2021-006

CCGS *John P Tully*

Dimethylsulfide (DMS) & Dimethylsulfoniopropionate (DMSP) Report

May 2, 2021 to May 18, 2021

Prepared by Michael Arychuk

1. Sample Collection

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

1.1 DMS

Fourteen water samples from various depths (400m, 200m, 150m, 100m, 75m, 50m, 40m, 30m, 25m, 20m, 15m, 10m, 5m, surface) were collected at station P4, P12, P16, P20 and P26. At P2 there were eleven samples collected (100m, 75m, 50m, 40m, 30m, 25m, 20m, 15m, 10m, 5m, surface). Duplicates were taken at 20m. 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

Seven samples for both $DMSP_D$ and $DMSP_T$ were collected (400m, 200m, 150m, 30m, 20m, 5m, surface). The only exception to this was P2 where there were no 400m, 200m or 150m samples, hence, only 4 samples were collected. Duplicates were taken at 20m.

2. Analysis

2.1 DMS

A sample was loaded onto the stripper and purged with UHP Helium 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 Chromasil 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 were allowed to flow directly from the Niskin into a filtration funnel containing a 0.7 μm GF/F filter. The first 3.5 ml were collected in a 15 ml or 5 ml polypropylene tube. The entire 3.5 ml were then transferred into a 5 ml, glass, serum bottle and 50 μl of a 50% sulphuric acid/water solution was added. The sample was then crimp sealed and stored in the dark and at 4˚C where it would be analysed back at IOS at a later date.

2.3 $DMSP_T$

Exactly 3.5 ml of seawater were collected directly from the Niskin into a 15 ml or 5 ml polypropylene tube. The entire 3.5 ml were then transferred into a 5 ml, glass, serum bottle and 50 μl of a 50% sulphuric acid/water solution was added. The sample was then crimp sealed and 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 $DMSP_{D,}$ 3.5 ml were collected from a separate funnel and for $DMSP_T$ 3.5 ml were added directly to the polypropylene tube. Like the samples, they were then transferred into a 5 ml, glass, serum bottle and 50 µl of a 50% sulphuric acid/water solution was added. The blank was then crimp sealed and stored in the dark and at 4˚C where it would be analysed back at IOS at a later date.

5. Data & Results

5.1 DMS

The workstation on the dimethylsulfide system was replaced on this cruise in response to the hard drive failure of the previous workstation in February. The purge and trap portion of the system was also serviced by cleaning all the glassware, replacing the rotor and replacing all the tubing. This resulted in the system working very well and without any problems.

5.2 DMSP

The DMSP samples were collected for all stations. Samples were run back in the lab in late May and early June.

6. Conclusions

6.1 DMS

As is typically the norm, the MQ water for the first two stations (P2 & P4) had slight elevations of DMS which resulted in the blanks not being entirely clean. The "contamination" was not enough to cause problems but it would be nice to try and solve this problem once and for all. A possible solution is to bring SQ water, pre-tested and stored in glass bottles to be used for the first couple of days until the MQ system on the ship has had some use and the cartridges have been adequately flushed. This is something that might be explored for the next cruise.

6.2 DMSP

Sample collection went well without any issues.