seawater. Salinity should be higher in fine-grained units. Drilling will penetrate Pleistocene-Upper Cretaceous unconsolidated to poorly consolidated sands, silts, and clays with thin (20 cm) coal stringers. Sample analysis will focus on pore fluid chemistry, noble gas, ^{18}O, ^{2}H, ^{14}C, ^{13}C, ^{81}Kr, ^{4}He, permeability, porosity, compressibility, and DNA/RNA analysis to assess fluid origin, flow behavior, and microbial activity. Crossing seismic lines (**Fig. 2**) exist for this site.

Site MV-03C (primary) is proposed for 650 m of penetration to characterize the freshwater-saltwater transition zone. We anticipate that we will sample Late Pleistocene glacial meltwater and meteoric water with increasing amounts of seawater relative to MV-02B and also with increasing depth. Salinity should be higher in fine-grained units. Drilling will penetrate Pleistocene-Upper Cretaceous unconsolidated to poorly consolidated sands, silts, and clays. Sample analysis will focus on pore fluid chemistry, noble gas, ^{18}O, ^{2}H, ^{14}C, ^{13}C, ^{81}Kr, ^{4}He, permeability, porosity, compressibility, and

DNA/RNA analysis to assess fluid origin, flow behavior, and microbial activity. Crossing seismic lines (**Fig. 2**) exist for this site.

Site MV-04B (primary) is proposed for 750 m of penetration to characterize the freshwater-saltwater transition zone. We anticipate that we will sample significant amounts of seawater with some freshening due to Late Pleistocene glacial meltwater and meteoric water. With increasing depth, salinity should increase and may exceed that of modern seawater such as observed in IODP Expedition 313 [*Mottl and Hayashi*, 2009]. Salinity should be higher in fine-grained units. Drilling will penetrate Pleistocene-Upper Cretaceous unconsolidated to poorly consolidated sands, silts, and clays. Sample analysis will focus on pore fluid chemistry, noble gas, ^{18}O, ^{2}H, ^{14}C, ^{13}C, ^{81}Kr, ^{4}He, permeability, porosity, compressibility, and DNA/RNA analysis to assess fluid origin, flow behavior, and microbial activity. Crossing seismic lines (**Fig. 2**) exist for this site.

Site MV-05B (primary) is proposed for 775 m of penetration to characterize the saltwater end member of the system. We anticipate that we will sample Pleistocene seawater in the shallow section, with salinity increasing above that of modern seawater with depth [e.g., *Mottl and Hayashi*, 2009]. Drilling will penetrate Pleistocene-Upper Cretaceous unconsolidated to poorly consolidated sands, silts, and clays. Carbonates may be encountered at the bottom of the site. Sample analysis will focus on pore fluid chemistry, noble gas, ^{18}O, ^{2}H, ^{14}C, ^{13}C, ^{81}Kr, ^{4}He, permeability, porosity, compressibility, and DNA/RNA analysis to assess fluid origin, flow behavior, and microbial activity. Crossing seismic lines (**Fig. 2**) exist for this site.

Site MV-01B (alternate to MV-02B) is proposed for 350 m of penetration to characterize the freshwater end member of system. We anticipate that we will sample Holocene meteoric water and/or Late Pleistocene glacial meltwater with minor amounts of seawater at depth >300 m. Drilling will penetrate Pleistocene-Upper Cretaceous unconsolidated to poorly consolidated sands, silts, and clays with thin (20 cm) coal stringers. Sample analysis will focus on pore fluid chemistry, noble gas, ^{18}O, ^{2}H, ^{14}C, ^{13}C, ^{81}Kr, ^{4}He, permeability, porosity, compressibility, and DNA/RNA analysis to assess fluid origin, flow behavior, and microbial activity. No high-resolution data were collected at this site due to shallow water conditions.

Societal Relevance

With increasing global demands for freshwater, sequestered continental shelf freshwater represents a large, untapped resource. These demands have led to local and regional coastal freshwater studies and management plans in Europe [*Custodio et al.*, 2001; *Edmunds*, 2001]. In our study region, more than 1300 km^3 of freshwater may exist [*Cohen et al.*, 2010], which would help coastal cities (e.g., New York City uses 1.5 km^3/yr), if efficiently managed. Globally these coastal freshwater resources will become more important with time; successful use rests upon a process-based understanding of their short-term and long-term behavior, which IODP 637-Full2 will help determine.

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IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ☐ **Revised** ■

Section A: Proposal Information

Title of Proposal:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England
Date Form Submitted:	01/15/10
Site Specific Objectives with Priority (Must include general objectives in proposal)	The primary objectives of drilling are to characterize the distribution of fresh-to-brackish water on the Atlantic continental shelf and to understand the fluid emplacement mechanisms which were active on the continental shelf during the Pleistocene. We will measure chemistry, microbiology, fluid pressure, and isotopic composition of the Atlantic continental shelf aquifers and confining units. MV-01B will characterize the freshwater-dominated zone of the transect. Three holes will be drilled. Hole A is for petrophysics. Hole B will be continuously cored and used for hydrogeologic tests and detailed water chemistry sampling. Hole C will be for spot coring for the collection of pristine microbiological samples.
List Previous Drilling in Area:	AMCOR wells 6001, 6009, 6020, 6021; COST wells B-2, G-1, G-2, ODP Leg 174A, IODP Exp. 313

Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	MV-01B	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	New England continental shelf
Latitude:	Deg: 41.3033 N	Min:	Jurisdiction:	USA
Longitude:	Deg: 70.5673 W	Min:	Distance to Land:	6 km
Coordinates System:	WGS 84, Other ( )			
Priority of Site:	Primary:	Alt: X	Water Depth:	21 m

Section C: Operational Information

	Sediments	Basement
Proposed Penetration: (m)	Recent to Cretaceous sediments	Not applicable
	What is the total sed. thickness? 350 m	
	Total Penetration: 350 m	
General Lithologies:	Sand, silt, and clay	
Coring Plan: *(Specify or check)*	Plan will be developed based on the successful approach of IODP Exp. 313.	
	1-2-3-APC ■ VPC* ☐ XCB ■ MDCB* ☐ PCS ☐ RCB ■ Re-entry ☐ HRGB ☐	
	** Systems Currently Under Development*	

Wireline Logging Plan:

Standard Tools		Special Tools				LWD	
Neutron-Porosity	☐	Borehole Televiewer	☐	Formation Fluid Sampling	■	Density-Neutron	■
Litho-Density	☐	Nuclear Magnetic Resonance	☐	Borehole Temperature & Pressure	■	Resistivity-Gamma Ray	■
Gamma Ray	☐	Geochemical	■	Borehole Seismic	☐	Acoustic	■
Resistivity	☐	Side-Wall Core Sampling	☐				
Acoustic	☐						
Formation Image	☐			Others ( )		Others ( )	

Max.Borehole Temp. :	*Expected value (For Riser Drilling)* _____°C
Mud Logging: *(Riser Holes Only)*	Cuttings Sampling Intervals
	from _____ m to _____ m, _____ m intervals
	from _____ m to _____ m, _____ m intervals
	Basic Sampling Intervals: 5m
Estimated days:	Drilling/Coring: 9.9 / Logging: 1.9 / Total On-Site: 11.8
Future Plan:	*Longterm Borehole Observation Plan/Re-entry Plan - None*

Hazards/ Weather:

Please check following List of Potential Hazards						*What is your Weather window? (Preferable period with the reasons)*
Shallow Gas	☐	Complicated Seabed Condition	☐	Hydrothermal Activity	☐	
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	March – August to avoid hurricanes and winter storms
Shallow Water Flow	☐	Currents	☐	Methane Hydrate	☐	
Abnormal Pressure	■	Fractured Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects	■	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☐	
CO_2	☐					

Form 2 - Site Survey Detail

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-01B	Date Form Submitted: 01/15/10

	Data Type	SSP Requir-ements	Exists In DB	Details of available data and data that are still to be collected
1	High resolution seismic reflection			Primary Line(s): :Location of Site on line (SP or Time only) Crossing Lines(s):
2	Deep Penetration seismic reflection			Primary Line(s): Location of Site on line (SP or Time only) Crossing Lines(s):
3	Seismic Velocity†			
4	Seismic Grid			
5a	Refraction (surface)			
5b	Refraction (near bottom)			
6	3.5 kHz			Location of Site on line (Time)
7	Swath bathymetry			
8a	Side-looking sonar (surface)			
8b	Side-looking sonar (bottom)			
9	Photography or Video			Assorted USGS imagery exists
10	Heat Flow			
11a	Magnetics			
11b	Gravity			
12	Sediment cores			Assorted grab samples from USGS exist
13	Rock sampling			
14a	Water current data			Available
14b	Ice Conditions			
15	OBS microseismicity			
16	Navigation			
17	Other			

SSP Classification of Site:	SSP Watchdog:	Date of Last Review:
SSP Comments:		

X=required; X*=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.

Form 3 - Detailed Logging Plan

IODP Site Summary Forms:

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-01B	Date Form Submitted: 01/15/10
Water Depth (m): 21	Sed. Penetration (m): 350	Basement Penetration (m): 0

Do you need to use the conical side-entry sub (CSES) at this site? Yes ☐ No ■

Are high temperatures expected at this site? Yes ☐ No ■

Are there any other special requirements for logging at this site? Yes ■ No ☐

If "Yes" Please describe requirements: LWD

What do you estimate the total logging time for this site to be: 1.9 days

Measurement Type	Scientific Objective	Relevance (1=high, 3=Low)
Neutron-Porosity	Alternate to LWD density-neutron; not required if run LWD	2
Litho-Density	Alternate to LWD density-neutron and gamma ray; not required if run LWD	2
Natural Gamma Ray	Alternate to LWD gamma ray; not required if run LWD	2
Resistivity-Induction	Alternate to LWD resistivity; not required if run LWD	2
Acoustic	Detailed sonic velocity for synthetic seismograms and core-log-seismic integration	1
FMS	Alternate to LWD resistivity-gamma ray; not required if run LWD	2
BHTV	Not required	3
Resistivity-Laterolog	Alternate to LWD resistivity; not required if run LWD	2
Magnetic/Susceptibility	Alternate lithologic indicator; not required if run LWD	2
Density-Neutron (LWD)	High-quality density characterization of sediments in an intact borehole to define bulk physical properties.	1
Resitivity-Gamma Ray (LWD)	High-quality lithologic characterization of the sediments, freshwater-saltwater porewater determination, and data for formation factor (microbiology, fluids) in an intact borehole.	1
Other: Special tools (CORK, PACKER, VSP, PCS, FWS, WSP	Packers for hydro tests and porewater analysis (chemical, biologic); VSP	1

For help in determining logging times, please contact the ODP-LDEO Wireline Logging Services group at:

borehole@ldeo.columbia.edu
http://www.ldeo.columbia.edu/BRG/brg_home.html
Phone/Fax: (914) 365-8674 / (914) 365-3182

Note: Sites with greater than 400 m of penetration or significant basement penetration require deployment of standard toolstrings.

Form 4 – Pollution & Safety Hazard Summary

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-01B	Date Form Submitted: 01/15/10

1	Summary of Operations at site: (Example: Triple-APC to refusal, XCB 10 m into basement, log as shown on page 3.)	APC to refusal, followed by XCB and RCB as necessary to reach TD in sediment. Drilling plan will be similar to that of IODP Exp. 313 based on similar lithology and TDs.
2	Based on Previous DSDP/ODP drilling, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock.	No previous DSDP/ODP/IODP drilling at this location. Nearby ODP Leg 174A and IODP Exp. 313 did not have hydrocarbon issues.
3	From Available information, list all commercial drilling in this area that produced or yielded significant hydrocarbon shows. Give depths and ages of hydrocarbon-bearing deposits.	Previous USGS and COST drilling did not indicate any hydrocarbon occurrence.
4	Are there any indications of gas hydrates at this location?	No gas hydrate indications at this location.
5	Are there reasons to expect hydrocarbon accumulations at this site? Please give details.	No reason to expect accumulation of hydrocarbons. Previous hydrocarbon evaluation did not show hydrocarbons, and documented that source rocks are immature. Initial seismic velocity analysis does not show any hydrocarbon indicators.
6	What "special" precautions will be taken during drilling?	A drilling program utilizing conductor pipe, casing, and drilling mud will be used to maintain formation integrity, maximize science, and protect the BHA and downhole tools.
7	What abandonment procedures do you plan to follow:	Standard IODP procedures of abandonment will be followed for shallow MSP holes building off procedures of IODP Exp. 313.
8	Please list other natural or manmade hazards which may effect ship's operations. (e.g. ice, currents, cables)	Fishing and lobster trapping are common in the region. A regional shipping lane also exists nearby. These hazards are easily mitigated for MSP operations using radio communication and notification.
9	Summary: What do you consider the major risks in drilling at this site?	Borehole stability and integrity/maintenance will be the major risk drilling this site.

IODP Site Summary Forms:

Form 5 – Lithologic Summary

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-01B	Date Form Submitted: 01/15/10

Sub-bottom depth (m)	*Key reflectors, Unconformities, faults, etc*	*Age*	*Assumed velocity (km/sec)*	*Lithology*	*Paleo-environment*	*Avg. rate of sed. accum. (m/My)*	*Comments*
0-350		<Cret.	1.5-2.0	Silt, sand, clay	Shelf		

IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ☐ **Revised** ■

Section A: Proposal Information

Title of Proposal:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England
Date Form Submitted:	01/15/10
Site Specific Objectives with Priority (Must include general objectives in proposal)	The primary objectives of drilling are to characterize the distribution of fresh-to-brackish water on the Atlantic continental shelf and to understand the fluid emplacement mechanisms which were active on the continental shelf during the Pleistocene. We will measure chemistry, microbiology, fluid pressure, and isotopic composition of the Atlantic continental shelf aquifers and confining units. MV-02B will characterize the freshwater-dominated zone of the transect. Three holes will be drilled. Hole A is for petrophysics. Hole B will be continuously cored and used for hydrogeologic tests and detailed water chemistry sampling. Hole C will be for spot coring for the collection of pristine microbiological samples.
List Previous Drilling in Area:	AMCOR wells 6001, 6009, 6020, 6021; COST wells B-2, G-1, G-2, ODP Leg 174A, IODP Exp. 313

Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	MV-02B	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	New England continental shelf
Latitude:	Deg: 41.1171 N	Min:	Jurisdiction:	USA
Longitude:	Deg: 70.3953 W	Min:	Distance to Land:	27 km
Coordinates System:	WGS 84, Other ( )			
Priority of Site:	Primary: X	Alt:	Water Depth:	37 m

Section C: Operational Information

	Sediments	Basement
Proposed Penetration: (m)	Recent to Cretaceous sediments	Not applicable
	What is the total sed. thickness? 550 m	
	Total Penetration: 550 m	
General Lithologies:	Sand, silt, and clay	
Coring Plan: *(Specify or check)*	Plan will be developed based on the successful approach of IODP Exp. 313.	
	1-2-3-APC ■ VPC* ☐ XCB ■ MDCB* ☐ PCS ☐ RCB ■ Re-entry ☐ HRGB ☐	
	** Systems Currently Under Development*	

Wireline Logging Plan:	Standard Tools	Special Tools		LWD
	Neutron-Porosity ☐	Borehole Televiewer ☐	Formation Fluid Sampling ■	Density-Neutron ■
	Litho-Density ☐	Nuclear Magnetic Resonance ☐	Borehole Temperature & Pressure ■	Resistivity-Gamma Ray ■
	Gamma Ray ☐	Geochemical ■	Borehole Seismic ☐	Acoustic ■
	Resistivity ☐	Side-Wall Core Sampling ☐		
	Acoustic ☐			
	Formation Image ☐		Others ( )	Others ( )

Max.Borehole Temp. :	*Expected value (For Riser Drilling)* _____°C	
Mud Logging: *(Riser Holes Only)*	Cuttings Sampling Intervals	
	from _____ m to _____ m, _____ m intervals	
	from _____ m to _____ m, _____ m intervals	
	Basic Sampling Intervals: 5m	
Estimated days:	Drilling/Coring: 15.6	Logging: 3.0 / Total On-Site: 18.6
Future Plan:	*Longterm Borehole Observation Plan/Re-entry Plan - None*	

Hazards/ Weather:	*Please check following List of Potential Hazards*			*What is your Weather window? (Preferable period with the reasons)*
	Shallow Gas ☐	Complicated Seabed Condition ☐	Hydrothermal Activity ☐	March – August to avoid hurricanes and winter storms
	Hydrocarbon ☐	Soft Seabed ☐	Landslide and Turbidity Current ☐	
	Shallow Water Flow ☐	Currents ☐	Methane Hydrate ☐	
	Abnormal Pressure ■	Fractured Zone ☐	Diapir and Mud Volcano ☐	
	Man-made Objects ■	Fault ☐	High Temperature ☐	
	H_2S ☐	High Dip Angle ☐	Ice Conditions ☐	
	CO_2 ☐			

Form 2 - Site Survey Detail

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-02B	Date Form Submitted: 01/15/10

	Data Type	SSP Requir-ements	Exists In DB	Details of available data and data that are still to be collected
1	High resolution seismic reflection			Primary Line(s): :Location of Site on line (SP or Time only) Line 1 (CDP 16382) Crossing Lines(s): Line 7 (CDP 1750)
2	Deep Penetration seismic reflection			Primary Line(s): Location of Site on line (SP or Time only) USGS Line 5 Crossing Lines(s):
3	Seismic Velocity†			Interval velocity from seismic processing
4	Seismic Grid			2D seismic grid of continental shelf collected in 2009
5a	Refraction (surface)			
5b	Refraction (near bottom)			
6	3.5 kHz			Location of Site on line (Time) Collected along 2D seismic lines on continental shelf in 2009
7	Swath bathymetry			
8a	Side-looking sonar (surface)			
8b	Side-looking sonar (bottom)			
9	Photography or Video			Assorted USGS imagery exists
10	Heat Flow			
11a	Magnetics			
11b	Gravity			
12	Sediment cores			Assorted grab samples from USGS exist
13	Rock sampling			
14a	Water current data			Available
14b	Ice Conditions			
15	OBS microseismicity			
16	Navigation			
17	Other			

SSP Classification of Site:	SSP Watchdog:	Date of Last Review:
SSP Comments:		

X=required; X*=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.

Form 3 - Detailed Logging Plan

IODP Site Summary Forms:

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-02B	Date Form Submitted: 01/15/10
Water Depth (m): 37	Sed. Penetration (m): 550	Basement Penetration (m): 0

Do you need to use the conical side-entry sub (CSES) at this site? Yes ☐ No ■

Are high temperatures expected at this site? Yes ☐ No ■

Are there any other special requirements for logging at this site? Yes ■ No ☐

If "Yes" Please describe requirements: LWD

What do you estimate the total logging time for this site to be: 3 days

Measurement Type	Scientific Objective	Relevance (1=high, 3=Low)
Neutron-Porosity	Alternate to LWD density-neutron; not required if run LWD	2
Litho-Density	Alternate to LWD density-neutron and gamma ray; not required if run LWD	2
Natural Gamma Ray	Alternate to LWD gamma ray; not required if run LWD	2
Resistivity-Induction	Alternate to LWD resistivity; not required if run LWD	2
Acoustic	Detailed sonic velocity for synthetic seismograms and core-log-seismic integration	1
FMS	Alternate to LWD resistivity-gamma ray; not required if run LWD	2
BHTV	Not required	3
Resistivity-Laterolog	Alternate to LWD resistivity; not required if run LWD	2
Magnetic/Susceptibility	Alternate lithologic indicator; not required if run LWD	2
Density-Neutron (LWD)	High-quality density characterization of sediments in an intact borehole to define bulk physical properties.	1
Resitivity-Gamma Ray (LWD)	High-quality lithologic characterization of the sediments, freshwater-saltwater porewater determination, and data for formation factor (microbiology, fluids) in an intact borehole.	1
Other: Special tools (CORK, PACKER, VSP, PCS, FWS, WSP	Packers for hydro tests and porewater analysis (chemical, biologic); VSP	1

For help in determining logging times, please contact the ODP-LDEO Wireline Logging Services group at:

borehole@ldeo.columbia.edu
http://www.ldeo.columbia.edu/BRG/brg_home.html
Phone/Fax: (914) 365-8674 / (914) 365-3182

Note: Sites with greater than 400 m of penetration or significant basement penetration require deployment of standard toolstrings.

Form 4 – Pollution & Safety Hazard Summary

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-02B	Date Form Submitted: 01/15/10

1	Summary of Operations at site: (Example: Triple-APC to refusal, XCB 10 m into basement, log as shown on page 3.)	APC to refusal, followed by XCB and RCB as necessary to reach TD in sediment. Drilling plan will be similar to that of IODP Exp. 313 based on similar lithology and TDs.
2	Based on Previous DSDP/ODP drilling, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock.	No previous DSDP/ODP/IODP drilling at this location. Nearby ODP Leg 174A and IODP Exp. 313 did not have hydrocarbon issues.
3	From Available information, list all commercial drilling in this area that produced or yielded significant hydrocarbon shows. Give depths and ages of hydrocarbon-bearing deposits.	Previous USGS and COST drilling did not indicate any hydrocarbon occurrence.
4	Are there any indications of gas hydrates at this location?	No gas hydrate indications at this location.
5	Are there reasons to expect hydrocarbon accumulations at this site? Please give details.	No reason to expect accumulation of hydrocarbons. Previous hydrocarbon evaluation did not show hydrocarbons, and documented that source rocks are immature. Initial seismic velocity analysis does not show any hydrocarbon indicators.
6	What "special" precautions will be taken during drilling?	A drilling program utilizing conductor pipe, casing, and drilling mud will be used to maintain formation integrity, maximize science, and protect the BHA and downhole tools.
7	What abandonment procedures do you plan to follow:	Standard IODP procedures of abandonment will be followed for shallow MSP holes building off procedures of IODP Exp. 313.
8	Please list other natural or manmade hazards which may effect ship's operations. (e.g. ice, currents, cables)	Fishing and lobster trapping are common in the region. A regional shipping lane also exists nearby. These hazards are easily mitigated for MSP operations using radio communication and notification.
9	Summary: What do you consider the major risks in drilling at this site?	Borehole stability and integrity/maintenance will be the major risk drilling this site.

IODP Site Summary Forms:

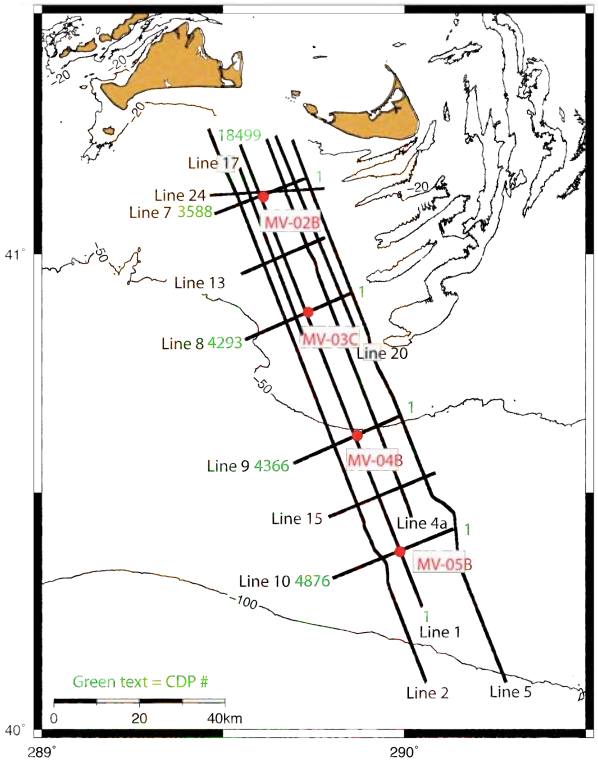
Form 5 – Lithologic Summary

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-02B	Date Form Submitted: 01/15/10

Sub-bottom depth (m)	*Key reflectors, Unconformities, faults, etc*	*Age*	*Assumed velocity (km/sec)*	*Lithology*	*Paleo-environment*	*Avg. rate of sed. accum. (m/My)*	*Comments*
0-550		<Cret.	1.5-2.0	Silt, sand, clay	Shelf		

Site Summary Form 6
Proposal 637
Site MV-02B
Line 1 CDP 16382; Line 7 CDP 1750



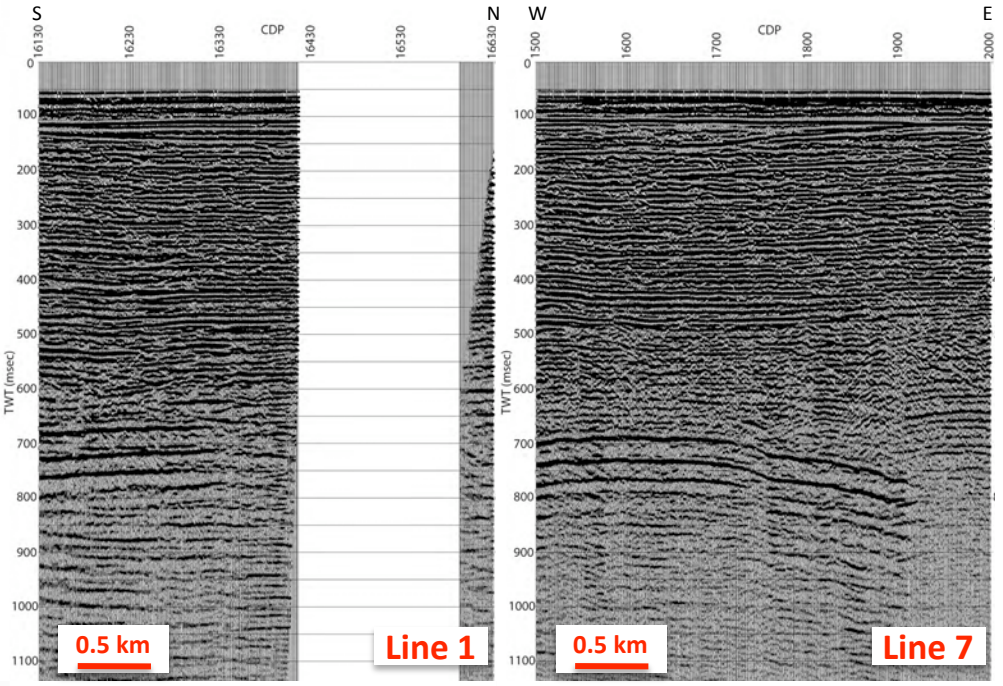
SSDB Data Files

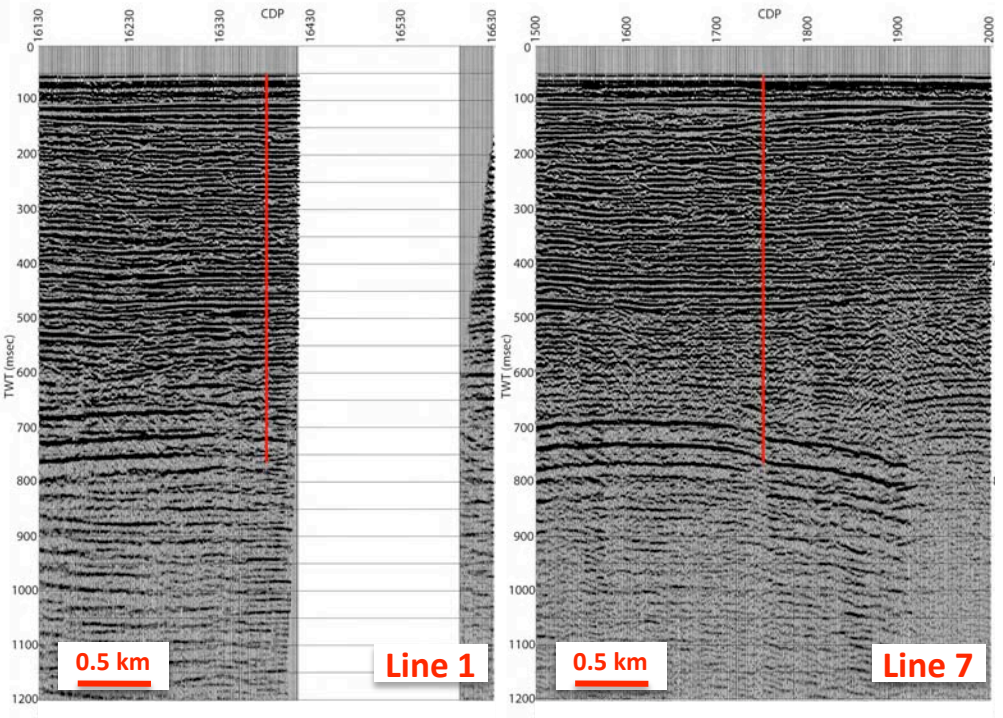
Regional CDP Trackline Map
mv_cdpmap_annotate.pdf

Seismic Data Figures
line1_mv02.pdf; line1_mv02_w_site.pdf;
line7_mv02.pdf; line7_mv02_w_site.pdf

SEG-Y Data
line1_stack.segy; line7_stack.segy

Navigation Data
line1_nav.txt; line7_nav.txt





IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ☐ **Revised** ■

Section A: Proposal Information

Title of Proposal:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England
Date Form Submitted:	01/15/10
Site Specific Objectives with Priority (Must include general objectives in proposal)	The primary objectives of drilling are to characterize the distribution of fresh-to-brackish water on the Atlantic continental shelf and to understand the fluid emplacement mechanisms which were active on the continental shelf during the Pleistocene. We will measure chemistry, microbiology, fluid pressure, and isotopic composition of the Atlantic continental shelf aquifers and confining units. MV-03C will characterize the freshwater-saltwater transition zone of the transect. Three holes will be drilled. Hole A is for petrophysics. Hole B will be continuously cored and used for hydrogeologic tests and detailed water chemistry sampling. Hole C will be for spot coring for the collection of pristine microbiological samples.
List Previous Drilling in Area:	AMCOR wells 6001, 6009, 6020, 6021; COST wells B-2, G-1, G-2, ODP Leg 174A, IODP Exp. 313

Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	MV-03C	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	New England continental shelf
Latitude:	Deg: 40.8746 N	Min:	Jurisdiction:	USA
Longitude:	Deg: 70.2697 W	Min:	Distance to Land:	56 km
Coordinates System:	WGS 84, Other ( )			
Priority of Site:	Primary: X	Alt:	Water Depth:	42 m

Section C: Operational Information

	Sediments	Basement
Proposed Penetration: (m)	Recent to Cretaceous sediments	Not applicable
	What is the total sed. thickness? 650 m	
	Total Penetration: 650 m	
General Lithologies:	Sand, silt, and clay	
Coring Plan: *(Specify or check)*	Plan will be developed based on the successful approach of IODP Exp. 313.	
	1-2-3-APC ■ VPC* ☐ XCB ■ MDCB* ☐ PCS ☐ RCB ■ Re-entry ☐ HRGB ☐	
	** Systems Currently Under Development*	

Wireline Logging Plan:

Standard Tools		Special Tools				LWD	
Neutron-Porosity	☐	Borehole Televiewer	☐	Formation Fluid Sampling	■	Density-Neutron	■
Litho-Density	☐	Nuclear Magnetic Resonance	☐	Borehole Temperature & Pressure	■	Resistivity-Gamma Ray	■
Gamma Ray	☐	Geochemical	■	Borehole Seismic	☐	Acoustic	■
Resistivity	☐	Side-Wall Core Sampling	☐				
Acoustic	☐						
Formation Image	☐			Others ( )		Others ( )	

Max.Borehole Temp. :	*Expected value (For Riser Drilling)* _____°C
Mud Logging: *(Riser Holes Only)*	Cuttings Sampling Intervals
	from _____ m to _____ m, _____ m intervals
	from _____ m to _____ m, _____ m intervals
	Basic Sampling Intervals: 5m
Estimated days:	Drilling/Coring: 18.6 / Logging: 3.5 / Total On-Site: 22.1
Future Plan:	*Longterm Borehole Observation Plan/Re-entry Plan - None*

Hazards/ Weather:

Please check following List of Potential Hazards

						What is your Weather window? (Preferable period with the reasons)
Shallow Gas	☐	Complicated Seabed Condition	☐	Hydrothermal Activity	☐	
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	March – August to avoid hurricanes and winter storms
Shallow Water Flow	☐	Currents	☐	Methane Hydrate	☐	
Abnormal Pressure	■	Fractured Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects	■	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☐	
CO_2	☐					

Form 2 - Site Survey Detail

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-03C	Date Form Submitted: 01/15/10

	Data Type	SSP Requir-ements	Exists In DB	Details of available data and data that are still to be collected
1	High resolution seismic reflection			Primary Line(s): :Location of Site on line (SP or Time only) Line 1 (CDP 11751) Crossing Lines(s): Line 8 (CDP 1785)
2	Deep Penetration seismic reflection			Primary Line(s): Location of Site on line (SP or Time only) USGS Line 5 Crossing Lines(s):
3	Seismic Velocity†			Interval velocity from seismic processing
4	Seismic Grid			2D seismic grid of continental shelf collected in 2009
5a	Refraction (surface)			
5b	Refraction (near bottom)			
6	3.5 kHz			Location of Site on line (Time) Collected along 2D seismic lines on continental shelf in 2009
7	Swath bathymetry			
8a	Side-looking sonar (surface)			
8b	Side-looking sonar (bottom)			
9	Photography or Video			Assorted USGS imagery exists
10	Heat Flow			
11a	Magnetics			
11b	Gravity			
12	Sediment cores			Assorted grab samples from USGS exist
13	Rock sampling			
14a	Water current data			Available
14b	Ice Conditions			
15	OBS microseismicity			
16	Navigation			
17	Other			

SSP Classification of Site:	SSP Watchdog:	Date of Last Review:
SSP Comments:		

X=required; X*=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.

Form 3 - Detailed Logging Plan

IODP Site Summary Forms:

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-03C	Date Form Submitted: 01/15/10
Water Depth (m): 42	Sed. Penetration (m): 650	Basement Penetration (m): 0

Do you need to use the conical side-entry sub (CSES) at this site? Yes ☐ No ■

Are high temperatures expected at this site? Yes ☐ No ■

Are there any other special requirements for logging at this site? Yes ■ No ☐

If "Yes" Please describe requirements: LWD

What do you estimate the total logging time for this site to be: 3.5 days

Measurement Type	Scientific Objective	Relevance (1=high, 3=Low)
Neutron-Porosity	Alternate to LWD density-neutron; not required if run LWD	2
Litho-Density	Alternate to LWD density-neutron and gamma ray; not required if run LWD	2
Natural Gamma Ray	Alternate to LWD gamma ray; not required if run LWD	2
Resistivity-Induction	Alternate to LWD resistivity; not required if run LWD	2
Acoustic	Detailed sonic velocity for synthetic seismograms and core-log-seismic integration	1
FMS	Alternate to LWD resistivity-gamma ray; not required if run LWD	2
BHTV	Not required	3
Resistivity-Laterolog	Alternate to LWD resistivity; not required if run LWD	2
Magnetic/Susceptibility	Alternate lithologic indicator; not required if run LWD	2
Density-Neutron (LWD)	High-quality density characterization of sediments in an intact borehole to define bulk physical properties.	1
Resitivity-Gamma Ray (LWD)	High-quality lithologic characterization of the sediments, freshwater-saltwater porewater determination, and data for formation factor (microbiology, fluids) in an intact borehole.	1
Other: Special tools (CORK, PACKER, VSP, PCS, FWS, WSP	Packers for hydro tests and porewater analysis (chemical, biologic); VSP	1

For help in determining logging times, please contact the ODP-LDEO Wireline Logging Services group at:

borehole@ldeo.columbia.edu
http://www.ldeo.columbia.edu/BRG/brg_home.html
Phone/Fax: (914) 365-8674 / (914) 365-3182

Note: Sites with greater than 400 m of penetration or significant basement penetration require deployment of standard toolstrings.

Form 4 – Pollution & Safety Hazard Summary

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-03C	Date Form Submitted: 01/15/10

1	Summary of Operations at site: (Example: Triple-APC to refusal, XCB 10 m into basement, log as shown on page 3.)	APC to refusal, followed by XCB and RCB as necessary to reach TD in sediment. Drilling plan will be similar to that of IODP Exp. 313 based on similar lithology and TDs.
2	Based on Previous DSDP/ODP drilling, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock.	No previous DSDP/ODP/IODP drilling at this location. Nearby ODP Leg 174A and IODP Exp. 313 did not have hydrocarbon issues.
3	From Available information, list all commercial drilling in this area that produced or yielded significant hydrocarbon shows. Give depths and ages of hydrocarbon-bearing deposits.	Previous USGS and COST drilling did not indicate any hydrocarbon occurrence.
4	Are there any indications of gas hydrates at this location?	No gas hydrate indications at this location.
5	Are there reasons to expect hydrocarbon accumulations at this site? Please give details.	No reason to expect accumulation of hydrocarbons. Previous hydrocarbon evaluation did not show hydrocarbons, and documented that source rocks are immature. Initial seismic velocity analysis does not show any hydrocarbon indicators.
6	What "special" precautions will be taken during drilling?	A drilling program utilizing conductor pipe, casing, and drilling mud will be used to maintain formation integrity, maximize science, and protect the BHA and downhole tools.
7	What abandonment procedures do you plan to follow:	Standard IODP procedures of abandonment will be followed for shallow MSP holes building off procedures of IODP Exp. 313.
8	Please list other natural or manmade hazards which may effect ship's operations. (e.g. ice, currents, cables)	Fishing and lobster trapping are common in the region. A regional shipping lane also exists nearby. These hazards are easily mitigated for MSP operations using radio communication and notification.
9	Summary: What do you consider the major risks in drilling at this site?	Borehole stability and integrity/maintenance will be the major risk drilling this site.

IODP Site Summary Forms:

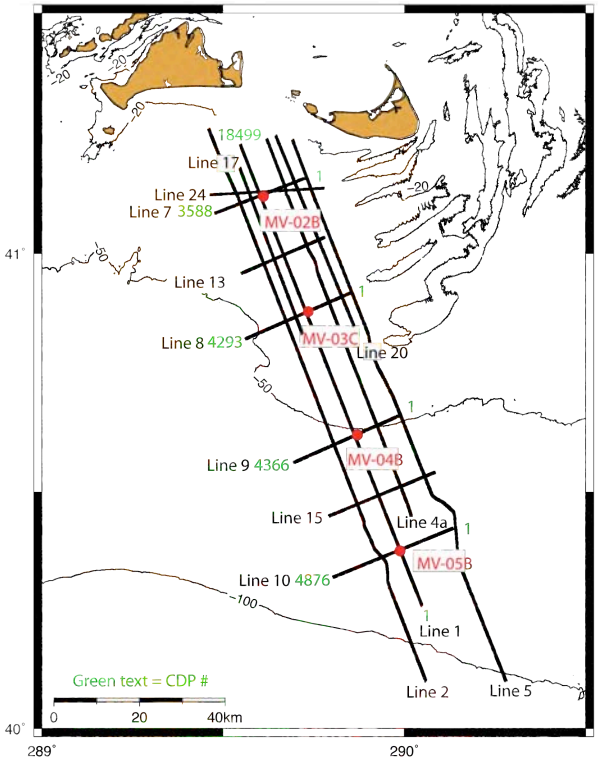
Form 5 – Lithologic Summary

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-03C	Date Form Submitted: 01/15/10

Sub-bottom depth (m)	*Key reflectors, Unconformities, faults, etc*	*Age*	*Assumed velocity (km/sec)*	*Lithology*	*Paleo-environment*	*Avg. rate of sed. accum. (m/My)*	*Comments*
0-650		<Cret.	1.5-2.0	Silt, sand, clay	Shelf		

Site Summary Form 6
Proposal 637
Site MV-03C
Line 1 CDP 11751; Line 8 CDP 1785



SSDB Data Files

Regional CDP Trackline Map

mv_cdpmap_annotate.pdf

Seismic Data Figures

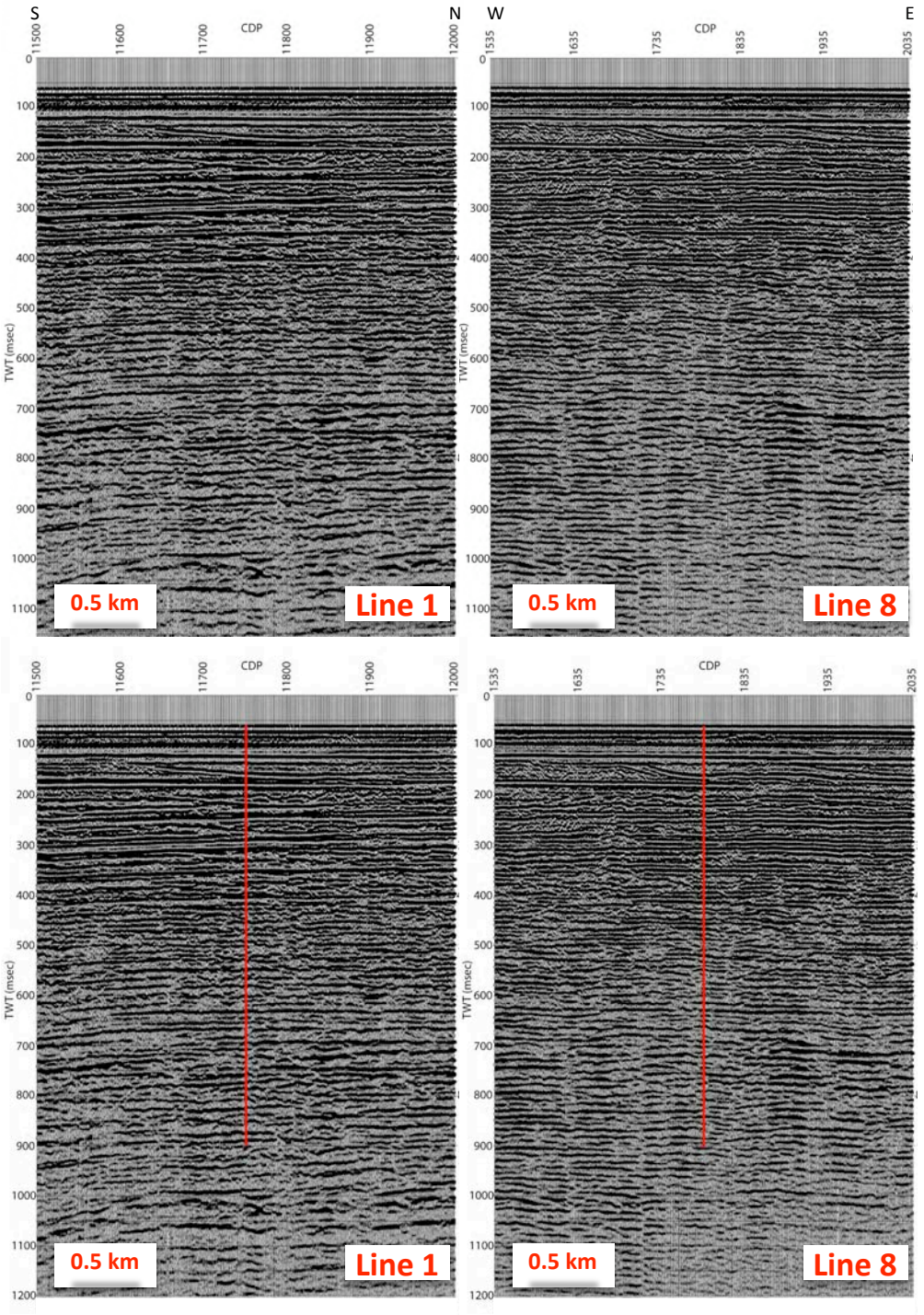
line1_mv03.pdf; line1_mv03_w_site.pdf;
line8_mv03.pdf; line8_mv03_w_site.pdf

SEG-Y Data

line1_stack.segy; line8_stack.segy

Navigation Data

line1_nav.txt; line8_nav.txt



IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ☐ **Revised** ■

Section A: Proposal Information

Title of Proposal:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England
Date Form Submitted:	01/15/10
Site Specific Objectives with Priority (Must include general objectives in proposal)	The primary objectives of drilling are to characterize the distribution of fresh-to-brackish water on the Atlantic continental shelf and to understand the fluid emplacement mechanisms which were active on the continental shelf during the Pleistocene. We will measure chemistry, microbiology, fluid pressure, and isotopic composition of the Atlantic continental shelf aquifers and confining units. MV-04B will characterize the freshwater-saltwater transition zone of the transect. Three holes will be drilled. Hole A is for petrophysics. Hole B will be continuously cored and used for hydrogeologic tests and detailed water chemistry sampling. Hole C will be for spot coring for the collection of pristine microbiological samples.
List Previous Drilling in Area:	AMCOR wells 6001, 6009, 6020, 6021; COST wells B-2, G-1, G-2, ODP Leg 174A, IODP Exp. 313

Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	MV-04B	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	New England continental shelf
Latitude:	Deg: 40.6206 N	Min:	Jurisdiction:	USA
Longitude:	Deg: 70.1381 W	Min:	Distance to Land:	87 km
Coordinates System:	WGS 84, Other ( )			
Priority of Site:	Primary: X	Alt:	Water Depth:	52 m

Section C: Operational Information

	Sediments	Basement
Proposed Penetration: (m)	Recent to Cretaceous sediments	Not applicable
	What is the total sed. thickness? 750 m	
	Total Penetration: 750 m	
General Lithologies:	Sand, silt, and clay	
Coring Plan: *(Specify or check)*	Plan will be developed based on the successful approach of IODP Exp. 313.	
	1-2-3-APC ■ VPC* ☐ XCB ■ MDCB* ☐ PCS ☐ RCB ■ Re-entry ☐ HRGB ☐	
	** Systems Currently Under Development*	

Wireline Logging Plan:

Standard Tools		Special Tools				LWD	
Neutron-Porosity	☐	Borehole Televiewer	☐	Formation Fluid Sampling	■	Density-Neutron	■
Litho-Density	☐	Nuclear Magnetic Resonance	☐	Borehole Temperature & Pressure	■	Resistivity-Gamma Ray	■
Gamma Ray	☐	Geochemical	■	Borehole Seismic	☐	Acoustic	■
Resistivity	☐	Side-Wall Core Sampling	☐				
Acoustic	☐						
Formation Image	☐			Others ( )		Others ( )	

Max.Borehole Temp. :	*Expected value (For Riser Drilling)* _____°C
Mud Logging: *(Riser Holes Only)*	Cuttings Sampling Intervals
	from _____ m to _____ m, _____ m intervals
	from _____ m to _____ m, _____ m intervals
	Basic Sampling Intervals: 5m
Estimated days:	Drilling/Coring: 21.4 / Logging: 4.0 / Total On-Site: 25.4
Future Plan:	*Longterm Borehole Observation Plan/Re-entry Plan - None*

Hazards/ Weather:

Please check following List of Potential Hazards

Shallow Gas	☐	Complicated Seabed Condition	☐	Hydrothermal Activity	☐	*What is your Weather window? (Preferable period with the reasons)*	
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	March – August to avoid hurricanes and winter storms	
Shallow Water Flow	☐	Currents	☐	Methane Hydrate	☐		
Abnormal Pressure	■	Fractured Zone	☐	Diapir and Mud Volcano	☐		
Man-made Objects	■	Fault	☐	High Temperature	☐		
H_2S	☐	High Dip Angle	☐	Ice Conditions	☐		
CO_2	☐						

Form 2 - Site Survey Detail

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-04B	Date Form Submitted: 01/15/10

	Data Type	SSP Requir-ements	Exists In DB	Details of available data and data that are still to be collected
1	High resolution seismic reflection			Primary Line(s): :Location of Site on line (SP or Time only) Line 1 (CDP 6901) Crossing Lines(s): Line 9 (CDP 1821)
2	Deep Penetration seismic reflection			Primary Line(s): Location of Site on line (SP or Time only) USGS Line 5 Crossing Lines(s):
3	Seismic Velocity†			Interval velocity from seismic processing
4	Seismic Grid			2D seismic grid of continental shelf collected in 2009
5a	Refraction (surface)			
5b	Refraction (near bottom)			
6	3.5 kHz			Location of Site on line (Time) Collected along 2D seismic lines on continental shelf in 2009
7	Swath bathymetry			
8a	Side-looking sonar (surface)			
8b	Side-looking sonar (bottom)			
9	Photography or Video			Assorted USGS imagery exists
10	Heat Flow			
11a	Magnetics			
11b	Gravity			
12	Sediment cores			Assorted grab samples from USGS exist
13	Rock sampling			
14a	Water current data			Available
14b	Ice Conditions			
15	OBS microseismicity			
16	Navigation			
17	Other			

SSP Classification of Site:	SSP Watchdog:	Date of Last Review:
SSP Comments:		

X=required; X*=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.

Form 3 - Detailed Logging Plan

IODP Site Summary Forms:

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-04B	Date Form Submitted: 01/15/10
Water Depth (m): 52	Sed. Penetration (m): 750	Basement Penetration (m): 0

Do you need to use the conical side-entry sub (CSES) at this site? Yes ☐ No ■

Are high temperatures expected at this site? Yes ☐ No ■

Are there any other special requirements for logging at this site? Yes ■ No ☐

If "Yes" Please describe requirements: LWD

What do you estimate the total logging time for this site to be: 4 days

Measurement Type	Scientific Objective	Relevance (1=high, 3=Low)
Neutron-Porosity	Alternate to LWD density-neutron; not required if run LWD	2
Litho-Density	Alternate to LWD density-neutron and gamma ray; not required if run LWD	2
Natural Gamma Ray	Alternate to LWD gamma ray; not required if run LWD	2
Resistivity-Induction	Alternate to LWD resistivity; not required if run LWD	2
Acoustic	Detailed sonic velocity for synthetic seismograms and core-log-seismic integration	1
FMS	Alternate to LWD resistivity-gamma ray; not required if run LWD	2
BHTV	Not required	3
Resistivity-Laterolog	Alternate to LWD resistivity; not required if run LWD	2
Magnetic/Susceptibility	Alternate lithologic indicator; not required if run LWD	2
Density-Neutron (LWD)	High-quality density characterization of sediments in an intact borehole to define bulk physical properties.	1
Resitivity-Gamma Ray (LWD)	High-quality lithologic characterization of the sediments, freshwater-saltwater porewater determination, and data for formation factor (microbiology, fluids) in an intact borehole.	1
Other: Special tools (CORK, PACKER, VSP, PCS, FWS, WSP	Packers for hydro tests and porewater analysis (chemical, biologic); VSP	1

For help in determining logging times, please contact the ODP-LDEO Wireline Logging Services group at:

borehole@ldeo.columbia.edu
http://www.ldeo.columbia.edu/BRG/brg_home.html
Phone/Fax: (914) 365-8674 / (914) 365-3182

Note: Sites with greater than 400 m of penetration or significant basement penetration require deployment of standard toolstrings.

Form 4 – Pollution & Safety Hazard Summary

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-04B	Date Form Submitted: 01/15/10

1	Summary of Operations at site: (Example: Triple-APC to refusal, XCB 10 m into basement, log as shown on page 3.)	APC to refusal, followed by XCB and RCB as necessary to reach TD in sediment. Drilling plan will be similar to that of IODP Exp. 313 based on similar lithology and TDs.
2	Based on Previous DSDP/ODP drilling, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock.	No previous DSDP/ODP/IODP drilling at this location. Nearby ODP Leg 174A and IODP Exp. 313 did not have hydrocarbon issues.
3	From Available information, list all commercial drilling in this area that produced or yielded significant hydrocarbon shows. Give depths and ages of hydrocarbon-bearing deposits.	Previous USGS and COST drilling did not indicate any hydrocarbon occurrence.
4	Are there any indications of gas hydrates at this location?	No gas hydrate indications at this location.
5	Are there reasons to expect hydrocarbon accumulations at this site? Please give details.	No reason to expect accumulation of hydrocarbons. Previous hydrocarbon evaluation did not show hydrocarbons, and documented that source rocks are immature. Initial seismic velocity analysis does not show any hydrocarbon indicators.
6	What "special" precautions will be taken during drilling?	A drilling program utilizing conductor pipe, casing, and drilling mud will be used to maintain formation integrity, maximize science, and protect the BHA and downhole tools.
7	What abandonment procedures do you plan to follow:	Standard IODP procedures of abandonment will be followed for shallow MSP holes building off procedures of IODP Exp. 313.
8	Please list other natural or manmade hazards which may effect ship's operations. (e.g. ice, currents, cables)	Fishing and lobster trapping are common in the region. A regional shipping lane also exists nearby. These hazards are easily mitigated for MSP operations using radio communication and notification.
9	Summary: What do you consider the major risks in drilling at this site?	Borehole stability and integrity/maintenance will be the major risk drilling this site.

IODP Site Summary Forms:

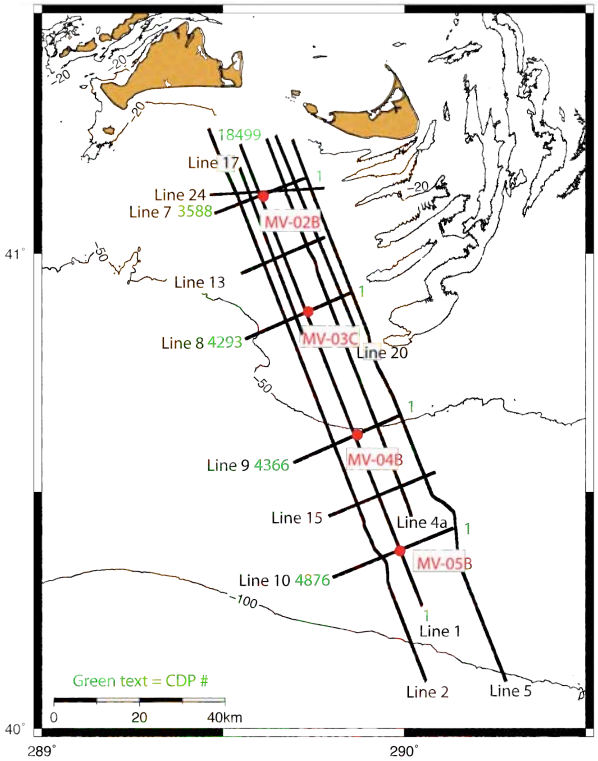
Form 5 – Lithologic Summary

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-04B	Date Form Submitted: 01/15/10

Sub-bottom depth (m)	*Key reflectors, Unconformities, faults, etc*	*Age*	*Assumed velocity (km/sec)*	*Lithology*	*Paleo-environment*	*Avg. rate of sed. accum. (m/My)*	*Comments*
0-750		<Cret.	1.5-2.0	Silt, sand, clay	Shelf-slope		

Site Summary Form 6
Proposal 637
Site MV-04B
Line 1 CDP 6901; Line 9 CDP 1821



SSDB Data Files

Regional CDP Trackline Map

mv_cdpmap_annotate.pdf

Seismic Data Figures

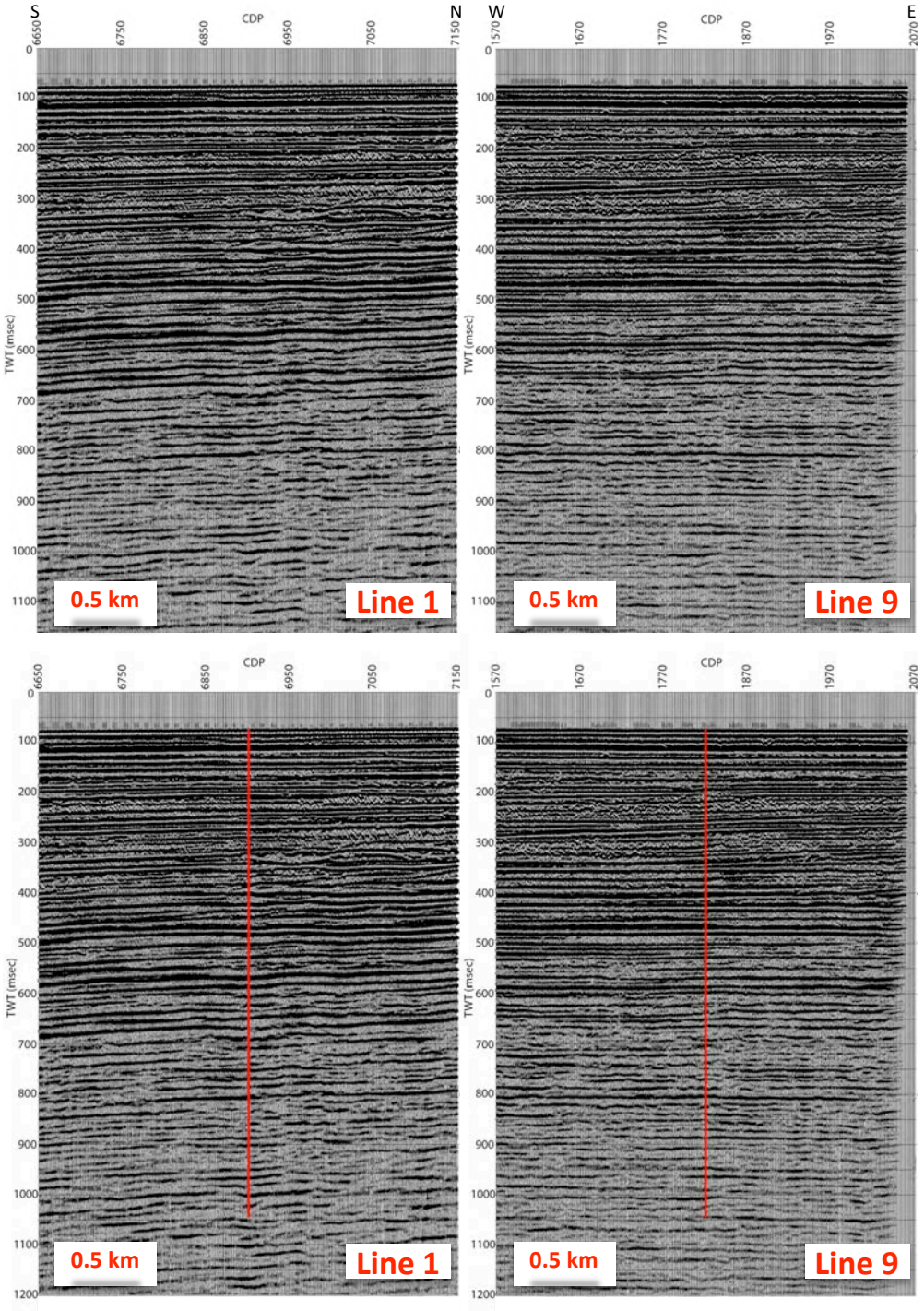
line1_mv04.pdf; line1_mv04_w_site.pdf;
line9_mv04.pdf; line9_mv04_w_site.pdf

SEG-Y Data

line1_stack.segy; line9_stack.segy

Navigation Data

line1_nav.txt; line9_nav.txt



IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ☐ **Revised** ■

Section A: Proposal Information

Title of Proposal:	A Shallow Drilling Campaign to Assess the Pleistocene Hydrogeology, Geomicrobiology, Nutrient Fluxes, and Fresh Water Resources of the Atlantic Continental Shelf, New England
Date Form Submitted:	01/15/10
Site Specific Objectives with Priority (Must include general objectives in proposal)	The primary objectives of drilling are to characterize the distribution of fresh-to-brackish water on the Atlantic continental shelf and to understand the fluid emplacement mechanisms which were active on the continental shelf during the Pleistocene. We will measure chemistry, microbiology, fluid pressure, and isotopic composition of the Atlantic continental shelf aquifers and confining units. MV-05B will characterize the saltwater-dominated zone of the transect. Three holes will be drilled. Hole A is for petrophysics. Hole B will be continuously cored and used for hydrogeologic tests and detailed water chemistry sampling. Hole C will be for spot coring for the collection of pristine microbiological samples.
List Previous Drilling in Area:	AMCOR wells 6001, 6009, 6020, 6021; COST wells B-2, G-1, G-2, ODP Leg 174A, IODP Exp. 313

Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	MV-05B	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	New England continental shelf
Latitude:	Deg: 40.3771 N	Min:	Jurisdiction:	USA
Longitude:	Deg: 70.0119 W	Min:	Distance to Land:	116 km
Coordinates System:	WGS 84, Other ( )			
Priority of Site:	Primary: X	Alt:	Water Depth:	79 m

Section C: Operational Information

	Sediments	Basement
Proposed Penetration: (m)	Recent to Cretaceous sediments	Not applicable
	What is the total sed. thickness? 775 m	
	Total Penetration: 775 m	
General Lithologies:	Sand, silt, and clay	
Coring Plan: *(Specify or check)*	Plan will be developed based on the successful approach of IODP Exp. 313.	
	1-2-3-APC ■ VPC* ☐ XCB ■ MDCB* ☐ PCS ☐ RCB ■ Re-entry ☐ HRGB ☐	
	** Systems Currently Under Development*	

Wireline Logging Plan:	Standard Tools		Special Tools				LWD	
	Neutron-Porosity	☐	Borehole Televiewer	☐	Formation Fluid Sampling	■	Density-Neutron	■
	Litho-Density	☐	Nuclear Magnetic Resonance	☐	Borehole Temperature & Pressure	■	Resistivity-Gamma Ray	■
	Gamma Ray	☐	Geochemical	■	Borehole Seismic	☐	Acoustic	■
	Resistivity	☐	Side-Wall Core Sampling	☐				
	Acoustic	☐						
	Formation Image	☐			Others ( )		Others ( )	

Max.Borehole Temp. :	*Expected value (For Riser Drilling)* _____°C	
Mud Logging: *(Riser Holes Only)*	Cuttings Sampling Intervals	
	from _____ m to _____ m, _____ m intervals	
	from _____ m to _____ m, _____ m intervals	
	Basic Sampling Intervals: 5m	
Estimated days:	Drilling/Coring: 22.1	Logging: 4.3 / Total On-Site: 26.4
Future Plan:	*Longterm Borehole Observation Plan/Re-entry Plan - None*	

Hazards/ Weather:	*Please check following List of Potential Hazards*						*What is your Weather window? (Preferable period with the reasons)*
	Shallow Gas	☐	Complicated Seabed Condition	☐	Hydrothermal Activity	☐	
	Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	March – August to avoid hurricanes and winter storms
	Shallow Water Flow	☐	Currents	☐	Methane Hydrate	☐	
	Abnormal Pressure	■	Fractured Zone	☐	Diapir and Mud Volcano	☐	
	Man-made Objects	■	Fault	☐	High Temperature	☐	
	H_2S	☐	High Dip Angle	☐	Ice Conditions	☐	
	CO_2	☐					

Form 2 - Site Survey Detail

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-05B	Date Form Submitted: 01/15/10

	Data Type	SSP Requir-ements	Exists In DB	Details of available data and data that are still to be collected
1	High resolution seismic reflection			Primary Line(s): :Location of Site on line (SP or Time only) Line 1 (CDP 2250) Crossing Lines(s): Line 10 (CDP 2115)
2	Deep Penetration seismic reflection			Primary Line(s): Location of Site on line (SP or Time only) USGS Line 5 Crossing Lines(s):
3	Seismic Velocity†			Interval velocity from seismic processing
4	Seismic Grid			2D seismic grid of continental shelf collected in 2009
5a	Refraction (surface)			
5b	Refraction (near bottom)			
6	3.5 kHz			Location of Site on line (Time) Collected along 2D seismic lines on continental shelf in 2009
7	Swath bathymetry			
8a	Side-looking sonar (surface)			
8b	Side-looking sonar (bottom)			
9	Photography or Video			Assorted USGS imagery exists
10	Heat Flow			
11a	Magnetics			
11b	Gravity			
12	Sediment cores			Assorted grab samples from USGS exist
13	Rock sampling			
14a	Water current data			Available
14b	Ice Conditions			
15	OBS microseismicity			
16	Navigation			
17	Other			

SSP Classification of Site:	SSP Watchdog:	Date of Last Review:
SSP Comments:		

X=required; X*=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.

Form 3 - Detailed Logging Plan

IODP Site Summary Forms:

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-05B	Date Form Submitted: 01/15/10
Water Depth (m): 79	Sed. Penetration (m): 775	Basement Penetration (m): 0

Do you need to use the conical side-entry sub (CSES) at this site? Yes ☐ No ■

Are high temperatures expected at this site? Yes ☐ No ■

Are there any other special requirements for logging at this site? Yes ■ No ☐

If "Yes" Please describe requirements: LWD

What do you estimate the total logging time for this site to be: 4.3 days

Measurement Type	Scientific Objective	Relevance (1=high, 3=Low)
Neutron-Porosity	Alternate to LWD density-neutron; not required if run LWD	2
Litho-Density	Alternate to LWD density-neutron and gamma ray; not required if run LWD	2
Natural Gamma Ray	Alternate to LWD gamma ray; not required if run LWD	2
Resistivity-Induction	Alternate to LWD resistivity; not required if run LWD	2
Acoustic	Detailed sonic velocity for synthetic seismograms and core-log-seismic integration	1
FMS	Alternate to LWD resistivity-gamma ray; not required if run LWD	2
BHTV	Not required	3
Resistivity-Laterolog	Alternate to LWD resistivity; not required if run LWD	2
Magnetic/Susceptibility	Alternate lithologic indicator; not required if run LWD	2
Density-Neutron (LWD)	High-quality density characterization of sediments in an intact borehole to define bulk physical properties.	1
Resitivity-Gamma Ray (LWD)	High-quality lithologic characterization of the sediments, freshwater-saltwater porewater determination, and data for formation factor (microbiology, fluids) in an intact borehole.	1
Other: Special tools (CORK, PACKER, VSP, PCS, FWS, WSP	Packers for hydro tests and porewater analysis (chemical, biologic); VSP	1

For help in determining logging times, please contact the ODP-LDEO Wireline Logging Services group at:

borehole@ldeo.columbia.edu
http://www.ldeo.columbia.edu/BRG/brg_home.html
Phone/Fax: (914) 365-8674 / (914) 365-3182

Note: Sites with greater than 400 m of penetration or significant basement penetration require deployment of standard toolstrings.

Form 4 – Pollution & Safety Hazard Summary

IODP Site Summary Forms:

Please fill out information in all gray boxes

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-05B	Date Form Submitted: 01/15/10

1	Summary of Operations at site: (Example: Triple-APC to refusal, XCB 10 m into basement, log as shown on page 3.)	APC to refusal, followed by XCB and RCB as necessary to reach TD in sediment. Drilling plan will be similar to that of IODP Exp. 313 based on similar lithology and TDs.
2	Based on Previous DSDP/ODP drilling, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock.	No previous DSDP/ODP/IODP drilling at this location. Nearby ODP Leg 174A and IODP Exp. 313 did not have hydrocarbon issues.
3	From Available information, list all commercial drilling in this area that produced or yielded significant hydrocarbon shows. Give depths and ages of hydrocarbon-bearing deposits.	Previous USGS and COST drilling did not indicate any hydrocarbon occurrence.
4	Are there any indications of gas hydrates at this location?	No gas hydrate indications at this location.
5	Are there reasons to expect hydrocarbon accumulations at this site? Please give details.	No reason to expect accumulation of hydrocarbons. Previous hydrocarbon evaluation did not show hydrocarbons, and documented that source rocks are immature. Initial seismic velocity analysis does not show any hydrocarbon indicators.
6	What "special" precautions will be taken during drilling?	A drilling program utilizing conductor pipe, casing, and drilling mud will be used to maintain formation integrity, maximize science, and protect the BHA and downhole tools.
7	What abandonment procedures do you plan to follow:	Standard IODP procedures of abandonment will be followed for shallow MSP holes building off procedures of IODP Exp. 313.
8	Please list other natural or manmade hazards which may effect ship's operations. (e.g. ice, currents, cables)	Fishing and lobster trapping are common in the region. A regional shipping lane also exists nearby. These hazards are easily mitigated for MSP operations using radio communication and notification.
9	Summary: What do you consider the major risks in drilling at this site?	Borehole stability and integrity/maintenance will be the major risk drilling this site.

IODP Site Summary Forms:

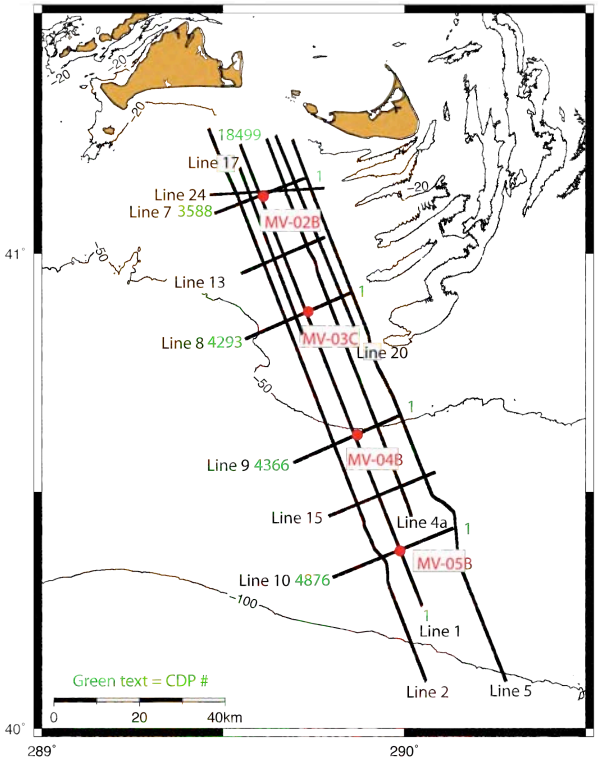
Form 5 – Lithologic Summary

New ☐ *Revised* ■

Proposal #: 637-Full2	Site #: MV-05B	Date Form Submitted: 01/15/10

Sub-bottom depth (m)	*Key reflectors, Unconformities, faults, etc*	*Age*	*Assumed velocity (km/sec)*	*Lithology*	*Paleo-environment*	*Avg. rate of sed. accum. (m/My)*	*Comments*
0-775		<Cret.	1.5-2.0	Silt, sand, clay	Shelf-slope		

Site Summary Form 6
Proposal 637
Site MV-05B
Line 1 CDP 2250; Line 10 CDP 2115



SSDB Data Files

Regional CDP Trackline Map

mv_cdpmap_annotate.pdf

Seismic Data Figures

line1_mv05.pdf; line1_mv05_w_site.pdf;
line10_mv05.pdf; line10_mv05_w_site.pdf

SEG-Y Data

line1_stack.segy; line10_stack.segy

Navigation Data

line1_nav.txt; line10_nav.txt