## Feb 17-18, 2015, Plymouth.

# MERP Mini-cruise summary – shake-down cruise

The minicruise on Plymouth Quest to 'Hilmar's Box' near L4 was delayed from Monday 16th Feb 2015 to Tuesday 17th due to strong winds and a poor weather forecast. It departed at 15.30 on 17/2/15, arriving back into Sutton harbour at 04:30 on Wednesday 18th. Angus Atkinson and Martin Lilley participated on the plankton side, with Ana Querios and Jo Nunes working the benthic samples.

Plankton nets were deployed once during daytime and twice at night (four hours apart). At each timepoint three successive vertical tows from 50m to the surface (bottom depth ~54m) were performed with 2 x WP2 (200um) and 1x 63um ringnets (comparable to L4 sampling). One pool of of 3 successive WP2 samples was fixed in 4% Formaldehyde in seawater for morphological analysis of the size spectra and prey field at that time point. The other pooled WP2 and the pooled 63um nets were both preserved in Ethanol for genetic/molecular analysis. These samples went without trouble, except for some sediment and shell accumulation in some of the replicates – possibly a result of the net touching the bottom, or bottom sediment being stirred up. An obvious phytoplankton bloom was prevalent, but it was unclear whether this is the actual bloom starting early.

The $1m^2$ 500um 'Jelly Net' was also deployed at three timepoints – 1 in daylight and 2 after dark (4 hours apart). Each time two 20 minute (~1 km) tows were made in a double-oblique profile to circa 50m, comparable to the Young Fish Trawl, across the tide (towing for approximately 1.1km). The tows were consecutive to each other and assumed to be comparable. The first was preserved in Formalin and the second in Ethanol to allow inter-comparison of methods. No jellyfish and larval fish or other macrozooplankton were observed in this early-season sampling and plankton catches were low. Those that were present could have been picked out and isolated if required in the future, either to speed processing or for molecular reasons.

A CTD profile was made before the multicoring for lugols preserved water samples at standard L4 depth of 0, 10, 25 and 50 m. We hope that these will provide compoarisons of the multicore fluff layer observed by comnparable microscope and flow CAM methods. Box-cores and multicores took place successfully during the minicruise and were timed to occur around slack water where possible. Slack water was at around 01:30 (2.5h after LW Devonport) and the tide started to slacken about 00:50 (2h after the 22:55 LW at Devonport).

**Timings:**
Plankton nets (2xWP2 and 1x63um towed together) took approximately 4-5 minutes per haul, and 20 minutes for a set of three.
The jellyfish net was 20 minutes per tow or 45 minutes per pair.
Processing of plankton and jellyfish nets (with two people) was about 5-10 minutes per set of nets. This would take longer if species were picked out and individually preserved and labelled.
CTD profile was approximately 15 minutes with water bottle collections
Box Coring took 2h30 for 6 cores, with difficulties in processing and may be shortened.
Multicoring took 3h30 for two deployments of 4 cores and processing.
+ setting up and movement of gear around the deck.

**Minicruise perspectives and improvements**

Although the original plan was to undertake a diurnal / 24h cycle of plankton and jelly net tows around the clock, the benefits of sampling like this appear to be less clear. Given the patchiness of plankton and variability known to take place between samples, it is difficult to see a case for regular sampling. Sample processing is also costly and labour intensive. Instead we foresee that sampling day and night (with replicates) may be sufficient to document the size spectrum of the plankton present offshore from Plymouth, without hourly or 2-hourly sampling being required.

Based on how effectively the cruise ran on Tuesday night, three scientists might be sufficient to carry out all the tasks – 1 plankton leader, 1 benthic leader, 1 assistant – but two pairs of scientists would be optimum and would allow downtime for recuperation, tea and food.
The crew were efficient, cheerful and always willing to help out and give advice. The sampling would have been much harder with a reluctant crew. Keeping the program clear and well organised for the crew should be a priority.

If a diurnal cycle is no longer adopted then there is little reason to sample through the night and the whole schedule of the MERP cruises can be adjusted. We propose that a morning start would allow a closer tie-in to L4 data, coring to be carried out by day at slack water, and plankton/jelly samples to be acquired during the day and into the night at regular intervals. A return between 23:00-01:00 would then be envisaged. Such a plan may require a return to drop off cores for processing and a return offshore to collect the night-time plankton tows.

Depending on the requirements for NGS and sample processing, it would be feasible to pick out larger objects from the plankton/jelly tows prior to preservation of the samples, allow for measurement and freezing/preserving individually. We think this would facilitate diet studies of gelatinous zooplankton and/or fish larvae if sufficient material is collected.
In terms of size spectrum work, picking out and measuring gelatinous prey before preservation would allow 1) a comparison of live to preserved lengths/displacement volume/mass, 2) the ability to quantify the size range of a species within a tow, 3) an initial attempt at species identification prior to distortion, dissolution, shrinking or colour loss on preservation.

Ideally deployment of the plankton nets ahead of the jellyfish net would allow specimens to be picked from all nets, while if the plankton followed the jelly net there is a risk of getting in confused over which sample is which.

The freezer space on board is small, so items to be frozen should be kept as small as possible – in bags or small sample jars.

Equipment:

- Two litre sample bottles are probably much larger than are required for the samples unless they become very dense. I would recommend having a selection of 500 ml and 1 litre bottles for the different samples. This would cut down on chemical use as well as unnecessarily large sample containers needing storage.
- Three buckets, complete with LARGE 2x100um and 1x30/50/63um sieves are required to sort and sieve the plankton tows. The 200um sieve is sufficient for the 500um jelly net.

- If the jelly net is lost or damaged or the non-filtering cod end is lost, what is the backup plan?
- A white or transparent sorting tray, with or without a light-box, would be useful for picking items from the samples. Plus large hand lens and good oblique light source. Camera and ruler for recording catches
- Petri-dishes or crystalising dishes are required for picking out of individual organisms. Standard 5 & 10cm diameter should be fine, with a bucket available for larger organisms.
- Bottles should be pre-prepared in the lab with Formaldehyde to avoid pouring neat Formalin around on a moving ship, or a carboy of 20% Formalin-Seawater solution made up in advance to be diluted to 10% in the sample jars on deck.
- A measuring board for large gelatinous organisms and vernier callipers for smaller individuals would be required on board, along with a measuring cylinder for bio/displacement volume. Motion-compensated balances on board are probably unworkable, unless a hanging balance (1g+) was sufficient to measure wet mass.
- Additional items – labels, ID guides, pencils, waterproof labels for inside sample bottles, ethanol (sufficient for plankton and jelly samples)