Project Manager: D. J. Osborne

900019 Core CTD Data – MDUC

1) Abstract

Project Title: **Core CTD Data – MDUC**

Lead Scientist:	David Caress (MDUC Chair)
Lead Engineer:	None
Project Manager:	D.J. Osborne (DMO Instrumentation Technician)

CTD data collected using MBARI ROV, underway, and profiler CTD systems have been designated as core data streams. Support for the maintenance, calibration and configuration of the instruments, electronics and related support hardware as well as support for the processing and archiving of the data, is provided on an institutional basis rather than through individual projects or divisional budgets.

The primary elements of this project are:

- Maintenance, configuration and calibration of MBARI CTD instrumentation and all associated system hardware.
- Maintain measurement accuracy and reliability required for core CTD data.
- Data processing, archiving and dissemination through the BOG database.
- Data validation through Science data "champions", Reiko Michisaki for the Profiler CTD, ~~and~~ Bruce Robison for the ROV CTD and Gernot Friederich for the Underway CTD, monthly status reports are to be given to MDUC.

The project budget will include expenses for instrument maintenance and calibration, related hardware and electronics, system upgrades, related tools and consumable supplies, CTD Technician time for maintenance, data processing, and data integrity issues and minimal IAG time for software support and development. The project manager is planning to replace the old CTD profiler with a newer, more reliable unit. Additionally, efforts are planned to purchase additional sensors for use as spares in the calibration rotation and to standardize instruments of a certain type. Efforts are planned to set up maintenance tasks in a more turn-key fashion by configuring portable instrument test systems.

This project is expected to operate in 2001 as it currently does. The primary change from the previous proposal is that the DMO Instrumentation Technician will serve as project manager, as agreed by MDUC and DMO. The requested resources will be larger than in 2000, when about half of the resources required to collect and process CTD data were derived from the DMO divisional budget. Additionally, the cost estimates used to develop the 2000 budgets did not accurately estimate the costs associated with running the underway mapping systems as core, for having both ROV's in simultaneous operation, and for running both CTD profilers in essentially simultaneous use by different science groups.

2) Proposal

MBARI has designated as 'core' the most mature, accurate, reliable and important measurements of its scientific instrumentation platforms. The purpose of this project is to continue to maintain and support the CTD and related data streams that have been designated as core. The primary difference between this proposal and the 2000 Core CTD project is the decision to include; budget and account for all the related and intimately associated equipment items that are not directly considered core data instruments.

MBARI has the designated the following as core data streams:

- **ROV CTD** (Tiburon and Ventana), Conductivity, temperature, pressure, dissolved oxygen and light transmission measurements are considered core.

- **Profiler CTD** (a SeaBird 10 liter system and major upgrades planned for the General Oceanics 5 liter system), Conductivity, temperature, pressure, dissolved oxygen, light transmission and fluorometer measurements that are made with MBARI maintained CTD instrumentation on MBARI sponsored cruises are considered core.

- **Underway CTD** (Point Lobos and Western Flyer) Conductivity, temperature, fluorometer, light transmission and navigation position data obtained with MBARI maintained instrumentation is considered core.

Scope – core, core-related and non-core equipment All core data support hardware and electronics are to be maintained with the same level of commitment, under the same budget and by the same individual as the actual core sensors. These systems must all operate in order for the data stream to maintain its integrity; thus it seems logical to lump them into the same pool of support. These systems are in essence core-related equipment. This includes items like computers, cables, pumps, CTD housings and frames, terminations, etc. Additionally, this budget will cover some items that are not themselves part of the core data stream, however they are so closely related to the rest of the systems that it only makes sense to manage the items in this project. This includes the following items: Niskin CTD bottles, Altimeter, refurbishment for GO pylon, upgraded SeaBird Carousel for refurbished CTD, and western flyer CTD station video monitors.

Changes compared to the 2000 Core CTD project. This 2001 proposal reflects our experience to date with the 2000 Core CTD project. In particular, we are in a much better position now to realistically estimate the instrument maintenance, calibration, and replacement expenses required to properly maintaining the MBARI CTD instrument infrastructure. Consequently, we are submitting a significantly larger budget for 2001 than in 2000. The 2001 Core CTD project includes:

- A complete upgrade to the existing older CTD rosette.
- Necessary upgrades and yearly service for the existing CTD hardware.
- Completing the purchase of spare sensors for ALL of the systems.
- Evaluation of replacement sensors that will eventually be used to phase out extremely old instruments. For example, the current SeaTech fluorometers and transmissometers are well over 10 years old and are quickly reaching the end of their useful life.
- Maintain a better calibration history and instrument reliability than in the previous years.

Data Quality Specifications. We will improve our accuracy estimates for the core CTD and related data. Pre and post use calibration information will be analyzed to determine the accuracy of each of our core instrument types. The present instrument accuracy quotes from the manufacturer will be reviewed and modified if needed. The present specifications are, 0.1 dbar pressure, 0.01 salinity, 0.01 C temperature, 0.1 ml/l dissolved oxygen and 1% light transmission.

Upgrades to existing systems. The old 5-liter General Oceanics CTD rosette will be upgraded to an identical system like the newer 10-liter SeaBird Rosette. After polling the science community and reviewing the needs from this past year, the only logical conclusion is to have two identical systems. Additionally, the SeaBird system will get a new frame to replace the already-twice-straightened original frame. An old SeaBird SBE9 CTD will be upgraded to a SBE9 plus and will serve as a spare for the two CTD systems. The ROV transmissometer sensor will be standardized to a Wetlabs C-Star and a spare will be purchased that can serve both vehicles. Currently Tiburon uses a Chelsea that was shown in 2000 to have a design flaw for our applications. A spare oxygen sensor (for Tiburon) and fluorometer (for the UCTD) will be purchased for the Western Flyer. The underway transmissometer sensor will be standardized to a SeaTech 20 cm unit and a unit will be purchased for the Flyer and a spare will be purchased that can serve either ship.

Data processing, archiving, dissemination, and quality control- The data processing scheme will operate much the same way as in 2000. The DMO Instrumentation technician will serve to maintain and archive the SeaBird processing scripts for the Profiler and Underway CTD data acquired with MBARI core instruments. The DMO Instrumentation technician will serve to interface with external data users, train others to run the CTD systems, maintain the MBARI procedures for running the CTD systems, and train others to use the CTD processing software. IAG will provide similar support as last year – modifying as required and maintaining the unix processing and logging jobs for the data streams. The data champions are requested to present the results of the monthly data verification and quality control checks to the MDUC committee

Instrument calibration and maintenance The Access database containing all the instrument calibration and model information will continue to be maintained and updated. This system will be used to monitor instruments that need calibration or yearly service. A portable calibration test stand will be built for the dissolved oxygen sensors and the transmissometers. This will significantly decrease the turn around time required to calibrate these sensors – providing better calibration drift assessment and more accurate measurements. These sensors are historically the most difficult to maintain with respect to accuracy and drift.

Project Team. The Core CTD data team includes:

- D.J. Osborne (Project Manager, MDUC, CTD Technician, DMO)
- Reiko Michisaki (Data Champion for Profiler CTD, Science)
- Bruce Robison (Data Champion for ROV CTD, Science)
- Gernot Friederich (Data Champion for Underway CTD, Science)
- David Caress (MDUC Chair, Science)
- Rich Schramm (IAG, MDUC)

3) Budget

The 2001 budget includes the following:

- 160 days DMO Instrument Technician (D.J. Osborne) for CTD hardware support and data processing.
- 5 days Scientist (Bruce Robison) for data validation as Data Champion
- ~~5~~ 6 days Research Specialist (Reiko Michisaki) for data validation as Data Champion
- 5 days Scientist (Gernot Friederich) for data validation as Data Champion
- 26 days IAG Software Engineer for general software and evaluation of data specifications and accuracy.
- 4 days IS Administrator for network and computer support.

The 2001 budget includes a large number of equipment purchase, instrument calibration, and instrument expendable expenses.

4) Milestones for 2001

- Feb 15, 2000 The new CTD system available for use
- March 15, 2000 In-Situ recalibration system available for Trans. & Oxygen
- April 1, 2000 Spares for all systems available in house
- May 1, 2000 Debubbler installed on Pt Lobos
- Aug 1, 2000 MBARI measurement accuracies reevaluated
- Sept 1, 2000 New Fluorometers and transmissometers evaluated for use on CTD profilers