

Abstract Form

NOTE: Continuing Projects should enter the internal project number **and** use the project title from the previous year.

Project Number:	600045
Project Title:	DORISS - Deep Ocean Raman In-Situ Spectrometer (formerly Laser Raman Spectrometer)
Project Manager/PI:	Peter Brewer
Lead Scientist:	Peter Brewer
Lead Engineer:	Bill Kirkwood

Project Description:

We have successfully introduced the first Raman spectrometer for deep-ocean science, and are now poised to make creative use of, and expand upon, this unique capability. During the first half of 2003 (Year 1) we deployed DORISS in the Gulf of California (GoC) and collected the first *in situ* Raman spectra of natural targets. We built and tested a preliminary version of the Precision Underwater Positioner (PUP). In Year 2 we propose to expand the use of DORISS in the ocean and in the laboratory, and to complete the full 5 DOF PUP system.

We will complete and publish Raman work successfully initiated in the GoC by comparing *in situ* and laboratory Raman spectra, and gas chromatographic analyses of the same samples carried out within our Greenhouse Gases project. We propose to create and test important new observing protocols for the analysis of geochemical solid phases through use of the PUP-DORISS system on MBARI's ROVs. We propose to extend this important new capability to expeditionary work by taking part in a Western Flyer cruise to northern sites in summer 2004. This will permit Raman studies at Hydrate Ridge, OR and the Cleft segment. To date our work has primarily been focused on greenhouse gas problems. We are now ready to significantly expand our range of inquiry. We propose to use the PUP-DORISS system to obtain the first Raman measurements of hydrothermal systems (including vent minerals, hydrothermal fluids, and associated bacterial mats) in conjunction with the work of other MBARI researchers at the Cleft segment during the northern Western Flyer cruise.

Several technical initiatives are necessary to accomplish our science goals. First, we plan to complete the PUP by adding 3 axes (main stage rotation, and pan & tilt for the remote head) as identified in the Concept Design. This is essential for *in situ* Raman measurements of solids, but could not be completed in 2003 due to resource limitations. Secondly, a series of upgrades are required to improve DORISS performance. The primary issue is sensitivity loss from attenuation in the fiber optic cables. The current fiber optic cables are pressure sensitive and significantly diminish the optical signals. As a result the trace gas components from the GoC gas vent were difficult to identify in the Raman spectrum, yet are known to be present at what should be detectable levels. Other items include researching the possibility of changing to a much smaller probe head that would make the DORISS-PUP combination easier to handle and accommodate on other

2004 Abstract Form – Internal-Only Projects (no external funding).

Deadline for Abstract submission is 8:00 a.m. on June 23rd.

ROV systems. Through the lens (TTL) visualization was put on hold in 2003 for lack of resources. This will be carried forward, but there are two possibilities: 1) replace the probe head and eliminate the need for TTL or 2) proceed with the delayed plans for TTL (should the smaller probe head prove invalid for our use). This would be accomplished as with the PUP design by appropriate trade studies and determining the best solution for MBARI. We are obtaining order of magnitude costs at this time, but it is difficult since our requirements are not for an "off the shelf" design.

The approach for the DORISS/PUP program in 2004 will be to outline the next multi-year elements for advancement. We will list our needs and prioritize them with the associated cost estimates and resource requirements. This plan will demonstrate the DORISS team's understanding of what we are trying to accomplish, and the relationship of each technical element to the program's scientific goals. Using the previous programmatic success we will propose the various elements in distinct groupings to optimize the management of resources.

Abstract Phase: LABOR Resource Request Form

Project Title:	DORISS – Deep Ocean Raman In Situ Spectrometer
Project Manager/PI:	Peter Brewer
Lead Scientist:	Peter Brewer
Lead Engineer:	Bill Kirkwood

Please place an "X" to the left of the resources you expect to need for this project, as well as next to "<10" (less than) or ">10" (more than) to indicate estimated need.

Research: IAG					
	Research: SAD/Software Engineer		< 10 days		> 10 days
Development					
X	Development: Electrical Engineer		< 10 days	X	> 10 days
X	Development: Software Engineer		< 10 days	X	> 10 days
X	Development: Mechanical Engineer		< 10 days	X	> 10 days
X	Development: Machinist		< 10 days	X	> 10 days
ITD					
X	ITD: Video Lab/Samples Tech	X	< 10 days		> 10 days
X	ITD: Technical Writer	X	< 10 days		> 10 days
DMO					
	DMO: Ocean Observatory Tech		< 10 days		> 10 days
	DMO: CTD Instrumentation Tech		< 10 days		> 10 days
	DMO: Diver		< 10 days		> 10 days
COO					
	COO: IS Administrator		< 10 days		> 10 days