MOCNESS sampling: TN050, TN054

Sampling and Analytical Methodology:

Double 1m^2 MOCNESS net. The double MOCNESS is configured like two 1m^2 MOCNESS systems attached side-by-side and carries twenty nets (Wiebe et al., 1985). The MOCNESS is designed to fish with a 1m^2 net mouth area when towed at a 45^o angle (Wiebe et al., 1976). A flow meter mounted on the frame, just ahead of the net mouth, allowed calculation of the volume of water sampled (Wiebe et al., 1976; 1985). The data-acquisition software used angle information when calculating volume of water filtered. The double MOCNESS was fitted with 153um mesh nets and included, in addition to the standard conductivity (Sea-Bird SBE4) and temperature (Sea-Bird SBE 3) sensors, a transmissometer (SeaTech, 25cm beam) and an oxygen probe (Sea-Bird SBE 13). The double MOCNESS was towed behind the ship at a speed of 1.5 to 2 knots (2.8-3.7 km h^{-1}) through the water. Winch speed generally ranged from 10 to 25m min^{-1} during deployment and 5 to 15m min^{-1} during recovery. Target sampling depths for this report were 300-250m, 250-200m, 200-150m, 150-100m, 100-75m, 75-50m, 50-25m and 25m to surface.

The MOCNESS was deployed primarily at 48-hour time-series stations (six per cruise), at locations determined prior to the cruises where regions of coastal upwelling, open ocean upwelling, strong suboxic conditions, or in the case of the most southerly station (S15) oligotrophic conditions were expected. Tows were done at approximately mid-day and mid-night, one each, at the 48-hour stations. Tow times were selected to avoid sampling during crepuscular periods when diel vertical migration would complicate observations of vertical distributions.

The 1m^2 MOCNESS samples collected during night were split using a flat-bottomed splitter. One-half of each night sample was preserved in 4% buffered formaldehyde/seawater solution for laboratory measurement of displacement volume (Smith et al., 1998; Lane and Smith, 1997) and taxonomic analysis. With the exception of the 25-50m sample, daytime collections were not split and were all preserved in 4% buffered formaldehyde/seawater solution. The 25-50m sample was split and treated similarly to the night collections.

Laboratory analysis. The samples reported here were split one to four times, depending on the amount of plankton present, in a Folsom splitter at the Rosenstiel School of Marine and Atmospheric Science (RSMAS), University of Miami. Subsamples were concentrated to 20 to 100ml and were transported to Ukraine (Russia) for enumeration and identification at the Institute for Biology of the Southern Seas (IBSS) in Sevastopol. Treatment of the samples at IBSS depended on the amount of plankton present in each sample. When the sample contained only a small amount of plankton, the entire split was analyzed for all species. In most cases, however, organisms smaller than ~1.5mm were identified and counted in smaller subsamples collected with a 1, 2 or 5ml Stempel pipette. Two replicate subsamples were withdrawn and counted and the data were averaged for calculation of abundance; generally 1-40 individuals per taxon were identified and sometimes more when a taxon was particularly abundant. Organisms ranging in size from ~1-2mm were counted in another part of the subsample collected with a 5ml Stempel pipette or by splitting the subsample into two or four equal parts. The entire subsample

originating at RSMAS was then analyzed for abundance of organisms larger than 2mm, including copepods, euphausiids, amphipods, fish larvae, ostracods and any rare, large organisms. A total of 300 to 500 organisms per entire split were identified and counted. The identifications were performed with the aid of Leningrad Optic-Mechanics Company (LOMO) binocular microscopes using various magnifications depending on the sizes of the individuals being identified. Copepod species are listed in alphabetical order. All copepod adult stages, copepodite stages and nauplii found in each sample are listed. The taxonomic notations are: c1 = copepodite stage I of the species; c2 = copepodite stage II of the species; c3 = copepodite stage III of the species; c4 = copepodite stage IV of the species; c5 = copepodite stage V of the species; c = undetermined copepodite stage of the species; m = adult males of the species; f = adult females of the species. Total length is the average length in mm measured microscopically for that taxon.

MOCNESS net 0.25m^2. The quarter-meter MOCNESS is configured like a 1m^2 MOCNESS system and designed to fish with a 0.25m^2 net mouth area when towed at a 45^o angle (Wiebe et al., 1976). A flow meter mounted on the frame, just ahead of the net mouth, allowed calculation of the volume of water sampled (Wiebe et al., 1976). The data-acquisition software used angle information when calculating volume of water filtered. The 0.25m^2 MOCNESS was fitted with 64um mesh nets and included standard conductivity (Sea-Bird SBE 4) and temperature (Sea-Bird SBE 3) sensors. The 0.25m^2 MOCNESS was towed from the quarterdeck of the ship at a speed of 1.5 to 2 knots (2.8-3.7 km h^{-1}) through the water. Winch speed generally ranged from 10 to 25m min^{-1} during deployment and 5 to 15m min^{-1} during recovery. Target sampling depths for this report were 200-150m, 150-100m, 100-80m, 80-60m, 60-40m, 40-20m, 20-10m and 10m to surface.

The 0.25m^2 MOCNESS was deployed primarily at 48-hour time-series stations (six per cruise), at locations determined prior to the cruises where regions of coastal upwelling, open ocean upwelling, strong suboxic conditions, or in the case of the most southerly station (S15) oligotrophic conditions were expected. Tows were done at approximately mid-day and mid-night, one each, at the 48-hour stations. Tow times were selected to avoid sampling during crepuscular periods when diel vertical migration would complicate observations of vertical distributions.

Samples from the 0.25m2 MOCNESS were preserved in 4% neutral seawater-formalin.

Laboratory analysis. The samples reported here were split one to four times, depending on the amount of plankton present, in a Folsom splitter at the Rosenstiel School of Marine and Atmospheric Science (RSMAS), University of Miami. Subsamples were concentrated to 20 to 100ml and were transported to Ukraine (Russia) for enumeration and identification at the Institute for Biology of the Southern Seas (IBSS) in Sevastopol. Treatment of the samples at IBSS depended on the amount of plankton present in each sample. When the sample contained only a small amount of plankton, the entire split was analyzed for all species. In most cases, however, organisms smaller than ~1.5mm were identified and counted in smaller subsamples collected with a 1, 2 or 5ml Stempel pipette. Two replicate subsamples were withdrawn and counted and the data were averaged for calculation of abundance; generally 1-40 individuals per

taxon were identified and sometimes more when a taxon was particularly abundant. Organisms ranging in size from ~1-2mm were counted in another part of the subsample collected with a 5ml Stempel pipette or by splitting the subsample into two or four equal parts. The entire subsample originating at RSMAS was then analyzed for abundance of organisms larger than 2mm, including copepods, euphausiids, amphipods, fish larvae, ostracods and any rare, large organisms. A total of 300 to 500 organisms per entire split were identified and counted. The identifications were performed with the aid of Leningrad Optic-Mechanics Company (LOMO) binocular microscopes using various magnifications depending on the sizes of the individuals being identified. Copepod species are listed in alphabetical order. All copepod adult stages, copepodite stages and nauplii found in each sample are listed. The taxonomic notations are: c1 = copepodite stage I of the species; c2 = copepodite stage II of the species; c3 = copepodite stage III of the species; c4 = copepodite stage IV of the species; c5 = copepodite stage V of the species; c = undetermined copepodite stage of the species; m = adult males of the species; f = adult females of the species. Total length is the average length in mm measured microscopically for that taxon.