FICHE META\_INFORMATION\_PARAMETRES

(à remplir par le responsable du paramètre)

### Nom du DATASET / Data SET NAME

*Data set Name* Phytoplankton total carbon uptake

### PROJET-ETUDE / *PROJECT TITLE*

*Campaign NAME* : MOBYDICK *LEG :*

*Date* *begin :* 18/02/2018

*Date end :* 27/03/2018

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### OPERATION *(if Relevant)*

*Sampling method: Niskin bottles from surface water (10m or 15m)*

*Station number-Cast number:*

*14C : M2\_2, M1, M4\_2, M2\_3, M3\_2*

*13C : M2\_1, M4\_1, M3, M2\_2, M1, M4\_2, M2\_3, M3\_2*

*FISH: M2\_1, M4\_1, M3, M2\_2, M1, M4\_2, M2\_3, M3\_2*

*(CTD- NCP)*

### RESPONSABLE SCIENTIFIQUE du paramètre / *PI of the parameter*

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### INFORMATION GEOGRAPHIQUES */ GEOGRAPHIC INFORMATION*

*Predefined site (if relevant):* Indian Ocean and Indian sector of the Southern ocean

*Location:*

*LATITUDE: 49.5°S – 52.5 °S*

*LONGITUDE: 67°E - 74.5°E*

### DESCRIPTION DES INSTRUMENTS / INSTRUMENTS DESCRIPTION *(if Relevant)*

*Instrument Type: Scintillation counter*

*Manufacturer: Packard*

*Model: Tricarb 2100 TR*

*Instrument Features / Calibration:*

### DESCRIPTION DES PARAMETRES */ PARAMETERS DESCRIPTION*

# Ce qui a été collecté, mesuré et comment / *How was the parameter collected and measured (include references for analytical methods)?*

*Sampling:*

* 14C incubations:

Water from the surface (10m or 15m) was sampled at all stations before sunrise and prefiltered through 100µm to remove large particles and mesozooplankton. For 14C incubations, 60ml of water were placed in 6 polycarbonate bottles previously cleaned with HCl 10% and rinced several times with seawater from the same CTD cast. The six bottles were spiked with 2,5μCi of NaH14CO3. Phytoplankton carbon uptake was determined by placing three of these bottles into an outdoor incubator, exposing the samples to a natural light cycle. By the use of filters, the in-situ irradiance in the on-deck incubators was reduced by 50%, corresponding to the sampling depth. A set of three bottles was also incubated in the dark to ascertain dark CO2 fixation. Shortly after dawn, incubations were stopped by adding PFA (1% final concentration w/v) and left for 1h at 4°C. Fixed cells were then harvested onto 0.2µm pore-size polycarbonate filters and washed three times with MilliQ water. Filters were then placed in a scintillation vial and 1ml of 10% (v/v) HCl (Sigma- Aldrich) was added to securely purge the residue of inorganic carbon. Subsequently, 3 ml of scintillation cocktail was added to each vial as in Jardillier et al. (2010). The vial content was mixed and left to equilibrate before radio- assaying. Radioactivity retained in cells, harvested on filters, was measured using a liquid scintillation counter on board the ship.

* 13C incubations:

A first set of five 10L polycarbonate carboys was filled up with 12L of seawater prefiltered through 100µm. Three of these bottles were amended with NaH13CO3 99 atom % 13C, 5 g in 250 mL of ultra pure water, to obtain a ∼ 10 atom % 13C-enrichment (12 mL/bottle). One of these three amended bottles was incubated in the dark to assess for eventual dark CO2 fixation. Two other bottles were left unamended as controls. 15ml of 0.2µm filtered seawater from all incubation carboys was sampled for DIC analysis and directly stored at -80°C to measure the exact DIC enrichment obtained in each bottle. All bottles were then placed in the on-deck incubator from sunrise to sunset.

A second set of four 10L polypropylene bottles filled up with 10L of the same CTD cast was filtered directly after water sampling to be processed at T0. Two of these bottles were fixed with PFA (final concentration 1% w/v). One fixed bottle and one unfixed bottle were then enriched with 13C to evaluate the impact of PFA fixation and of 13C addition on bulk 13C measurements.

For bulk carbon fixation, 1,5L from each carboy (T0 and T final) were filtered onto precombusted (450 ◦ C, 4 h) GF/F filters and rinsed three times with 20ml of filtered seawater. For unfixed samples, water was transferred into dark polypropylene bottles and filtered within one hour maximum to avoid further carbon fixation. Filters were then stored into precombusted glass tubes at −80°C.

To evaluate if the incubations led to changes in the community composition, 2x5ml of water were sampled at T0 and T final from each bottle and fixed if needed with PFA (1% final concentration w/v) for cytometry analysis of pico-, nano-phytoplankton. To determine more precisely the abundance of different taxonomic groups using FISH, 300ml, 600ml and 900ml of water from the T0 bottles fixed with PFA were filtered onto 0,4µm polycarbonate filters and further dehydrated successively with 50%, 70% and 100% ethanol (Not et al., 2002).

*Analytical procedure :* Pico-, nano-phytoplankton and bacterial abundances will be determined using flow cytometry within 3 months. 14C samples were counted on board and will be analyzed a second time by July 2018. DIC samples will be analyzed by September 2018. Filters for bulk 13C uptake will be processed using EA-IRMS by August 2018 following Maugendre et al. (2015). FISH samples will be processed within 2 years according to Not et al. (2002). The probes to be used for FISH analysis will be chosen accordingly to the results on molecular eukaryotic diversity (parameter 7).

*Units:* pmol C cell-1 L-1 d-1

*Sensor Precision:*

# Décrire quels types de données sont nécessaires pour vous compléter votre propre jeu de données **avant** envoi à la base de données, et estimer le délai avant la disponibilité de vos données pour la base de données / *Post-cruise data analysis/treatment required, and the time frame for this*

Environmental variables (CTD data, pigments, phytoplankton, microzooplankton diversity and abundance from microscopic analysis, rates measured on board)

*Estimated Date of Delivery :*

1. Flow cytometry: 3 months.
2. 14C samples: July 2018.
3. DIC samples: September 2018.
4. 13C samples: August 2018
5. FISH samples: end of 2019

### REFERENCES BIBLIOGRAPHIQUES

Jardillier, L., Zubkov, M.V., Pearman, J., and Scanlan, D.J. (2010). Significant CO2 fixation by small prymnesiophytes in the subtropical and tropical northeast Atlantic Ocean. ISME J *4*, 1180–1192.

Maugendre, L., Gattuso, J.-P., de Kluijver, A., Soetaert, K., van Oevelen, D., Middelburg, J.J., and Gazeau, F. (2015). Carbon-13 labelling shows no effect of ocean acidification on carbon transfer in Mediterranean plankton communities. Estuarine, Coastal and Shelf Science 1–12.

Not, F., Simon, N., Biegala, I.C., and Vaulot, D. (2002). Application of fluorescent in situ hybridization coupled with tyramide signal amplification (FISH TSA) to assess eukaryotic picoplankton composition. Aquatic Microbial Ecology *28*, 157–166.