

Abstract Form

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

Project Number:	200001
Project Title:	Ocean Chemistry of the Greenhouse Gases II
Project Manager/PI:	Edward Peltzer
Lead Scientist:	Peter Brewer
Lead Engineer:	William Kirkwood

Project Description:

We propose to continue our influential work on the greenhouse gases in 2004 with innovative ROV based experiments on the geochemistry of both CH₄ and CO₂ in the deep ocean. The work is closely aligned to MBARI developments in laser Raman spectrometry, and we hope to take advantage of this newly developed and exciting tool.

Methane geochemistry. We propose first to complete work begun in the Gulf of California, where a major gas vent was found at 1508m depth. A suite of excellent gas samples was collected, with hydrate fractionation during collection avoided by a new heated funnel technique. We will obtain gas chromatography data in house, and isotopic data in collaboration with W. Reeburgh (UCI). We will obtain laboratory Raman data to compare with field data obtained *in situ*. We have established a NURP funded collaboration with E. D. Sloan (CSM), and will carry out joint field and laboratory Raman spectroscopic studies of methane hydrate formation with MBARI ships and vehicles.

We propose a summer Western Flyer cruise to Hydrate Ridge, OR to extend the hydrate work successfully initiated there and to take advantage of our new spectroscopic skills. We will initiate the expedition use of MBARI's new PUP instrument to obtain novel sea floor data. This will permit the first field examination of hydrates in the unaltered state, and should also allow us to accomplish sea floor Raman sensing of important other constituents such as carbonates and bacterial mats.

Ocean CO₂ studies. Our work here has attracted significant international attention. Peter Brewer serves as a lead author on the IPCC Special Report on this topic, and on the committee for a major SCOR/IOC international meeting in early 2004. It is very likely that this field will evolve to a more general concern over the science of a low pH ocean (impacts on coral reefs, animal physiology, microbial cycles, carbonate sediment dissolution), which will inevitably occur as this century unfolds. Thus the experiments we propose to carry out may very well have far broader significance than sequestration studies alone, and could create important techniques that would be widely adopted. We will continue the NEDO (Japan) funded series of sequestration experiments with colleagues from Osaka and Bergen, in which we examine the physical properties of a

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

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

plume from a small pool of CO₂ on the sea floor. We will also continue DoE supported experimental studies jointly with Jim Barry and other external investigators to examine the effects of high CO₂ levels on deep-sea animals and microbes, with a focus on creating known stable CO₂ enriched areas. Important questions over the kinetics of CO₂ hydration rates at low temperatures and high pressures, and the dynamics of the dense CO₂ rich water plume, will be addressed so that valid representations of the field can be obtained.

Abstract Phase: **LABOR** Resource Request Form

Project Title:	Ocean Chemistry of the Greenhouse Gases II
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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	X	< 10 days		> 10 days
X	Development: Software Engineer	X	< 10 days		> 10 days
X	Development: Mechanical Engineer	X	< 10 days		> 10 days
X	Development: Machinist	X	< 10 days		> 10 days
ITD					
	ITD: Video Lab/Samples Tech		< 10 days		> 10 days
	ITD: Technical Writer		< 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