An update on:
Developing CTD Best Practices

RVTEC 2024
October 21-25th
Portsmouth, New Hampshire

UNOLS
UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Ocean best practices

R2R
ROLLING DECK TO REPOSITORY

RCRV
Regional Class Research Vessels

Group Members & Working Group Leads

Rebecca Hudak
Rolling Deck to Repository
Woods Hole Oceanographic Institute

Margaret Archibald: MMA
Ryan Anderson: WHOI
Susan Becker: UCSD
Lynne Butler: URI
Taylor Crockford: WHOI
Calla Lloyd-lim: NOAA
William Dullea: WHOI
Dan Fitzgerald: Hawaii
Gordon Furey: POMaritime
Alexa Gonzales: NOAA
Morgan Hudgins: UGA

Gabe Matthias: UAF
Aaron Mau: UCSD
Leah McRaven: WHOI
Jessica McLaughlin: UCSD
Sara Rivero-Calle: UGA
Fernando Santiago-Mandujano: UH
Emily Shimada: OSU
Peter Shanks: Australian Antarctic Division
Aiden Thayer: WHOI
Michael Tepper-Rasmussen: WHOI
Katie Watkins-Brandt: NOAA

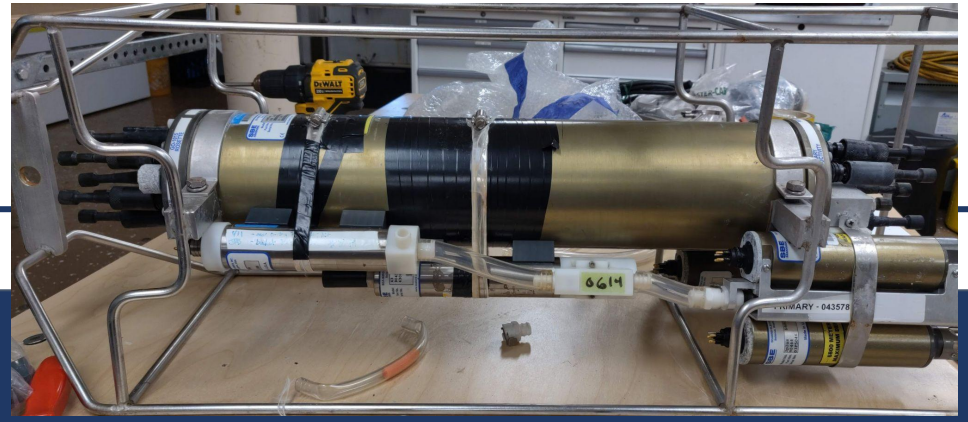
UNOLS
UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Ocean best practices

R2R
ROLLING DECK TO REPOSITORY

RCRV
Regional Class Research Vessels

General Best Practice for CTD



- CTD Cast naming convention
  - should be unique, preferably with *CRUISE ID* included - where possible
    - *RR2301_001*
    - *AE2319_CTD_001*
- CTD data structure
  - raw - hex, xmlcon, btl, hdr
  - proc - processed data ie (cnv, asc)
  - doc - all sensors which are on the CTD package, calibration files & other documentation
- Log file of events - (R2R Eventlog)
  - Suggested: deploy; max depth; recover; abort
  - Sensor cleaning, especially when using bleach or TritonX/Tergitol
  - Oxygen sensor (####) swapped out for (####)

Basic Recommended Cleaning

There are several options described by **Sea-Bird Application Notes**, and are summarized below.

1) Flush the T/C sensors using the Sea-Bird provided syringe. Agitate warm (wrist warm) DI water through the cell in a washing action, forcefully pull the plunger in and out to flush the sensors (this can be accomplished with Tygon tubing and a syringe kit – see **Application Note 2D**) for 2 minutes.

2) Cleaning chemicals

a. Bleach - For bio-fouling it is extremely effective in controlling growth.
b. Tergitol - For removal of surface and airborne oils ingested into the plumbing.
c. White Vinegar - For minor mineral deposits (5 – 8% acetic acid).

Bottle Types

What does your vessel use?:

- Niskin Bottles
  - General Oceanics (traditional)
  - OTE (Ocean test equipment)
  - Bullister-style
  - "Wally"
  - ROV/Convertible niskins
  - Van Dorn
- GO-FLO
- Ruttner bottle
- Other?

General niskin (left) vs Bullister-style (right)

Pictured left to right: 10L, GO 1.7L, GO 10L, GO 30L.

Bottle Types Contin.

- Pros and Cons of external vs internal tension
  - Material used especially for internal tension
  - Reasons why internal tension is a good idea

GO-FLO Bottle with external tension

Tier Structure (3 Tiers)

Tier 1

- Small vessel w/ no technician or not primary science objective
- Mar Tech follows all CTD BP for sensor cleaning and storage. The technician can conduct at least one validation method for each sensor.

Tier 2

- More than one tech, science party has little responsibility
- Mar techs trains science party on deployment, recovery, and sensor flushing between casts

Tier Structure Contin.

Tier 3

- Repeat hydrographic line where science party may bring their own CTD and/or the CTD watch. Water samples are collected and analyzed on board. The sensors are calibrated ‘in situ’.
- Mar Techs are responsible for training the CTD watch on ship specific needs for CTD deployment and recovery.

Is a tier structure like this useful to the community? Each tier could have an associated decision tree.

Poll Question

What type of Best Practice Document is most beneficial to the Community?

-As much info as possible
-Printable appendices
-just the basics
-etc.

Question for the Techs!

When do you turn your deck unit on? When do you start acquisition? Does having a LARS deployment change your answer?

Question for the Techs!

What kind of on-ship processing do you use/have available?

Troubleshooting/Issues/Experiences

What have been your experiences with CTDs? Any issues or tips and tricks that you would like to share?

Want to share an Institutional SOP?

Give us your email & we will be in touch!

Questions?

Thank you!

Check out our POSTER!!!

How to install and run Mojolicious CTD plotting routine, available via R2R Github!

UNOLS
UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Ocean best practices

R2R
ROLLING DECK TO REPOSITORY

RCRV
Regional Class Research Vessels

Post Deployment

1. Agitate and flush warm water through cell, repeat 3x
2. Push through DI water, leave syringe in place until next cast.

30 minutes

1. Agitate and flush warm water through cell, repeat 3x
2. Push through DI water, leave syringe in place until next cast.
3. Rinse entire package package

4. Process CTD stations and plot up; if possible plot a couple of stations on top of each other.

>60 minutes

1. Agitate and flush warm water through cell, repeat 3x
2. Push through DI water, leave syringe in place until next cast.
3. Rinse entire package
4. Pull pylon clips up and flush with fresh water

5. Process CTD data station and plot up; if possible plot multiple casts showing difference in temperature and conductivity

Post Cruise

1. Inspect and clean all bulkhead connectors, cables, and O-rings
2. Main housing maintenance
3. Inspect pressure port
4. Conductivity cell cleaning based on fouling

5. Validate frequency output for zero conductivity
6. Validate temperature sensors
7. Ancillary sensor and pump maintenance
8. Refer to proper storage recommendations