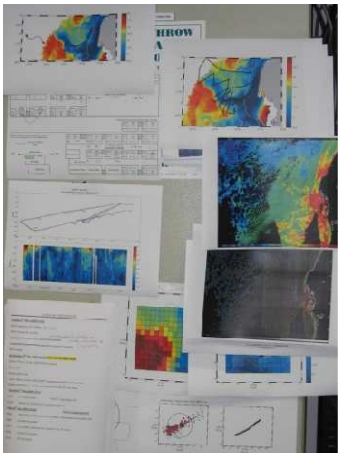


Saturday 2 May 2009 JD 122

Buoy #5990 was safely retrieved at 06:38. The MVP was then redeployed and we headed towards the last known position of buoy #5988. This was sighted at 10:14 bobbing merrily on the surface rather than dunking beneath the waves as the others had done, and so was obviously no longer attached to the drogue and thermistor chain it had been deployed with. Thanks to John Stephen's 'patent pending' buoy scooper, it was safely on board by 10:54. With all seven buoys now safely on board (photo 1), we continued on the large scale MVP survey. Our position is 20° 02.01 N 018° 37.14 W, sea surface temperature is 19.8 °C, fluorescence is 0.4 fluorescence units, salinity is 36.52, air temperature is 19.1 °C and the water depth is 2697m. Winds are light at NNE 15-20 knots. Today was a designated 'mid cruise break' or day off for most people – a time to catch up with writing the cruise diary and the logsheets identifying all underway sampling and over-the-side deployments, and analysing any frozen samples to reduce the backlog of sample analysis once we reach shore. We planned to collect surface water samples across the filament tomorrow morning for the determination of plankton community structure, dimethyl sulphide and inorganic nutrient concentrations to assess the spatial variability in these parameters. Some people found the gym and cycled 10 km to work and back, and others relaxed at the local cinema where a selection of scary Sci Fi movies was being shown.



One thing which is very important during a research cruise is keeping everyone up to date with what's planned for the day, and then informing them of any changes to this plan. For example, a delay in one sampling deployment will have a knock on delay to another, and if timing is critical, it may require cancelling an activity or prioritising one thing over another. Some analyses or activities can only be made whilst the ship is 'head to wind', so that if for any reason the ship needs to move, then the people expecting to sample head to wind have to be informed in time to switch off their instruments. Real time communication on a research ship can be difficult, as the scientists work in 6 different laboratories within the ship and 3 container laboratories on two deck levels. To help communication, we have 2 notice boards, one in the deck laboratory and one in the main laboratory where we post a daily timetable (with all too frequent updates) and any satellite images or data of interest (see photo 2).



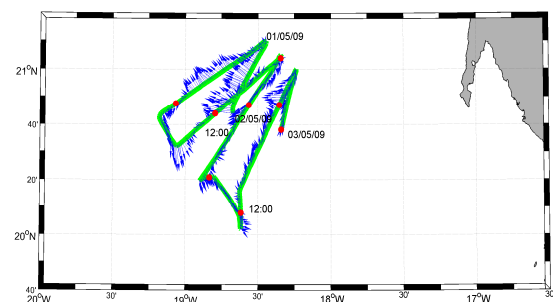
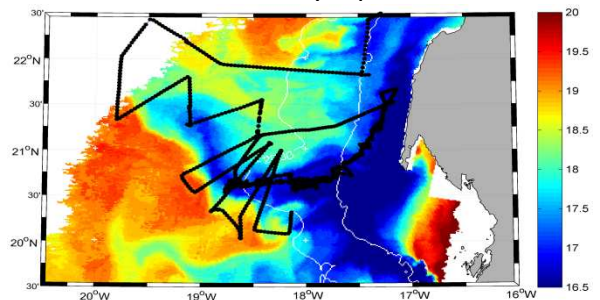
Sunday 3 May 2009 JD 123

The MVP survey continued overnight and is due to continue until Tuesday. Our position is 20° 10.25 N 018° 09.04 W in 3823m of water travelling at 6 knots with steady 28 knot NNE winds. The surface water chemistry sampling began at 06:00 and samples were taken at 30-60 minute intervals. Most people spent the day plotting and interpreting their data ready for the data workshop scheduled for 15:00 in the bar, where we'd set up a screen and projector. Everyone gave short presentations of their results so far and gave some indication of where they would like the second Lagrangian experiment to take place. Concentrations of chlorophyll ($\sim 8 \mu\text{g l}^{-1}$) and rates of total primary production ($10 \text{ gC m}^{-2} \text{ d}^{-1}$) were, as expected, highest at the upwelling source stations, and decreased as we moved offshore. Gross production and community respiration in surface waters decreased from 40 to 8 $\text{mmol O}_2 \text{ m}^{-3} \text{ d}^{-1}$ and from 5 to 2 $\text{mmol O}_2 \text{ m}^{-3} \text{ d}^{-1}$ respectively,

bacterial production derived from ^3H -leucine incorporation decreased from 30 to 5 nM d⁻¹. The partial pressure of carbon dioxide in the upwelled surface waters reached values of 500 μatm – around 120 μatm higher than atmospheric concentrations, decreasing to 400 μatm offshore. Surface water dimethyl sulphide concentrations ranged from 2 to 9 nM, and towards the end of the Lagrangian experiment, nitrite concentrations were reaching a mid water maximum (at $\sim 100\text{m}$) of 0.8 μM . Gavin and Vas set up a 6 and 24 hour photo-oxidation experiment each day, measuring the impact of UV+visible light, visible light and darkness on concentrations of O₂, carbon monoxide, pH, ammonium, dissolved organic carbon, amino acids and coloured dissolved organic matter (photo 2 of photo-oxidation incubators). The rate of photo-production of ammonium ranged from 1.5 to 4.5 nM hr⁻¹ and the rate of photo-consumption of oxygen reached a maximum of 0.1 mmol m⁻³ hr⁻¹ (or about 50% of the rate of biological consumption of oxygen). Rachael has made some of the first measurements of methanol, propanol and acetone in seawater and found concentrations ranging from 50-200 nM, 200-1100 nM and 6-12 nM respectively.



After dinner, the meeting continued until 20:30, as we discussed the possible strategy for the next experiment, including where to deploy the SF₆ along the continuum of coastal newly upwelled water to offshore waters (see cruise track so far) and which scientific objectives to prioritise on each CTD cast. It is clear that there isn't enough time in the day to complete all the CTD and turbulence probe deployments requested and still leave sufficient time to adequately map the SF₆ patch overnight – bearing in mind that it increases in surface area each day. Nor is there sufficient time to cover the full range of high to low productivity waters whilst still unequivocally in Lagrangian mode (i.e. within the SF₆ patch). The provisional plan is to continue the large scale ADCP/MVP survey of the filament through Monday and Tuesday, stopping for a CTD and net deployment at Monday lunchtime. The data from this filament survey will be used to decide



where the second SF₆ deployment should be (the direction of the major currents determined by the ADCP are shown overlain on the track of the first few transects of the large scale survey – the length of the arrows is relative to the speed of the water movement). On Wednesday we will complete a smaller scale survey to choose the site for SF₆ deployment, and deploy the buoy attached to an ADCP which will become the central buoy of the SF₆ patch. On Thursday morning we will collect water at 04:00 before deploying the SF₆ and five drifters including the Carioca buoy (which includes instrumentation capable of measuring surface water carbon dioxide concentrations). Friday will be our first Lagrangian sampling day, and we estimate that we have time for 12 Lagrangian days (providing we can continue to track the SF₆) before 5 final days surveying the large scale variability of the filament with the MVP and ADCP, and two days to pack everything and transit home.