Dataset name: **Diatom triple labelling (30Si, 13C, and 15NO3 vs 15NH4)**

|  |  |
| --- | --- |
| Parameters: | * **single cell uptake of Si/C/N (NO3 vs NH4)**
* **image bank**
* **silicic acid concentrations**
 |

PROJECT TITLE: **MOBYDICK**

Oceanographic cruise: **MOBYDICK**

Start date: **18/02/2018**

End date: **27/03/2018**

Project manager: **Bernard Quéguiner** bernard.queguiner@mio.osupytheas.fr

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 Geographic information: **Indian sector of the Southern Ocean**

 Latitude: **49.5°S – 52.5°S**

 Longitude: **67,0°E – 74.5°E**

Parameter supervisor: **Karine Leblanc**

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# OPERATIONS

## Sampling device(s)

Samples from surface water (10 or 15 m) were taken from rosette bottles during CTD NCP casts.

## List of stations sampled

M2\_1 (CTD\_008), M4\_1 (CTD\_015), M3 (CTD\_024), M2\_2 (CTD\_032), M1 (CTD\_040), M4\_2 (CTD\_043), M2\_3 (CTD\_054), M3\_3 (CTD\_062)

# INSTRUMENTS

Instrument Type: **Nanometer-scale secondary-ion mass spectrometer**

Manufacturer: **CAMERA**

Model: **NanoSIMS 50**

Instrument Features / Calibration: **N/A**

Instrument Type: **Spectrophotometer**

Manufacturer: **Helios**

Model: **Helios gamma**

Instrument Features / Calibration: **N/A**

# DESCRIPTION of PARAMETERS

## Measurement details

Triple labelling of 30Si, 15NO3, 15NH4 and 13C for NanoSIMS analysis experiments were carried out at each site following Bonnet *et al.* (2016). At the surface depth on each NCP CTD, 2 x 2 L samples were spiked with 30Si, 13C, and one with 15NH4, the other with 15NO3. A third 2 L sample was not spiked as control. Nutrients and NH4 were subsampled at T0 (analyses tobe done at LOMIC by Olivier Crispi). After 24h incubation, 2 x 125 mL samples were incubated 1 h in 2% PFA, before being filtered onto 2 µm nuclepore filters, then stored in Petri slides at –80°C. A lugol–fixed sample was collected from the non spiked sample and the rest was filtered onto 0.6 µm polycarbonate filter for BSi analyses. The rest of the two samples spiked with 15NH4 and 15NO3 were filtered onto pre-combusted Whatman GFF filters for mass spectrometry determination of POC, PON, ρNO3 and ρNH4 (H. Berthelot, LEMAR).

Surface orthosilicic acid concentrations were measured from either rosette bottle or shipboard continuous flowthrough water supply prior to each NCP CTD, following the colorimetric method of Mullin and Riley (1962) adapted by Strickland and Parsons (1972).

## Analytical procedure

Filters for NanoSIMS will be analyzed on in Paris by H. Berthelot. This will allow to quantify the isotopic uptake (% enrichment per taxon ) of each element within the cells, and help determine which species preferentially take up NO3 or NH4, as well as C and Si.

## Units

* specific uptake rate per taxon d–1
* silicic acid concentrations µM

## Sensor precision

N/A

## Post-cruise data analysis/treatment required

N/A

## Estimated Date of Delivery

NanoSIMS results January 2019

Orthosilicic acid concentrations available (measurements done onboard)

# BIBLIOGRAPHY

Bonnet S., Berthelot H., Turk‐Kubo K., Cornet‐Barthaux V., Fawcett S., Berman‐Frank I., Barani A., Grégori G., Dekaezemacker J., Benavides M., Capone D.G., 2016. Diazotroph derived nitrogen supports diatom growth in the South West Pacific: A quantitative study using nanoSIMS. Limnology and Oceanography 61 (5), 1549-1562.

Mullin J.B., Riley J.P., 1962. A modified single solution method for determination of phosphate in natural waters, *Analytica Chimica Acta*, **27**, 31–36.

Strickland J.D.H., Parsons T.R., 1972. *A practical handbook of seawater analysis*, 2nd ed. *Fisheries Research Board of Canada Bulletin*, **167**, 328 pp.