Water Column Time Series Protocol

Moorea Coral Reef LTER

BOAT WATER COLLECTION PROCEDURES (Safeboat Cruises)

I. GET TOGETHER IN SANTA BARBARA BEFORE TRIP:

1. Update the "water chem" sampling sheet on the "all-template" excel file with the next numbers to be used for the upcoming trip. Print and put it in the binder.
2. Print out a CTD sheet if needed. Print out the ^{14}C sheets (2) and put them in the binder.
3. Keep careful lists during each trip of what you are running out of. Be sure to replace what you need.
4. Bring back to Moorea each time- empty cryovial box, 2 small ice chests, acid washed falcon tubes (if needed), TOC bottles from Carlson lab and any other bottles or filters needed (contact Ellie ~2 weeks prior to trip)

II. IN MOOREA-Preparation Day: CHECKLIST

*red toolbox on top of cabinet has lots of tools, tape, etc.

1. LABEL vials and bottles with NUMBERS (foil, vials, filters, sample bottles etc. all in dry lab):

34 Nutrients- falcon tubes– separate numbers for each tube, label with "MCR" so it doesn't get mixed up with SBC LTER

34 TOC bottles (get from Craig Carlson's lab)- separate numbers for each bottle (same numbers as Chl/POC), also label with "MCR"

34 POC foils- separate numbers for each bottle, also label with "MCR"

34 Chlorophyll foils- separate numbers for each bottle

34 Cryovials- Use bacteria numbers with A and B (47A,47B etc) (transfer paraformaldehyde from freezer to fridge to thaw-if you forget, you can always thaw it in your hands day of)

Cryovials do not go out on boat, water is sampled into falcon tubes first (reuse already labeled ones from last time, #1-8 & 1-9)

5 Phytoplankton 60 ml bottles – 5 m depth at each station (label with number and "MCR Phytoplankton")

27 Primary Production Bottles (3 per station *already labeled* 1-9; 2 light, 1 dark per station)

DIC if this is to be measured

2. Preliminary preparation for ^{14}C

Label 7 ml scintillation vials, 6 per station (102 total):

Initial ^{14}**C** added: Station #A-T, Station#B-T, Station# D-**T**

Filter samples: Station #A, Station#B, Station# D,

Label 6 wipe test scint vials 1-6

Warm up Scintillation Counter (turn on 1-2 days ahead)

3. Set up filtering system for POC and Chlorophyll

4. Prepare the CTD and erase any files in the memory ("initlogging" erases memory)

Check that voltage is at least 11; Clean tube with 0.1% Triton, let soak, rinse with DI)

5. Set up slate for following day. Columns include bottle number (or CTD cast #), site, depth, time of cast, time of C^{14} inoculation.

It takes 4 full days to collect and process water samples for time series sampling.

Day 1: Sample Oceanic and Forereef sites (8 depths total at 2 stations) using Carboys labeled 1 -8..

Day 2: Take down ^{14}C and prep for next boat sampling day

Day 3: Sample the Backreef, Fringing Reef, Cooks Bay and Cooks Bay Stream (9 depths total at 4 stations) using the same 8 carboys plus an additional 9th carboy. The Backreef must be sampled from a small boat. The rest should be sampled from the Safeboat. Days can be exchanged if weather is bad.

Day 4: Take down ^{14}C and clean up

III. GET TOGETHER and load on the SafeBoat:

- 5, 4-liter carboys with valves on the spigots - Labeled 1 through 5 (All carboys above flume room)
- 5-10 liter carboys – Labeled 1-5
- 4- 20 liter carboys – Labeled 6 through 9
- Medium sized Ice Chest – with the following in it:

A. 2- acid-washed silicone tubes for transferring water from Niskins to carboys

B. Labeled Ziplock Bags (Gallon size) of sample bottles for each depth at each station (labeled 1-9) containing

1) 2 labeled acid-washed falcon tubes for nutrients
2) 2 labeled acid-washed 60 ml bottles for TOC (from Carlson Lab)
3) 2 light and 1 dark polycarbonate bottle for primary production – all labeled with the same number A, B & D
4) 1 falcon tube for cryovials
5) For 5 m depths: 1- 60 ml labeled bottle for phytoplankton (
6) Glass Bottles for DIC with all the paraphernalia if this is to be measured (see separate protocol)

C. Plastic "caddy" to hold bottles on the deck while sampling

D. Plastic slate with columns for "date, station ID, depth, time sampled"

- 2 Teflon- coated Niskin Bottles (#10 and #12 in cardboard box: #11 is not Teflon coated) all stored in storage trailer. (1 of the 3 does NOT have a messenger line-don't use!!)
- 2 messengers (in storage trailer in bucket of line).
- Barrel containing 350 m of line marked at 5, 10, 20, 25, 75, and 200 m.(in storage trailer)
- 25 lb weight with swivel snap and line (in storage trailer)
- 8 lb weight with swivel snap (in storage trailer)
- Seabird CTD plus wrench or pliers (stored in library)
- Wooden Niskin Bottle rack (stored above flume room) – attach to Safeboat
- Winch –attach to Safeboat (in storage trailer)
- Boom- attach to Safeboat (in storage trailer)
- If sampling at Lagoon 1, put the L1 sampling bottles in a small cooler and use the 50 m rope in the smaller bucket.

IV. SAMPLE COLLECTION

1. Rinse all carboys 3 times with seawater collected at the surface at the first station but under the surface layer.
2. Before first cast for each Niskin, check that wingnuts are tight. Rinse Niskin bottle by putting down ~3m, pulling up and down. Also, rinse both tubes at very first.
3. Deploy one Niskin bottle to the appropriate depth, recover, and place in the wooden rack. Deploy the second Niskin Bottle to the same depth while water is drawn from the first. Note the time of collection in the log.
4. Collect samples from the first Niskin bottle <u>in the following order</u> <u>after rinsing each small sampling bottle 3 times</u> from the Niskin Bottle. Place the samples into the cooler after collection. Don't let the sampling tube lie on the deck or the bilge! Try to avoid handling the end of the tube with your sunscreen coated hands. Try not to let water flow too hard-can disrupt the phytoplankton.

   a. **DIC (If sampled)** – Follow the detailed Protocol provided for this collection.

   b. **Nutrient samples** - are collected in duplicate unfiltered directly from the Niskin. Make sure the falcon tubes are labeled with the proper consecutive sample number and that only about 12 ml of seawater fills each tube to <u>allow for expansion when frozen</u>. Do not put the tube into the mouth of the sample bottle.

c. **TOC** samples- are collected in duplicate unfiltered directly from the Niskin. Make sure the vials are labeled with the proper consecutive sample number and fill only to shoulder to allow for expansion when frozen. Do not put the tube into the mouth of the sample bottle.

d. **Cryovials-** collect directly from the Niskin into an acid-washed falcon tube labeled for the station (1-9)

e. **Phytoplankton –** is collected only at 5 m depths directly from the Niskin. Make sure the bottles are labeled with the proper consecutive sample number. Fill bottle to shoulder.

f. **Primary Production** – Fill 2 light and one dark bottle completely to the brim and cap.

4. Fill either 1-4 liter and 1-10 liter carboy (each with the same number; 1-5), or 1-20 liter carboy (numbers 6-9) at each depth at each station with the rest of the water from both Niskins. These are for POC/PON and Chlorophyll. Keep carboys in the shade or cover for protection from the sun.

5. CTD cast to the bottom at each site, 200m at the offshore site

*Remember to remove the fluorometer cap!! Turn CTD on, soak for 45 seconds. Bring back to the surface, then start the downcast at ~10m/min. Record start time of downcast. First 75 feet are most important.

V. LOG EVERYTHING:

Record ALL information in the log equating each depth at each station with a carboy number. Make a note on the log sheet if any problems were encountered during water collection. LOG THE WEATHER CONDITIONS.

VI: ORDER OF ACTIONS BACK ON THE DOCK

If you are doing the inshore stations, 2 people must run out immediately to Lagoon 1 in a small boat to sample there. Transfer the needed equipment (1 Niskin, CTD, small ice chest with bottles, carboys, orange bucket w/ 50m rope and small weight, slate) to the small boat.

1. Sort samples and place nutrients and TOC samples in ziplock bags in the -80 freezer. (put your name on the bags). Store cryovial falcon tubes and phytoplankton bottles in fridge for now, until after C^{14} inoculation is finished.
2. Inoculate ^{14}C and start incubations
3. Preserve cryovial samples- immediately place in -80 freezer
4. Preserve Phytoplankton samples– store in refrigerator
5. Filter for POC and Chl
6. Clean bottles and inside of Niskins (hang these to dry) with 3 rinses of nanopure or Bottled water.
   NEVER USE THE LAB HOSE ON THE INSIDE OF ANY BOTTLE
   Do a final rinse of the CTD cell with Triton and nanopure water
7. On last sampling day, remove wingnuts on Niskins to rinse and WD40 metal bits. WD40 all hardware, i.e. messengers