

## Project Summary

We propose to develop a hardware/software interface system that will allow the acquisition of various scientific data from the seafloor in observatory mode, using seafloor cables to provide power and communications. The main objective of this proposal is to provide a system, based as much as possible on off-the-shelf technology, that will allow the following seafloor-to-cable capabilities:

- Connection of scientific instruments that are not in the immediate vicinity of a cable node and therefore require an extension cable.
- Connection of multiple sensors with different interfaces (analog and digital), data rates, and other requirements to the extension cable.
- Data acquisition as part of an existing continuous and real time monitoring system

There is currently a unique opportunity for this development with the conjunction of : 1) the planned installation of the MARS cable (Monterey Accelerated Research System; <http://www.mbari.org/mars>), now scheduled for the Fall of 2006, a testbed for cabled observatories such as NEPTUNE; and 2) the proximity of the MARS cable path to the existing ocean floor broadband seismic MOBB station (Monterey Ocean Bottom Broadband observatory), operated cooperatively by MBARI (Monterey Bay Aquarium Research Institute) and the Berkeley Seismological Laboratory (BSL) in autonomous mode for the last 4 years.

This project will define, design, fabricate, and install the interfaces necessary to have MOBB installed on the MARS cable to fully exploit the power of the existing instrumentation and the benefits provided by MARS. In particular, we propose to adapt to the cabled observatory environment, the AUDL(Advanced Underwater Data Logger) electronics module currently being developed by GEOSense for autonomous seafloor deployments, as well as software for on-shore data acquisition and remote communication with the sensors on the seafloor. The components developed will then be available for connecting other seafloor sensors to MARS and for replication on other cables: the system we propose to build is based on a commercially available datalogger, a Science Instrument Interface Module (SIIM) that will be freely available to other users and available for non-exclusive license to manufacturers, while the software for data telemetry and shore-based acquisition and data distribution software based on Freeorb will be freely open and available.

The proposed system, when combined with the MOBB instruments will demonstrate how the components can be used in a wide range of cabled experiments. We will demonstrate data acquisition and near-real time telemetry from:

- Analog devices (DPG),
- Simple serial devices (current meter).
- Complex serial devices (Guralp seismometer).

*Intellectual Merit* The need for long term ocean floor observatories has now been widely recognized, and several national and international efforts are underway to resolve the technological and logistical issues associated with such deployments. The proposed work would provide a solution for cabled observatories comprising different sets of sensors for the acquisition of geophysical, geological or biological data.

*Broader Impacts* The cabled observatory system developed in this proposal will serve for other users interested in connecting sensors to the MARS cable, provide a prototype for interfaces for the Ocean Observatory Initiative (OOI) Cabled observatory and coastal observatories, and more generally, contribute to advance the capabilities of ocean floor observatories at the international scale. The data acquired during this project will be openly available in real-time and for future analysis by the research community through the NCEDC.