

IODP Proposal Cover Sheet☒ **New**☐ **Revised**☐ **Addendum****621-Full***Please fill out information in all gray boxes**Above For Official Use Only*

Title:	Installation of Borehole Observatories in Monterey Bay		
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Keywords: (5 or less)	Boreholes, cabled-observatory, geohydrology, seismic	Area:	Central California Margin

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Permission to post abstract on iSAS Web site: ☐ Yes ☐ No ☐*Abstract: (400 words or less)*

We propose that IODP install three ~300-m cased reentry boreholes in Monterey Bay, California, to establish a borehole instrument test facility and to develop borehole-to-submarine-cable technologies. Two closely spaced holes (50 m apart) will have basic completion assemblies. These sites will first be used to conduct borehole hydrologic and geochemical measurements to establish what equilibrium conditions are in a low flow environment. Subsequently these sites will be used to conduct perturbation experiments (by pumping) that will be fundamental to our understanding of how porosity and permeability measurements scale in time and space. After these tests, the side-by-side boreholes will be available for other down-hole experiments and tests. The third hole will be configured for a borehole seismometer with a casing strategy to minimize fluid flow into or out of the formation, which is a source of seismic noise. The seismic hole will be placed ~ 2 km from the other holes to isolate it from noise associated with the other facilities. This site will be the first cable-connected borehole seismic observatory along the North American Margin that is entirely on the Pacific Plate.

The borehole sites are located near the proposed terminus of the MARS cabled observatory. The MARS observatory was funded by the USA's NSF to serve as a test bed for oceanographic instrumentation, experiment protocols, operational procedures, management policies, data archiving, and educational outreach for any future regional cabled observatories. Given the very wide interest in the marine community for combining the power and communications capabilities of cabled observatories with the ability of IODP to get instruments into the sub-seafloor environment, the site of an IODP hole with reentry capability near the MARS test bed is a wonderful match. It will not only make the test bed more attractive to a wider range of researchers, but should also accelerate the development of new instruments and experiments to be deployed in IODP holes globally.

The primary borehole sites will be located on the surface of Smooth Ridge in Monterey Bay, offshore California, in water depths of 831 m and 1008 m and penetrate Neogene hemipelagic sediments. The proposed borehole sites are only 2 hours steaming time from Moss Landing, home port to two vessels equipped with remotely operated vehicles (ROVs) operated by the Monterey Bay Aquarium Research Institute (MBARI). The combination of near-shore deep water, year-round favorable weather, the cable test bed, and logistically-convenient ROV support make Monterey Bay an ideal site for developing the next generation of instrumentation for scientific boreholes and for developing experiments that take advantage of synergy between cabled observatories and future IODP holes.

621-Full

Scientific Objectives: (250 words or less)

The objective is to stimulate the development of the next generation of seafloor borehole experiments. IODP promises to expand on the progress made in ODP to conduct experiments in boreholes under the ocean floor. However, the experience with conducting bore hole experiments shows that these are inherently complicated systems to develop and deploy. Thus, an accessible facility in which new systems can be tested and refined will be critical to stimulating this new style of science within the IDOP community.

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

While the sub-seafloor completions envisioned for this facility are essentially standard, the seafloor expressions will be altered to make them more easily ROV serviceable, less noisy, and capable of being connected to a seafloor cable that will provide power and bi-directional communication.

Proposed Sites:

Site Name	Position	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
MARS node	36.71137° N 122.18681° W	890				Node to connect with borehole
MBTS-03A	36.71751° N 122.17605° W	831	300	0	300	Geohydrology test site supply borehole
MBTS-04A	(side-by-side with MBTS-03A)	831	300	0	300	CORKed monitoring site borehole
MBTS-05A	36.70214° N 122.20320° W	1008	300	0	300	Seismic observatory borehole