

2004 Proposal Form – Internal-only Projects

Submission Deadlines: Phase I: 8:00 a.m. on August 4th, Phase II: TBD

Project Number: 200105

Project START: Jan 1, 2001 **Project Duration** (in years): _____

Project Manager/PI: David Caress

**Project Title: Core Navigation -
MDUC**

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1) Abstract

This MDUC project provides for the institutional support of “core” navigation data from MBARI ships and ROVs. This is a continuing project since 2001.

The elements of this project are:

- Maintenance and minor development of software used for the processing and archiving of ROV and ship navigation.
- Data archiving and dissemination through the expedition database.
- Data validation through Science data “champion”.
- Shipboard testing of the sensors and software involved in the calculation and logging of ROV navigation.

2) Proposal

a) Introduction

ROV and ship navigation have been designated as core data streams, which means that support for the collection, processing, and archiving of the data is provided on an institutional basis rather than through individual projects or divisional budgets.

A number of failures in navigation data logging and validation have occurred or been discovered over the past two years. Additionally, both DMO and Science have expressed dissatisfaction with the quality of ROV navigation and a suspicion that a combination of calibration errors and non-optimal system settings may be degrading basic navigation data (e.g. USBL ranges and angles). Consequently, the 2004 Core Navigation Project is proposed to encompass greater effort and resources than in past years.

We have, in fact, already put considerable effort into improving MBARI’s handling of ROV navigation during 2003, and will make significant progress during this year.

- In April, we started logging an additional data file on the Point Lobos that includes the raw values from all navigation related sensors. Additionally, we are frequently logging Ventana DVL data during benthic dives. We have combined USBL and DVL data from test dives in April that included closed loops to and from stationary beacons. Working in conjunction with the Seafloor Mapping project, we also have test navigation data from two dives using the Kearfott INS (with integrated DVL) that provide independent INS navigation to compare with the USBL navigation. Our goal is to create an alternative ROV navigation processing stream that does not depend on the realtime Kalman filtering provided by the Winfrog software; we expect to have this secondary processing stream in place by late 2003.
- Following problems with the primary GPS navigation source on the Western Flyer during the Gulf of California Expedition, IAG is now working to log Western Flyer ship navigation from the Leica GPS receiver used by the crew and the ROV navigation system instead of the currently logged Trimble GPS data.

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- Many of our core data problems involve cases where data logging failures were not recognized in realtime. The dataprobe application is designed by IAG to display data logging status on either vessel, but this program is not always displayed prominently (or at all) because the available control room monitors are occupied by other displays. IAG is now planning to provide portable PDA or tablet PC-based displays that will run dataprobe using the shipboard wireless networks. These displays will be repositioned easily (with tape and Velcro) to wherever a particular science party desires.

b) Approach to the problem

The primary elements of this project are:

- Maintenance and development of software used for the processing and archiving of ROV and ship navigation, primarily by IAG.
- Evaluation of navigation sensor hardware and software in collaboration with ROV pilots and Rob McEwen of Engineering.
- Data archiving and dissemination through the expedition database.
- Data validation through a Science data “champion”.

The data archiving, processing, and validation activities will proceed substantially as in past years.

As part of a comprehensive review of core data stream processing, IAG will identify necessary changes to the systematic processing and review of core data. Possible changes include improved Dataprobe usage, automated error detection in data post-processing, automatic generation of review requests to Chief Scientists (of the dive) and Data Champions (of the data stream), and production of visualizations in real-time or immediately after the data has been archived.

In particular, IAG will attempt to address barriers to Dataprobe operations, including screen real estate and location issues. To maximize Dataprobe accessibility, we will investigate providing Dataprobe (and/or Dataprobe alerts) on a highly portable device such as the HP iPac Pocket PC via the ship's wireless network. This would enable scientists to check on the data, and receive alarms about the data, from anywhere on the ship at any time.

The ROV Pilots will work with Rob McEwen and David Caress on validating the hardware and software components of the systems that produce ROV navigation data. Among the questions to be answered are:

- Is there slop or misalignment of the shipboard USBL head mounts, particularly on the Western Flyer?
- Are the shipboard attitude sensor bias settings correct?
- What are the optimal Winfrog settings?

One result of this effort will be standardized procedure documentation for the navigation related systems on both vessels.

d) Project team (new and continuing projects)

The MDUC Chair (David Caress) will serve as both project manager and lead scientist for this project.

The core navigation data team for 2004 will include:

David Caress (Data Champion, MDUC, Science)

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Rich Schramm (IAG)
John Graybeal (IAG)
Mike McCann (IAG)
Rob McEwen (Engineering)
ROV Pilots (DMO)
Dan Chamberlein (DMO)

3) Budget Justification (new and continuing projects)

The 2004 budget includes the following labor totals:

- Science – IAG – 85 days
- Science – Caress – 10 days
- Engineering – McEwen – 10 days
- DMO – Ventana pilors – 5 days
- DMO – Tiburon pilots – 5 days

We request \$1K for incidental hardware and software to support the navigation testing effort.

We request 2 Point Lobos days and 1 Western Flyer days for system testing at sea.

4) Milestones (new and continuing projects)

	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5	Total Resources ¹ for each resource category for all milestones listed here
Milestone date		April 2004	May 2004	July 2004	August 2003	
Milestone description	General data processing and validation	ROV Ventana navigation tests	ROV Tiburon navigation tests	MDUC budget recommendations for 2004	Finalize 2004 proposal	
Science	4 (spread over year)	3	3			10
SE		5	5			10
IAG	35 (spread over year)	25	25			85
DMO		5	5			10

¹ This number should be same as the number you entered on the resource requests for this particular resource

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