2012-12

CCGS *JP Tully*

Dimethylsulfide (DMS) & Dimethylsulfoniopropionate (DMSP) Report

May 23 - June 8, 2012

Prepared by Michael Arychuk

1. Sample Collection

Samples were collected from all major stations (P2, P4, P12, P16, P20, P26) for DMS, $DMSP_{D\ (dissolved)}$ & $DMSP_{T\ (total)}$.

1.1 DMS

Fourteen water samples from various depths (300m, 200m, 175m, 100m, 75m, 50m, 40m, 30m, 25m, 20m, 15m, 10m, 5m, surface) were collected at each of the stations P4, P12, P16, P20 & P26. At P2 there were eleven samples collected (100m, 75m, 50m, 40m, 30m, 25m, 20m, 15m, 10m, 5m, surface). In all cases, samples were collected in 250 ml ground glass stoppered bottles and stored in a fridge, in the dark and removed one at a time before analysis.

1.2 DMSP

Six samples for both $DMSP_D$ and $DMSP_T$ were collected at each station; two at the surface (0m, 5m), one in the mixed layer (100m), one in the deep chlorophyll max (20m) and two in the salinity mix layer (175m, 200m). The only exception to this was P2 where there were no 175m or 200m samples, hence, only 4 samples were collected.

2. Analysis

2.1 DMS

A sample was loaded onto the stripper and purged with UHP Nitrogen for 10 minutes at ~100 ml/min. The DMS was extracted from the water and absorbed onto a Tenax TA trap kept at -80^{o}C. The trap was subsequently desorbed at 100^{o}C (with a dewar containing boiling water) onto a Chromasorb 330 column which eluted onto a Flame Photometric Detector (FPD). All samples were run as soon as possible after being collected.

2.2 $DMSP_D$

Approximately 50-75 ml of seawater was allowed to flow directly from the niskin into a filtration funnel containing a 0.7μm GF/F filter. The first 3.5 ml was collected in a polypropylene tube (15 ml) containing 50 μl of a 50% sulphuric acid solution. The sample was then stored in the dark and at 4˚C where it would be analysed back at IOS at a later date.

2.3 $DMSP_T$

3.5 ml of seawater was collected directly from the niskin into a polypropylene tube (15 ml) containing 50 µl of a 50% sulphuric acid solution. The sample was then stored in the dark and at 4˚C where it would be analysed back at IOS at a later date.

3. Calibration

3.1 DMS

A four to six level calibration table was used for calculating the concentrations of DMS. The standards were prepared in water and run under the same conditions, as described above, for the samples. A calibration curve was valid for 12 hours. If analysis exceeded 12 hours, a continuing calibration standard was run to ensure the calibration curve was still within acceptable limits.

4. Quality Control

4.1 DMS

System blanks and duplicates were run approximately every 13 samples to ensure the system remained free of contamination and had acceptable reproducibility. Stripping efficiency was evaluated at the beginning of the cruise and was proven to be acceptable at over 96%.

4.2 DMSP

Blanks and duplicates were collected at every station. Blanks were done by simply treating MQ water as an actual sample. For example, in the case of $DMSP_D$ it was put through a separate funnel and for $DMSP_T$ it was added directly to the polypropylene tube.

5. Data & Results

5.1 DMS

Previous cruises have given problems with high DMS backgrounds but this cruise did yield any such problems. The suspected reasons are explained in the "conclusions" part of this report.

The only other thing worth reporting was the 90% difference between the duplicates on sample 689. There was nothing odd or notable with these two samples visually, nor were they handled any differently but yet they yielded quite different results. I have left them in the data set simply because I can come up with no reason to exclude them. All the other duplicates done in the cruise were within the acceptable difference ranges so it was not an instrument error. The only explanation is that there was some active biology within the niskin and this was reflected in the variable blanks. Users of the data set can make their own determinations on how to treat this sample with respect to averaging the two numbers or simply deleting the sample altogether.

5.2 DMSP

Samples are to be run at IOS within the next few months.

6. Conclusions

6.1 DMS

The system worked very well for this cruise. The elevated levels of background DMS observed on previous cruises was not a problem on this cruise perhaps due to a few changes made with respect to the analysis. In essence the water bath was turned on a minimum of 12 hours before the first blank water was run. Once the bath was at 4^{o} C the purge and trap was put in the "Strip" mode and the system was allowed to sit in this "ready" state for a minimum of 12 hours before the analysis was set to begin. By doing these two things the system was allowed to purge out and perhaps prevent any accumulation of DMS in the system. The added wear and tear on the water bath (by having it on longer) is a concern but outweighed by the benefits of getting clean blanks. Hopefully continued practice of this new procedure will continue to solve the problem of high background and/or contaminated blanks.

6.2 DMSP

No problems to report.