Group 10 Methodology for Estuary and Offshore Work

In Field:

Physical: A combination of Acoustic Doppler Current Profiler (ADCP) transects and CTD (Conductivity, Temperature and Depth) deployments are used with an associated Niskin bottle rosette to capture water samples.

Chemical: Samples were taken for the following:

Dissolved Oxygen Content: This is the first sample taken. A hose is attached to the valve on the Niskin bottle, water is flushed through the hose and the sample bottle to prevent contamination and chemical reactions with the air, which could cause raised oxygen levels in the water sample. The bottle is then filled to the brim, the Winkler reagents (manganous sulfate, potassium hydroxide, and potassium iodide) are added. This is the standard operating procedure for dissolved oxygen titration (www.epa.gov.uk 2007). Once this sample is collected, the rest of the water is collected from the Niskin and taken to the on-board laboratory for further sampling. Once the reagents have been added, the sample is stored in cold water.

Chlorophyll: 3 samples of 50ml of the samples are each syringed through 3 filters, which are then collected and stored in acetone in cold conditions.

Nutrients: The filtered water is collected between two bottles. The first clear plastic bottle is used for detecting dissolved silicon concentrations, and the second dark glass bottle is used for detecting phosphate and nitrate concentrations.

Biological: samples were taken for the following:

Phytoplankton: 50ml of water was taken from each Niskin bottle for the identification of phytoplankton. The samples were chemically preserved, but not otherwise altered or filtered.

Zooplankton: A 50cm diameter zooplankton net with a mesh size of 200µm was used to collect a sample of zooplankton. On the Bill Conway, all zooplankton samples were collected horizontally, and on the Callista, all zooplankton samples were collected vertically. The zooplankton net was deployed, retrieved after a set distance and hosed to ensure all zooplankton collected were forced into the sample bottle and not left on the net. Formalin was added to fix the sample and prevent any further biological interactions.

In the Laboratory:

Physical: ADCP transects were analysed using WinRiver software. CTD data was processed and converted into graphs using MatLab.

Chemical:

Dissolved Oxygen: Sulphuric acid was added to the samples. The samples were then automatically titrated with sodium thiosulphate until the liquid became transparent, at which point

a value of dissolved oxygen concentration in the sample is obtained as per the method described by Grasshoff *et al* (1999).

Chlorophyll**:** The samples collected were analysed using a fluorometer, which calculates chlorophyll in µm/L as per the method described by Parsons *et al* (1984).

Dissolved Silicon: Using known concentration a set of standards was mixed and tested in the spectrophotometer. The samples were also measured using the spectrophotometer and compared to the standards to determine concentrations, as per the method described by Parsons *et al* (1984).

Dissolved Phosphate: Similarly to the silicon analysis a set of standards were used and the samples compared to these in order to determine concentrations as per the method described by Parsons *et al* (1984).

Dissolved Nitrate: Another colorimetric technique is used, also with standards as described by Johnson and Petty (1983).

Biological:

Phytoplankton: For each sample a 1ml sedgewick-rafter counting cell was filled, and all the phytoplankton in 100 squares were counted, overall and individual species. Using this data, the amount of phytoplankton per litre was calculated.

Zooplankton: For each sample a 5ml Bogorov counting chamber was filled and all the zooplankton were counted, overall and individual species. Using this data and the data concerning the zooplankton net used and distance traversed, the amount of zooplankton per litre was calculated.

Methodology for the Pontoon

One team of two recorded the direction (°) and speed (ms) of the water flow using a current meter at 1-meter intervals from the surface.

Another team of two measured the light intensity by deploying a light meter into the water and comparing the intensity at 1m intervals to a surface meter.

A team of three used a YSI multi-probe to determine temperature (°C), salinity (PSU), chlorophyll (µg/L), dissolved oxygen (µg/L), dissolved oxygen saturation (%), pH and turbidity (FNU).

The final team of two collected surface samples so that surface chlorophyll levels could later be determined in the lab.

References

Grasshoff, K., Kremling, K. and Ehrhardt, M. (1999) Methods of seawater analysis. 3rd ed. Wiley-VCH.

Johnson, K. and Petty, R.L.(1983) Determination of nitrate and nitrite in seawater by flow injection analysis. Limnology and Oceanography 28 1260-1266.

Parsons, T. R., Maita, Y. and Lalli, C. (1984) A manual of chemical and biological methods for seawater analysis. 173p. Pergamon.

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