BIOSWOT-Med

Campaign Metadata

v0.0
2023-05-14

Table of Contents

Salinity was corrected for thermal lag effect. Fluorometer output was calibrated to fit the CTD-rosette fluorometer. DO sensor output was calibrated to fit the CTD-rosette oxygen sensor (SBE),

Carousel bottles: Alkaline Phosphatase Activity (APA)

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Sampling methods
Sampling from CTD carousel (6 depths between 0 and 150 m) once per station.
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Analysis methods:
Addition of a fluorogenic substrate (Methylumbellyferyl phosphate disodium salt, MUF-P) to seawater samples inmediately after sampling. Incubations in the dark at in situ temperature. Measurement of fluorescence at selected intervals during the incubations by spectrofluorimetry using a Varioskan multi-plate reader. Concentration kinetics based on 8 substrate concentrations ranging from 0.025 to 1 µM.

Hoppe, H.-G.: Use of fluorogenic model substrates for extracellular enzyme activity measurement of bacteria. In: Handbook of methods in aquatic microbial ecology, Kemp, P. F., Sherr, B. F., Sherr, E. B., and Cole, J. J. (Eds.), Lewis, Boca Raton, 1993.

Carousel bottles – Chromophoric Dissolved Organic Matter (CDOM) ; Fluorescent Dissolved Organic Matter (FDOM)

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Sampling methods
Sampling from CTD carousel (13 depths between 0 and 500 m) once per station. Filtration immediately after sampling through 0.2 µm under a laminar flow hood. Samples stored at -20°C.
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Analysis methods:Measurements of absorption spectra for CDOM were performed with a 10-cm long cell on a UV–Vis 2450 spectrophotometer (Shimadzu, Japan). Measurements for FDOM were performed on a F-7000 spectrofluorometer (Hitachi, Japan) for which excitation-emission matrices (EEMs) were combined with PARAFAC (Ferretto et al., 2014 ; 2017 ; Tedetti et al., 2016).

Carousel bottles : cytometry

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Sampling methods
For each Rosette Cast, 16 Niskin bottels (corresponding to 16 different depths between 500m and surface) are sampled, in triplicates (phytoplankton, bacterias/HNF and viruses analysis).
So 48 samples for each cast (192 samples for each lagrangian station).
Samples are then fixed with glutaraldehyde (20µl glutaraldehyde-pluronic for 1980µl sample) before being flash freezed in liquide nitrogen and stored at -80°C.

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Analysis methods:
Samples are acquired on a Cytoflex (Beckman Coulter), using the CytExpert software, according to two protocoles : "PiNa" focused on the nano/microplankton (V=500µl), and "ProSyn" focused on the picoplankton and small particules such as Prochlorococcus and Synechococcus (V=250µl).
The cytometer is in "Plate loader" acquisition mode (one plate per station, and 12h acquisition per plate). Only samples for the analyze of phytoplankton communities are acquired on board. Viruses and bacterias will be analyzed at land.

Carousel bottles : Dissolved Organic Carbon (DOC)

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Sampling methods
Sampling from CTD carousel (13 depths between 0 and 500 m) once per station. Filtration immediately after sampling through 0.2 µm under a laminar flow hood. Acidification of samples with 20 µL of H2SO4 inmediately after filtration. Samples stored at 4°C.

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Analysis methods:At the laboratory, samples were bubbled with CO2-free air for 2 min to purge inorganic carbon followed with a high-temperature catalytic oxidation using TOC-V csh equipment (Shimadzu, Japan). DOC concentrations (µM) are validated using certificate reference material (low carbon water and deep sea water references) purchased fron Hansell Laboratories (Miami, USA).

The protocol is adapted from Sohrin, R. and Sempéré, R.: Temporal variation in total organic carbon in the Northeast Atlantic in 2000–2001, J. Geophys. Res., 110, C10S90, doi:10.1029/2004JC002731, 2005.

Carousel bottles : Dissolved Organic Nitrogen (DON) and Dissolved Organic Phosphorus (DOP)

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Sampling methods
Sampling from CTD carousel (10 depths between 0 and 200 m). Filtration immediately after sampling through 0.2 µm under a laminar flow hood. Acidification of the samples with 100 µL of H2SO4 inmediately after filtration. Samples stored in Teflon flasks at room temperature.

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Analysis methods:
Total dissolved nitrogen and total dissolved phosphorus are measured at the laboratory by using the wet-oxidation procedure described by Raimbault et al. (1999). Dissolevd organic nitrogen (DON) and dissolved organic phosphorus (DOP) are calculated as total dissolved nitrogen and total dissolved phosphorus minus dissolved inorganic nitrogen (nitrate+nitrite+ammonium) or phosphate respectively measured in the same samples. Analysis are performed using an automated colorimetric procedure (Aminot and Kerouel, 2007). Aminot, A., Kérouel, R., 2007. Dosage automatique des nutriments dans les eaux marines : méthodes en flux continu. Ed. Ifremer, Méthodes d'analyse en milieu marin 188 pp.

Underway sampling : isotopes

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Sampling methods
Filtration of water content from 2 Niskin bottles (12L each) at DCM layer.

Each of the bottle content is filtered on sequential filtration devices, one with Four filters (60 µm, 20 µm, GFD and GFF) for 3 size fractions (20-60 µm; 3-20 µm; 0.7-3 µm), another with two filters (60 µm, GFF) for the bulk (0.7-60 µm)
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Carousel bottles : microscope

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Sampling methods

For each station 2 Rosettes Cast (day and night), 2 Niskin bottles, were sampled : 150 m and DCM. Samples are collected from the Niskin bottle with a tube into a 250mL amber glass bottle; 2 bottles per depth.
Immediatly after sampling, the samples are fixed one with acidified Lugol's iodine solution and one with neutral formalin solution.
Once the all the samples have been prepared, they have been stored on board in the cold lab in the dark then, in the cold room at 4 °C in the MIO

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Analysis methods:

The samples will be analyzed by optical microscopie to address the diversity and abundances of the community of micro-phytoplankton in the differents stations
All the analysed will be performed by Utermöhl method.

Ref ; Utermöhl, von H. (1931) Neue Wege in der quantitativen Erfassung des Planktons. (Mit besondere Beriicksichtigung des Ultraplanktons). Verh. Int. Verein. Theor. Angew. Limnol., 5, 567–595.

Carousel bottles : nanomolar nitrate

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~ a subfolder for the raw data (L0) and
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Sampling methods
Sampling from CTD carousel (12 depths between 0 and 150 m) once per station. Filtration immediately after sampling through 0.2 µm under a laminar flow hood. Samples stored at -20°C.

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Analysis methods:
Analytical basis: Colorimetric method based on the formation of a pink-colored azo dye resulting from diazotizing nitrite with sulfanilamide. Nitrate are prior reduce to nitrite by a copper-coated cadmium column. Absorbance is read at 540 nm.
To increase absorbance, the SFA (segmented flow analyzer) is coupled to a LWCC (long waveguide capillary cell). The protocol is based on Zhang, 2000 and Patey et al. 2008M. Material used: A Liquid Waveguide Capillary Cell (LWCC) made of quartz capillary tubing (length = 1 m) + spectrophotometer (USB-Flame Preconfigured for General Lab Use, 200 -850 nm, Ocean Optics) and a light source (FO-6000).

Carousel bottles : nanomolar phosphate

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Sampling methods
Sampling from CTD carousel (12 depthes between 0 and 150 m) 4 times per station. Inline filtration during sampling through 0.2 µm. Samples stored at -20°C.

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Analysis methods:
Analytical basis: reaction of phosphate with molibdate in an acidic solution to form a 12-molybdophosphoric acid. Subsequent reduction to the phosphomolybdenum blue complex. Absorbance is measured at 710 nm. To increase absorbance, an auto-analyzer system (SFA, segmented flow analyzer) is coupled to a 1 m length LWCC (long waveguide capillary cell) and connected to a USB-Flame spectrophotometer. The protocol is based on Zhang and Chi, 2002 and Patey et al. 2008. Material used: A Liquid Waveguide Capillary Cell (LWCC) made of quartz capillary tubing (length = 1 m) + spectrophotometer (USB-Flame Preconfigured for General Lab Use, 200 -850 nm, Ocean Optics) and a light source (FO-6000).

Carousel bottles : Net Community Production (NCP)

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Sampling methods
Sampling from CTD carousel (150m - 100m - 50m and 2 x DCM) 1 times per station. Coupled with sampling from underway.

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Analysis methods:

Samples were incubated in a bath with temperature controlled. Each bottle has an optode for dissolved oxygen sensor aquisition. The light was controlled by 2 leds system to make a ramp.

Carousel bottles : NH_4

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Sampling methods
Sampling from CTD carousel (12 depths between 0 and 500 m) once per station. Twenty-ml samples collected into PC 60ml Nalgene Oak Ridge bottles. The orthophtaldialdehyde (OPA) reagent was then added and samples were incubated for 4 hours in the dark before fluorescence measurements.

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Analysis methods:
Analysis was performed on board using a Fluorimeter TD-700 Turner Designs using Holmes et al method based on the reaction of ammonia with orthophtaldialdehyde and sulfite.
Holmes, R.M., Aminot, A., Kérouel, R., Hooker, B.A., Peterson, B.J. 1999. A simple and precise method for measuring ammonium in marine and freshwater ecosystems. Can. J. Fish. Aquat. Sci. 56 : 1801-1808.

Carousel bottles : nutrients

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Sampling methods
Sampling from CTD carousel (16 depths between 0 and 500 m) 4 times per station. Samples stored at 4°C until analysis within 1-2 days.
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Analysis methods:
Analysis for nitrite, nitrate, phosphate and silicate were performed on board using an automated colorimetric procedure (Aminot and Kerouel, 2007). Aminot, A., Kérouel, R., 2007. Dosage automatique des nutriments dans les eaux marines : méthodes en flux continu. Ed. Ifremer, Méthodes d'analyse en milieu marin 188 pp.

Carousel bottles : oxygen

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Sampling methods
Sampling from CTD carousel (16 depths between 0 and 500 m) 1 times per station. Samples stored at ambient temperature in water and in dark until analysis after minimum 2 hours.

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Analysis methods:

Analysis for dissolved oxygen was performed on board by the Winkler titration method (Aminot et Kérouel, 2004. Hydrologie des écosystèmes marins Paramètres et analyses. Partie 2)
using a spectrophotometre of end-point detection : Endpoint-v1

Carousel bottles : omics

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This folder contains the dataset collected
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Sampling methods:
For each Rosette Cast, 4 Niskin bottles were sampled with 2 at DCM and 2 at 150m. Details of each data collection can be found in the BIOSWOT_Med_Samples.xls file which is regularly updated. Samples are collected directly from the Niskin bottle with a 200 µm mesh into a 25L carboy. A peristaltic pump is passing the seawater through the system. Seawater is first passing through a 142 mm filtration tripode equipped with a 3 µm PC filter and subsequently through another 142 mm filtration unit equipped with a 0.2 µm PC filter (based on MetaBGTomics – S320: protocol modified with a mesh of 200µm instead of 20µm; MetaBGTomics – S023 and EMO-BON). A first filtration taking no longer the 15 min allows to make metaT samples. Then a second filtration with the rest of seawater, taking no longer than one hour, allows to make the metaG samples. Once the samples are done, they are flash frozen in liquid nitrogen and stored onboard in a -80°C freezer. The seawater resulting of the 2 filtrations, inferior of 0.2 µm, is treated by Iron Chloride (2.82 g FeCL3 in 50 mL ultrapure water) for virus precipitation and after one hour at room temperature the seawater is filtered on a 0.8 µm PC filters and should not take more than one hour. These virus samples are stored at +4°C (Matthew Sullivan and Raffaella Casotti).
All samples are labelled with appropriate barcode and printed label.
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Analysis methods:

All the samples will be used for DNA and RNA extraction and send for sequencing to Genoscope. The bioinformatics analysis will be done at MIO and Genoscope.

Ref :

MetaBGTomics – S320 - targeting unicellular eukaryotes - Patrick Wincker, CEA Genoscope France (pwinker@genoscope.cnrs.fr)

MetaBGTomics – S023 - targeting prokaryotes - Patrick Wincker, CEA Genoscope France (pwinker@genoscope.cnrs.fr)
MetaBGTomics – S<02 – targeting viruses - Matthew Sullivan, Ohio State University, USA (mbsulli@gmail.com) - https://www.protocols.io/view/Iron-Chloride-Precipitation-of-Viruses-from-Seawat-x54v981pl3eq/v1?step=4
Raffaella Casotti- NEREA – SOP: Viruses - https://www.nerea-observatory.org/_files/ugd/044fbd_743e50d7e3d54584a5bb6ede605a76f7.pdf
Raffaella Casotti- EMO-BON - https://www.embrc.eu/newsroom/publications/european-marine-omics-biodiversity-observation-network-emo-bon-handbook

Carousel bottles : Particulate Organic Nitrogen (PON), Particulate Organic Phosphate

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Sampling methods
Sampling from CTD carousel (6 depths between 0 and 150 m). 1.2 L samples filtered inmediately after sampling onto a precombusted (450°C, 4h) glass fiber filter (Whatman 47 mm GF/F). The filter was stored at -20°C until analyse at laboratory.

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Analysis methods:
Particulate organic nitrogen (PON) and Particulate organic phosphorus (POP) are converted in nitrate ans phosphate respectively using the wet oxidation method based on a persulfate digestion at 120°C according to Raimbault et al. (1999). The nitrogen and phosphate formed by this oxidation are then determined with a nutrient auto-analyser (SEAL AA3)

Carousel bottles : tintinids

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Sampling methods
Four Niskin bottles were sampled between the surface and the DCM. Details of each data collection can be found in the yyyymmdd_Sampling_Notes_Tintinnids.docx
file which is regularly updated. A tube was connected to the Niskin bottle and 10 L of water were filtered through a plankton net of mesh size 10 µm. After 10 L were filtered the net was rinsed with the filtered seawater. The content of the non-filtering cod-end was collected in small bottles where I added 400 uL of Lugol. The bottles were stored in the fridge.
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Analysis methods:

The tubes with samples are put on a shelf in a shallow tray (or basin). After 24 h, the supernatant is siphoned out using a pipette. Samples are then observed under abinocular microscope in order to identify and count the Tintinids.

Carousel : CTD

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Sampling methods

The hydrographic work was carried out using a CTD-water sampling package from SeaBird Inc., acquiring data during both down and upcast. The package consisted of a SBE 911plus CTD with sensors listed below. The CTD was equipped with a 24 position SBE 32 Carousel, fitted with 22 12L sampling bottles. In total XX CTD-stations were performed during the mission.

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Analysis methods:

Raw data (.hex, .xmlcon, .bl) for each CTD cast is stored under L0 folder.
In the L1 folder, a set of processed files can be found :

- BTL contains the .btl file with all variables taken at each sampled depth
- CNV and ASC contains the 1-dbar binned profile (downcast only) in different format
- CNV_LADCP contains the 1s binned CTD data (down and up) used for lowered ADCP processing

Carousel: Laser In Situ Scattering and Transmissometry (LISST)

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by : leo.berline@mio.osupytheas.fr

~~~~~~

Last update of the folder : 14/05/2023
by : leo.berline@mio.osupytheas.fr

~~~~~~

Sampling methods

LISST-Deep was fixed horizontally at the bottom of the CTD rosette, together with its battery compartment. A total àf 48 vertical casts were carried out from surface to depth of 500m, and up to 2000m.

~~~~~~

Analysis methods:

The LISST-Deep measured the light attenuation and scattering from a red light-emitting laser diode of 670 nm wavelength at a frequency of 1 Hz. The kernel matrix corresponding to spherical particles was used to invert scattering into VC. Background was estimated using the in-situ minimum raw scattering signal for each profile in the 200-1000 m layer, to avoid the thick bottom nepheloid layers.

Measurements were retrieved from the downward casts only. To avoid contamination by particles smaller and larger than the range covered by the LISST and ambient light contamination, data from the 1st and 32nd size classes were ignored. Because of the high VC and high variability at classes 31 and 32 (from 180 to 250 µm) potentially impacting neighboring bins (Agrawal & Pottsmith, 2000), we discarded classes 29 to 32 from our analysis, restricting our analysis to classes below 128.9 µm (i.e. 27 classes from 2nd to 28th). Then, for each profile, a quality control procedure was applied (Leroux et al 2017).

Leroux R, Gregori G, Leblanc K, Carlotti F, … & Berline L (2017) Combining laser diffraction, flow cytometry and optical microscopy to characterize a nanophytoplankton bloom in the northwestern Mediterranean, Progress in Oceanography, doi:10.1016/j.pocean.2017.10.010

Carousel: Underway Vision Profiler (UVP)

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: leo.berline@mio.osupytheas.fr
Responsible of the data analysis : leo.berline@mio.osupytheas.fr
Responsible of the workpackage : françois.carlotti@mio.osupytheas.fr

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Last update of this README : 5/05/2023
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Last update of the folder : 14/05/2023
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~~~~~~

Sampling methods

UVP5 was fixed vertically inside the rosette. A total of 48 vertical
casts were carried out from surface to depth (500m and up to 2000m).
UVP5 records images at a frequency of up to 20 Hz all along the
water column. Acquisition mode was mixtfd (save of ROI for selected
images).

~~~~~~

Analysis methods:

See https://ecopart.obs-vlfr.fr/ and https://ecotaxa.obs-vlfr.fr/

Picheral, M., Guidi, L., Stemmann, L., Karl, D. M., Iddaoud, G.,
& Gorsky, G. (2010). The Underwater Vision Profiler 5: An advanced
instrument for high spatial resolution studies of particle size
spectra and zooplankton. Limnology and Oceanography: Methods,
8(1), 462–473. https://doi.org/10.4319/lom.2010.8.462

Drifters: CARTHE

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: maristella.berta@sp.ismar.cnr.it,
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marcello.magaldi@sp.ismar.cnr.it
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Responsible of the workpackage : francesco.dovidio@locean.ipsl.fr,
anthony.bosse@mio.osupytheas.fr

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Last update of this README : 11 May 2023
by : maristella.berta@sp.ismar.cnr.it

~~~~~~

Last update of the folder : 11 May 2023
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~~~~~~

Sampling methods
CARTHE drifters are gps-tracked buoys following the upper 60cm sea currents.
Position transmission every 10 minutes (nominal).

Novelli, G., C. M. Guigand, C. Cousin, E. H. Ryan, N. J. M. Laxague, H. Dai,
B. K. Haus, and T. M. Özgökmen, 2017: A Biodegradable Surface Drifter for
Ocean Sampling on a Massive Scale. J. Atmos. Oceanic Technol., 34,
2509–2532, https://doi.org/10.1175/JTECH-D-17-0055.1.

~~~~~~

Analysis methods:
Raw data cleaning removes spikes and spurious positions.

Drifters: CODE

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: maristella.berta@sp.ismar.cnr.it,
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mpacciaroni@ogs.it,
mmenna@ogs.it
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anthony.bosse@mio.osupytheas.fr

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Last update of this README : 11 May 2023
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Last update of the folder : 11 May 2023
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~~~~~~

Sampling methods
CODE drifters are gps-tracked buoys following the upper 1 m sea currents.
Position transmission every 10 minutes (nominal).

Davis, R. E. (1985), Drifter observations of coastal surface currents during
CODE: The method and descriptive view, J. Geophys. Res., 90(C3), 4741– 4755,
doi:10.1029/JC090iC03p04741.

~~~~~~

Analysis methods:
Raw data cleaning removes spikes and spurious positions.

Drifters: eOdyn

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: francesco.dovidio@locean.ipsl.fr
Co-responsible of the data collection: maristella.berta@sp.ismar.cnr.it
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Last update of this README : 2023/05/10
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Last update of the folder : 2023/05/10
by : francesco.dovidio@locean.ipsl.fr

~~~~~~

Sampling methods

eOdyn drifters are surface Lagrangian drifters transmitting their position together with significant wave height and optionally directional wave spectra. For BIOSWOT-Med, they have been parameterised for collecting directional wave spectra for 15 days starting from their activation.
~~~~~~

Drifters: Spotter

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: maristella.berta@sp.ismar.cnr.it,
francesco.dovidio@locean.ipsl.fr,
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Responsible of the workpackage : francesco.dovidio@locean.ipsl.fr,
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Last update of this README : 11 May 2023
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Last update of the folder : 11 May 2023
by : maristella.berta@sp.ismar.cnr.it

~~~~~~

Sampling methods
Spotter drifters are gps-tracked buoys following currents at the very surface.
Spotter measure the wave spectra along their path.
Position transmission every hour.

Raghukumar, K., Chang, G., Spada, F., Jones, C., Janssen, T., & Gans, A. (2019). Performance characteristics of "spotter," a newly developed real-time wave measurement buoy. Journal of Atmospheric and Oceanic Technology, 36(6), 1127–1141. https://doi.org/10.1175/JTECH-D-18-0151.1

Analysis methods:
Raw data cleaning removes spikes and spurious positions.
~~~~~~

Drifters: Surface Velocity Program - Biogeochemistry (SVP-BGC)

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: maristella.berta@sp.ismar.cnr.it,
francesco.dovidio@locean.ipsl.fr,
Marco.Bellacicco@artov.ismar.cnr.it,
lcenturioni@ucsd.edu
Responsible of the data analysis : Marco.Bellacicco@artov.ismar.cnr.it
Responsible of the workpackage : francesco.dovidio@locean.ipsl.fr,
anthony.bosse@mio.osupytheas.fr

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Last update of this README : 12 May 2023
by : maristella.berta@sp.ismar.cnr.it

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Last update of the folder : 12 May 2023
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~~~~~~

Sampling methods
SVP drifters are gps-tracked buoys following the upper 15 m sea currents.
The BGC-SVP drifter is equipped with CTD and optical device for biochemical meas.
Position transmission every 10 minutes (nominal).

Niiler, P. P., Sybrandy, A. S., Bi, K., Poulain, P. M., & Bitterman, D. (1995).
Measurements of the water-following capability of holey-sock and TRISTAR drifters.
Deep Sea Research Part I: Oceanographic Research Papers, 42(11–12), 1951– 1964.
https://doi.org/10.1016/0967-0637(95)00076-3
~~~~~~

Drifters: Surface Velocity Program (SVP) OGS

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: maristella.berta@sp.ismar.cnr.it,
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Last update of this README : 12 May 2023
by : maristella.berta@sp.ismar.cnr.it

~~~~~~

Last update of the folder : 12 May 2023
by : maristella.berta@sp.ismar.cnr.it

~~~~~~

Sampling methods
SVP drifters are gps-tracked buoys following the upper 15 m sea currents.
Position transmission every 10 minutes (nominal).

Niiler, P. P., Sybrandy, A. S., Bi, K., Poulain, P. M., & Bitterman, D. (1995).
Measurements of the water-following capability of holey-sock and TRISTAR drifters.
Deep Sea Research Part I: Oceanographic Research Papers, 42(11–12), 1951– 1964.
https://doi.org/10.1016/0967-0637(95)00076-3

~~~~~~

Analysis methods:
Raw data cleaning removes spikes and spurious positions.

Drifters: Surface Velocity Program (SVP) SIO

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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anthony.bosse@mio.osupytheas.fr

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Last update of this README : 12 May 2023
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Last update of the folder : 12 May 2023
by : maristella.berta@sp.ismar.cnr.it

~~~~~~

Sampling methods
SVP drifters are gps-tracked buoys following the upper 15 m sea currents.
Position transmission every 10 minutes (nominal).

Niiler, P. P., Sybrandy, A. S., Bi, K., Poulain, P. M., & Bitterman, D. (1995).
Measurements of the water-following capability of holey-sock and TRISTAR drifters.
Deep Sea Research Part I: Oceanographic Research Papers, 42(11–12), 1951– 1964.
https://doi.org/10.1016/0967-0637(95)00076-3

~~~~~~

Analysis methods:
Raw data cleaning removes spikes and spurious positions.

Echosounder EK60

~~~~~~
This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: CEDRIC COTTE & SVEN GASTAUER
Responsible of the data analysis : CEDRIC COTTE & SVEN GASTAUER
Responsible of the workpackage : CEDRIC COTTE & SVEN GASTAUER
~~~~~~
Last update of this README : ###DATE###
by : cedric.cotte@locean-ipsl.upmc.fr, sven.gastauer@thuenen.de
~~~~~~
Last update of the folder : ###DATE###
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~~~~~~
Sampling methods

L0: Simrad RAW Data

Simrad EK60 at 12, 38 and 200 kHz

Channel | Mode | Pule Duration (us)| Power (W)
==========
12-16 | Active | 1024 | 2000
ES38B | Active | 1024 | 2000
ES200-7c| Active | 1024 | 150

Ping rate: 4 s

Depth recording ranges:

Frequency | Depth range
==========
12 kHz | 3500 m
38 kHz | 1500 m
200 kHz | 350 m

Recording Mode:
Power / Angle Samples (Reduced File Size)

Recording Software: Simrad EK80 21.15
Synchronisation: OSEA with ADCP 38 and 150 kHz. No synchronisation with Nortek Signature 500 kHz.
~~~~~~

The Simrad EK60s were calibrated shortly before the cruise.

Free-Fall Acoustic Doppler Current Profiler (FFADCP)

~~~~~~

This folder contains the dataset collected
during the cruise organised as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analysed data (L1,...).
~~~~~~

Responsible of the data collection: stephanie.barrillon@mio.osupytheas.fr
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~~~~~~

Last update of this README : 11/05/2023
by : Stéphanie Barrillon
~~~~~~

Last update of the folder : 09/05/2023
by : Stéphanie Barrillon
~~~~~~

Sampling methods

Introduction

The ADCP (Acoustic Doppler Current Profiler) is a classical instrument for measuring oceanic currents using acoustic beams and the Doppler effect. ADCPs are usually used for the horizontal components measurements, but we are now exploiting them for the vertical component. In particular, the new generation ADCPs can have an additional vertical beam dedicated to this component.

ADCPs are either fixed on the bottom of the ship or deployed with a package attached to the ship, their measurements are thus largely influenced by the ship movement. The idea of the FF-ADCP (ADCP in Free Fall) is to decouple the ADCP from the vertical movement of the ship : attached to the ship by a loose rope, the FF-ADCP falls freely, independently from the ship movements.

Thanks to this decoupling, and using the vertical beam of the new generation ADCPs, the measurement of the vertical velocities reaches a precision of a few mm/s.

Instrument
~~~~~~

The FF-ADCP is composed by a cage containing an ADCP, a CTD and an acoustic release system with losable weights. Above the cage 2 buoys insure a total weight in water of 5 kg (70kg in air). A 200m rope is attached to the FF-ADCP and deployed with the help of a winch (provided by Genavir).

ADCP : RDI Sentinel V, 5 beams, 500 kHz, 5m bins, ~40m range, sampling frequency 1Hz
CTD : RBR Concerto
Release system : iXblue Oceano R1

ref : C. Comby, S. Barrillon, J.-L. Fuda, A.M. Doglioli, R. Tzortzis, G. Gr egori, M. Thyssen, A.A. Petrenko, "Measuring vertical velocities with ADCPs in low-energy ocean", Journal of Atmospheric and Oceanic Technology, 39(11), pp.1669-1684 (2022).

~~~~~~

Analysis method

The analysis method is briefly described as follows:
- data selection: quality criteria of the ADCP 5th beam velocity (intensity and correlation)
- projection of the velocity components to the Earth reference frame (and removal of the u,v projections to the non-vertical 5th beam due to the tilt/roll of the instrument), projection of depths (expressed in the ADCP reference frame) to the gravimetric vertical axis
- subtraction of the vehicle vertical velocity (from the pressure sensor of the ADCP Sentinel) to obtain the oceanic vertical velocity
- temporal smoothing, removal of the upper and lower ends of profiles (small data occurrence)

Ref : C. Comby, S. Barrillon, J.-L. Fuda, A.M. Doglioli, R. Tzortzis, G. Gr egori, M. Thyssen, A.A. Petrenko, "Measuring vertical velocities with ADCPs in low-energy ocean", Journal of Atmospheric and Oceanic Technology, 39(11), pp.1669-1684 (2022).
~~~~~~

Floats

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for each instruments containing a README file,
~ a sub~subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1, L...).

~~~~~~

Responsible of the data collection: mpacciaroni@ogs.it
Responsible of the data analysis : mpacciaroni@ogs.it
Responsible of the workpackage : anthony.bosse@mio.osupytheas.fr

~~~~~~

Last update of this README : 09 May 2023
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Last update of the folder : 08 May 2023
by : mpacciaroni@ogs.it

~~~~~~

Sampling methods and Analysis:

A total of six floats (NKE manufactured) were deployed during the campaign, three Arvor-I DO are equipped with CTD and Aanderaa 4330 probe for the dissolved oxygen.
Two Provor CTS4 with CTD, oxygen probe, radiometer plus PAR, fluorimeter (chl, CDOM, backscattering).
One Provor CTS4 with CTD, oxygen probe, radiometer plus PAR, fluorimeter (chl, CDOM, backscattering), SUNA_V2 for nitrates.

The BGC floats were configured to cycle at 6 hours, reaching about 300-400 dbar. The vertical resolution is 1 dbar for CTD and oxygen and 2 dbar for the other parameters.
The Arvor-I floats were configured to cycle at 6 hours, reaching about 400 dbar. The vertical resolution is 2 dbar for CTD and oxygen.

The acquired profiles were decoded in real time to have information on parameter values and GPS locations.
The vertical profiles of each floats are reported in the L0 folder together with the depht and time interpolations and trajectories in .kml files.
~~~~~~

Gliders: SEA003

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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Responsible of the workpackage : anthony.bosse@mio.osupytheas.fr

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Last update of this README : 2023-May-10
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Last update of this README : 2023-May-10
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~~~~~~

Sampling methods

SEA003 is a Seaexplorer autonomous glider manufactured by Alseamar.
SEA003 was equipped with the following sensors :
-
It was deployed on 24 April 2023 from RV Atalante by JL Fuda. It performed 65 cycles to a maximim depth of 500m before having a water inlet alert and was recovered anticipatedly on 03 May.

~~~~~~

Analysis methods:

Raw data (L0) contains sensors and navigation outputs in two different level of completeness :
- realtime contains the data transmitted by iridium during the mission
- realtime_coriolis contains the data transmitted during the mission to GDAC Coriolis and processed in netcdf OceanGliders format.
- full_postmission contains the full data recorded by the instrument and downloaded after the glider had been recovered.

In L1, folder data are transformed into a netcdf file containing vertical profiles interpolated every 1dbar for the all the physical variables measured by the sensors.
The netcdf data format is compliant the standards defined by the OceanGliders program.

Reference:
EGO gliders data management team (2023). EGO gliders NetCDF format reference manual. https://doi.org/10.13155/34980

Gliders: EA090

~~~~~~
This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: nagib.bhairy@mio.osupytheas.fr
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~~~~~~
Last update of this README : 2023-May-10
by : anthony.bosse@mio.osupytheas.fr
~~~~~~
Sampling methods

SEA090 is a Seaexplorer autonomous glider manufactured by Alseamar.
SEA090 was equipped with the following sensors :
-
It was deployed on 24 April 2023 from RV Atalante by JL Fuda. It performed 105 cycles to a maximum depth of 1000m and was recovering on 9 May 2023.
~~~~~~
Analysis methods:

Raw data (L0) contains sensors and navigation outputs in two different level of completeness :
- realtime contains the data transmitted by iridium during the mission
- realtime_coriolis contains the data transmitted during the mission to GDAC Coriolis and processed in netcdf OceanGliders format.
- full_postmission contains the full data recorded by the instrument and downloaded after the glider had been recovered.

In L1, folder data are transformed into a netcdf file containing vertical profiles interpolated every 1dbar for the all the physical variables measured by the sensors.
The netcdf data format is compliant the standards defined by the OceanGliders program.

Reference:
EGO gliders data management team (2023). EGO gliders NetCDF format reference manual. https://doi.org/10.13155/34980

Gliders: SLOCUM

~~~~~~
This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: fiona.elliott@uib.no
Responsible of the data analysis : anthony.bosse@mio.osupytheas.fr
Responsible of the workpackage : anthony.bosse@mio.osupytheas.fr
~~~~~~
Last update of this README : 2023-May-10
by : anthony.bosse@mio.osupytheas.fr
~~~~~~
Last update of this README : 2023-May-10
by : anthony.bosse@mio.osupytheas.fr
~~~~~~
Sampling methods

Odin is a Slocum autonomous glider manufactured by Teledyne Webb Research.
Odin was equipped with the following sensors :
-
It was deployed on 24 April 2023 from RV Atalante by JL Fuda. It performed 105 cycles to a maximum depth of 1000m and was recovering on 9 May 2023.
~~~~~~
Analysis methods:

Raw data (L0) contains sensors and navigation outputs in two different level of completeness :
- realtime contains the data transmitted by iridium during the mission
- realtime_coriolis contains the data transmitted during the mission to GDAC Coriolis and processed in netcdf OceanGliders format.
- full_postmission contains the full data recorded by the instrument and downloaded after the glider had been recovered.

In L1, folder data are transformed into a netcdf file containing vertical profiles interpolated every 1dbar for the all the physical variables measured by the sensors.
The netcdf data format is compliant the standards defined by the OceanGliders program.

Reference:
EGO gliders data management team (2023). EGO gliders NetCDF format reference manual. https://doi.org/10.13155/34980

Gliders: SPRAY

~~~~~~
ZOOGLIDER CTD DATA
~~~~~~
~~~~~~
This folder contains the dataset collected
during de cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: MARK D. OHMAN & SVEN GASTAUER
Responsible of the data analysis : MARK D. OHMAN & SVEN GASTAUER
Responsible of the workpackage : MARK D. OHMAN & SVEN GASTAUER
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Last update of this README : 14.05.2023
by : sven.gastauer@thuenen.de
~~~~~~
Last update of the folder : 14.05.2023
by : sven.gastauer@thuenen.de
~~~~~~
Sampling methods

L0: CTD data

Number of raw files:xx
Total size raw files: xx

Instrument: SeaBird CP41
Seapoint mini-scf fluorometer

Data: Temperature, Salinity, Fluorescence counts

Detailed description can be found in Ohman et al. (2019).
REFERENCES

Ohman, M. D., R. E. Davis, J. T. Sherman, K. R. Grindley, B. M. Whitmore, C. F. Nickels, and J. S. Ellen. 2019. Zooglider: An autonomous vehicle for optical and acoustic sensing of zooplankton. Limnol. Oceanogr. Methods 17: 69–86. doi:10.1002/lom3.10301
~~~~~~
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END OF FILE
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~~~~~~
ZOOGLIDER ZONAR DATA
~~~~~~
This folder contains the dataset collected
during de cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: MARK D. OHMAN & SVEN GASTAUER
Responsible of the data analysis : MARK D. OHMAN & SVEN GASTAUER
Responsible of the workpackage : MARK D. OHMAN & SVEN GASTAUER
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~~~~~~
Last update of the folder : 14.05.2023
by : sven.gastauer@thuenen.de
~~~~~~
Sampling methods

L0: Zonar Acoustic data

Number of raw files:xx
Total size raw files: xx
Zonar acoustics at 200 and 1000 kHz
Zonar specs:
Frequencies: 200 / 1000 kHz
Calculated Source Level: 115 dB / 112 dB re 1 uPa @ 1 m
Beam Angle: 9.8 deg / 4.00 deg
Input Voltage: +12V, -12 V
Pulse duration: 6 ms / 6ms
Sampling Rate: 5 kHz
Output noise level: 225 mV
The inter-ping interval was 200 ms (ping rate = 5 Hz) for the 200 kHz and 100 ms (ping rate = 10 Hz) for the 1000 kHz. A 1 ms blanking time for both, which extends further than the theoretical nearfield zone of the transducers, was applied. Full description in Gastauer et al (2022)
Intercalibration of the 200 kHz was perfromed with the calibrated echosounders of the RV Atalante. Echosounders were calibrated in a tank at Scripps Institution of Oceanography, largely following Demer et al. 2015.

REFERENCES

Demer, D.A., Berger, L., Bernasconi, M., Bethke, E., Boswell, K., Chu, D., Domokos, R., et al. 2015. Calibration of acoustic instruments. ICES Cooperative Research Report No. 326. 133 pp.
Gastauer, S., Nickels, C. F., & Ohman, M. D. (2022). Body size-and season-dependent diel vertical migration of mesozooplankton resolved acoustically in the San Diego Trough. Limnology and Oceanography, 67(2), 300-313.

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ZOOGLIDER ZOOCAM DATA
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This folder contains the dataset collected
during de cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: MARK D. OHMAN & SVEN GASTAUER
Responsible of the data analysis : MARK D. OHMAN & SVEN GASTAUER
Responsible of the workpackage : MARK D. OHMAN & SVEN GASTAUER
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Last update of this README : 14.05.2023
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~~~~~~
Sampling methods

L0: Zoocam Optical data

Number of raw files:xx
Total size raw files: xx

Raw png files recorded bz the Zoocam Shadowgraph Camera.
Sampling volume 250 mL
Sampline rate 1 Hz during the ascent

Engineering details and data description can be found in Ellen et al. 2019 and Ohman 2019.

REFERENCES

Ellen, J. S., C. A. Graff, and M. D. Ohman. 2019. Improving plankton image classification using context metadata. Limnol. Oceanogr. Methods 17: 439–461.
Ohman, M. D., R. E. Davis, J. T. Sherman, K. R. Grindley, B. M. Whitmore, C. F. Nickels, and J. S. Ellen. 2019. Zooglider: An autonomous vehicle for optical and acoustic sensing of zooplankton. Limnol. Oceanogr. Methods 17: 69–86. doi:10.1002/lom3.10301
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Lowered Acoustic Doppler Current Profiler (LADCP)

/BIOSWOT/DATA/LADCP/
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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: caroline.comby@mio.osupytheas.fr
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Sampling methods

Lowered Acoustic Doppler Current Profiler (LADCP) systems are routinely
used to collect full-depth profiles of ocean velocity.
They are attached to the carousel and measure the velocity of particles
passively transported by the stream, in all three spatial dimensions,
along the entire length of the CTD cast.

Two ADCPs measure the currents in a synchronized way. One is fixed towards
the bottom (downlooker, 'Master ADCP'), the second is fixed towards the
surface (uplooker, 'Slave ADCP').

M. Visbeck, 2002, Deep Velocity Profiling Using Lowered Acoustic Doppler
Current Profilers: Bottom Track and Inverse Solutions, JAOT, 794-807,
https://doi.org/10.1175/1520-0426(2002)019<0794:DVPULA>2.0.CO;2
~~~~~~

Analysis methods:

The data are processed for horizontal velocity using the “LDEO Implementa-
tion” of the velocity-inversion method, also called the LDEO IX Software.
The software is available at https://www.ldeo.columbia.edu/LADCP.

A.M. Thurnherr, 2021, How To Process LADCP Data With the LDEO Software
(Version IX.14)

Mesocosm: chlorophyll

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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Sampling methods
1 L water samples for chlorophyll were collected at
T1 : filling of the day tank (day tank only)
T2 : filling of the night tank (day and night tank)
T5 : end of the experiment

Water was filtered on 47 mm GFF filters which were then frozen in the -80 C.

~~~~~~

Analysis methods:
From JGOFS Protocols—June 1994 to be carried out on land at MIO

1. After removal from liquid nitrogen or freezer), the pigments are extracted by placing the filters in 5.0 ml 100% acetone. For 47 mm GF/F filters, 0.8 ml of water is retained adjusting the final extraction solution to 86% acetone and the final extraction volume to 5.8 ml. The samples are covered with Parafilm to reduce evaporation, sonicated (0°C, subdued light) and allowed to extract for 4 hours in the dark at -20°C. Following extraction, samples are vortexed, filters are pressed to the bottom of the tube with a stainless steel spatula and spun down in a centrifuge for 5 minutes to remove cellular debris.
2. The addition of 5.0 ml acetone for pigment extraction is necessary to completely submerge 47 mm GF/F filters in 15 ml centrifuge tubes. This volume may be altered depending on the size of the filter and volume of the extraction tube.
3. The fluorometer is allowed to warm up and stabilize for 30 minutes prior to use.
4. The fluorometer is zeroed with 90% acetone.
5. 1.0 ml of pigment extract is mixed with 4.0 ml 90% acetone in a cuvette and read on the appropriate door to give a reading between 30 and 100. The sample is then acidified with 2 drops of 1.2 M HCl. Further dilutions may be necessary for higher chlorophyll a concentrations.
6. For laboratory use, the fluorometer is calibrated every 6 months with a commercially available chlorophyll a standard (Anacystis nidulans, Sigma

Chemical Company). If the fluorometer is taken to sea, it is recommended that the fluorometer be calibrated before and after each cruise.
7.

8. From the standard, a minimum of five dilutions are prepared for each door. Fluorometer readings are taken before and after acidification with 2 drops 1.2 M HCl.

9. Linear calibration factor (Kx) are calculated for each door (x) as the slope of the unacidified fluorometric reading vs. chlorophyll a concentration calculated spectrophotometrically.

10. The acidification coefficient (Fm) is calculated by averaging the ratio of the unacidified and acidified readings (Fo /Fa) of pure chlorophyll a.

11. Samples are read using a door setting that produces a dial reading between 30 and 100. The fluorometer is zeroed with 90% acetone each time the door setting is changed.

Mesocosm: cytometry

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

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Sampling methods

Triplicates of water samples were collected from each tank at multiple time steps:
- T1 : when the day tank is filled
- T2 : when the night tank is filled
- T3 : 2 am
- T4 : 4 am
- T5 : end of the experiment (~ 6 am)

From each container I extracted 1.98 mL of water and added 2 mL of gluta-p. Samples were left to incubate for 15 minutes in the dark at room temperature, then flash frozen and transferred to the -80 C freezer.

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Analysis methods:

3 um and 2 um beads (add quantities - check with Morgane) were added to each sample and 500 uL were processed in the Accuri xxx flow-cytometer.

Mesocosm: zooplankton gut content

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

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Sampling methods

Zooplankton was collected with a Regent's net with a non-filtering cod-end. Once collected the organisms were kept in the cold room in the dark. An aliquot (typically equivalent to 2 L) was collected, mixed with soda seawater, and filtered on a Nitex filtered which was then flash frozen and stored in the -80 C freezer.

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Analysis methods:

Protocol from Mark Ohman
Preparation

Add ice to black tub to hold extraction tubes
Label extraction tubes and fill to 10.0 mL with 90% acetone (HPLC grade)

Sorting/removal of detritus (only small section at a time; keep all other samples in freezer on ice dish)

- Remove phytoplankton debris under dissecting microscope
- Remove radiolarians and their spines, if phytoplankton are trapped in them
- Make notes of dominant organisms
- Make notes of any unique or unusual organisms
- Remove large animals (e.g., myctophid fishes) and make notes of removals
- Rinse fish w/ FSW
- Transfer sample into 10 mL of 90% acetone in extraction tube
- Keep extraction tubes in ice tub, protected from the light, while sorting remaining samples
- Rinse forceps between samples

Sonication (w/ micro-tip)

- Sonicate on setting 7
- Apply four 5-sec bursts, while holding extraction tube in beaker in ice water
- If organisms remain intact, sonicate with two additional 5-sec bursts

· Rinse and wipeoff sonicator probe between samples
·

Extraction
· Store samples in tub of ice in -20° C freezer for one hour
· Turn on fluorometer

Centrifugation
· Invert extraction tubes twice to mix thoroughly
· Place in clinical centrifuge in balanced array
· Centrifuge for 10 minutes at maximum speed

Transfer to Cuvettes
· Under fume hood, use large pipette to carefully extract 4 mL of supernatant
· Place supernatant into numbered cuvette and close with screw cap
· Repeat with a second aliquot, making two 4 mL replicates from each extraction tube (label A & B)
· Place cuvettes A into freezer in labelled and dated test tube rack
· Bring other cuvettes with you to fluorometer area (bring glass-disposable pipette)

Fluorometric Analysis
· Use "CCE" fluorometer [Turner Designs 10AU]
· Record acetone blank for each range and sensitivity combination on the fluorometer. Use acetone mixture used for samples and clean cuvette with Kimwipe
· Record coproprophyrin blanks at settings 100 and 1
· Place sample cuvette in fluorometer (after wiping with Kimwipe)
· Record fluorometer reading, sensitivity, and range; reading should be between 2 and 7
· Add 2 drops of HCl to cuvette
· Cap cuvette and invert twice
· Record fluorometer reading on same sensitivity and range as before acidification
· If readings are above 7 on 1/1 setting, make a dilution of 0.1 mL of extraction solution in 4 mL of 90% acetone. Analyze before and after acidification, as above.
· Record acetone blank for each range and sensitivity combination on the fluorometer

Storage of samples
· Place analyzed samples in labeled and dated test tube rack in -20° C flammable-resistant freezer

Cleanup
· Discard used acetone in labelled waste container
· Clean glassware, stopper, forceps in water with Sparkleen soap
· Rinse all items 4-5 times in tap water and 2-3 times in deionized water
· Allow to drip dry

Mesocosm : zooplankton nutrient samples

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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Sampling methods

Nutrient samples were collected for the last 3 realisations of the experiment.
Nutrient bottles were rinsed three times with water from each tanks, filled, and put in the fridge (add temperature, Elvira).
We collected three replicates at the start of each experiment for each tank and two at the end.
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Mesocosm : planktoscope

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

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Sampling methods

2 L bottles of water samples were collected when each tank was filled and emptied. During the last two realisations of the experiment I also collected triplicates. The content of each bottle was concentrated to a small volume between 5 and 15 mL (depending on the sample) and processed through the Planktoscope.

As a result I collected:
3 (1) samples for the day tank at the start
3 (1) samples for the night tank at the start
3 (1) samples for the day tank at the end
3 (1) samples for the night tank at the end

One sample per set at the start of the experiment was processed while fresh while the last two were fixed with 400 uL acidified lugol.
** Note the first two realisation of the experiment followed a slightly different sampling method and samples were only processed fresh within 36 hours and they were kept in a 15 C fridge in the dark in the meantime.

Mériguet, Z., Oddone, A., Le Guen, D., Pollina, T., Bazile, R., Moulin, C., ... & Lombard, F. (2022). Basin-scale underway quantitative survey of surface microplankton using affordable collection and imaging tools deployed from Tara. Frontiers in Marine Science, 1125.

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Analysis methods:

Each sample was passed through the Planktoscope three times to quantify the impact of the limited volume that is imaged over the total pumped volume.

Mesocosm : taxonomy

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

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Sampling methods

Zooplankton for each mesocosm was sampled at the time of filling and at the end of the experiment following two different protocols.

START
Before each tank was filled we deployed a Regent's net with a non-filtering cod-end to the estimated position of the DCM (or to the deepest possible location where we could pump the wate for each tank). The content of the cod-end is then transferred to a 10 L container and put in the dark cold room while the tank is filled. Once, the tank is full, an aliquot of the container is transferred to the appropriate tank and an aliquot is conserved as a representative of the zooplankton community inoculated in the tank.
For the first realisation of the experiment, we used a concentration that is ~ 5 times the average one over the top 40 m and for the other three we used a higher concentration (to be confirmed and recalculated), where we transferred the content of 5 L of the container in the tank. The sample was then concentrated into a 50 mL container and Formol was added for its preservation.

END
At the end of the experiment, when each tank is emptied a 200 um filter was placed on the outgoing pipe. For the first realisation of the experiment we placed the filter between the tank and the pipe, for the second one the sample was lost, and for the last two realisations the filter was placed between the pipe and the water (which was way more secure). The content of the filter was diluted in water in a 50 mL container and was preserved using Formol.

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Analysis methods:

To be determined

Moving Vessel Profiler (MVP)

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This folder contains the dataset collected
during de cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
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Sampling methods:

We used a MVP200 equipped with a MSFFF I (MultiSensor Free Fall Fish type I) containing a microCTD MVPx2 with a sound velocity sensor (AML SV X2Change)
a fluorometer (Wetlabs FLRTD) a Dissolved Oxygen sensor (RinkoIII ARO-CAV-CM)
a Turbidity sensor (Wetlabs ECO-FLNTU-RT).
The fish carries out vertical casts from ~6m to ~350m, at a ship speed of 6 knt.
A total of 14xx casts were carried out.
~~~~~~
Analysis methods:

MVPtools.
For L2 QC files, temperature and Salinity profiles were compared with CTD-rosette casts. Salinity was corrected for thermal lag effect. Fluorometer output was calibrated to fit the CTD-rosette fluorometer. DO sensor output was calibrated to fit the CTD-rosette oxygen sensor (SBE), which was calibrated with bottle measurments (Winkler titration). Turbidity sensor was not calibrated.

Photosynthetic Available Radiation (PAR) Auto

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for each instruments containing a README file,
~ a sub~subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1).

~~~~~~

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Co-responsible : dominique.lefevre@mio.osupytheas.fr

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Last update of this README : 14 May 2023
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Last update of the folder : 14 May 2023
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Sampling methods and Analysis:

Automatized PAR (Photosyntheticaly Available Radiation) instrument on the deck of the ship:
QCR-S/N 10637 Biospherical Instruments Inc.
Frequency of acquisition = 1min.
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Phytonet20 : omics

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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Sampling methods:

At each station at 12:00, we deployed a WP2 net with a 20 microns mesh at 150 m (speed 0.5 m/s). The content of the collector is immediately sieved to 2 mm.
1/4 of cod-end with the live fraction 20 to 2000 microns is used for OMICS filtration. And 1/2 of the live fraction 20_2000 is sieved to a 300 microns mesh.
Two subsamples of each size fraction (125 mL each) are filtered on a 10 µm PC filter using 47 mm filtration unit and a peristaltic pump. Once the samples are done, they are flash frozen in liquid nitrogen and stored onboard in a -80°C freezer.
Details of each data collection can be found in the BIOSWOT_Med_Samples.xls file which is regularly updated.
All samples are labelled with appropriate barcode and printed label.

~~~~~~

Analysis methods:

All the samples will be used for DNA and RNA extraction and send for sequencing to Genoscope. The bioinformatics analysis will be done at MIO and Genoscope.

Phytonet20 : taxonomy

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
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~~~~~~
Sampling methods

For each station at about 12:00 we deployed a WP2 net with mesh of 20 microns at 150 m (speed 0,5 m/s). The content of the collector is immediately sieved to 2 mm.
Two subsamples of 30 ml are taken in amber glass bottle; one is fixed with acidified Lugol's iodine solution and one with neutral formalin solution and stored on board in the cold lab in the dark
1/4 of the live fraction 20_2000 will be use for OMICS filtration.

About 1/2 of the live fraction 20_2000 sieved to 300 microns.
Two subsamples of 60 ml are taken in amber glass bottle; one is fixed with acidified Lugol's iodine solution and one with neutral formalin solution and stored on board in the cold lab in the dark

1 at 5 ml of this fraction 20-300 filtered on Polycarbonate filter 0,2 microns for observation by SEM. This filters are dried in an oven at 60°C for 24 h, then stored at room temperature.

~~~~~~
Analysis methods:

The live samples are observed on board by optical microscopy with images taking, for a approach of the live community (interaction between organisms for example).
The live samples fraction 20_300 are analyzed on board with planktoscope to obtain the diversity of the microplankton.

At the MIO the fixed samples will be analyzed by optical microscopie to address the diversity and abundances of the community of micro-phytoplankton in the differents stations.

The filters PC 0.2 microns will be observe by SEM at MIO or other laboratory.

Pumping : CTD

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for each instruments containing a README file,
~ a sub~subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1).

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Co-responsible : laura.giraud@mio.osupytheas.fr, laurina.oms@mio.osupytheas.fr

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Last update of the folder : 03 May 2023
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Sampling methods and Analysis:

Pumping system (ASTI) with two pipes with different lengths (50m and 24m) to sample in the same time two different depths.
This is reproduced three time per day, with a resolution of 2m, 3m, 4m.
~~~~~~

Pumping : cytometry

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
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~~~~~~
Sampling methods
The sampling between the surface and 50m depth has been performed thanks to 2 plastic pipes of 70 and 51 m, connected to 2 ASTI pneumatic pumps. Samples were collected every 2, 3 or 4 meters from 50m to the surface. Details of each data collection can be found in the yyyymmdd_Sampling_Notes_CytometryPumping.docx file which is regularly updated.
Samples have been collected directly from the pipes into a 25mL falcon tube (previously rinsed 3 times with the seawater). From this falcon tube, a subsample of 1980 µL is pipetted into a small cryotube containing 20 µL of a solution made
of glutaraldehyde (25%) and Poloxamer (Pluronic). Once all the samples have been prepared, they have been incubated in a fridge for 10 min, in the dark, prior to be flash frozen in liquid nitrogen. Then they were stored onboard in a -80°C freezer.
~~~~~~
Analysis methods:

All the samples will be analyzed by flow cytometry to address the diversity and abundances of the various components of the microbial food web : pico- and nano- phytoplankton, bacterioplankton, viruses and heterotrophic nanoflagellates.
For each of these groups a dedicated protocol is applied. All the analysed will be performed on the Cytoflex flow cytometer (Beckman Coulter) of the PRECYM flow cytometry platform of the M.I.O.
The micro-organisms will be analysed one by one, at hifh frequency (up to several thousands per second). Light scatter and fluorescence emissions will allow to discriminated the various groups of phytoplankton (Marie et al., 1999).

Ref :

Marie, D., Partensky, F., Vaulot, D. and Brussaard, C. (1999), Enumeration of Phytoplankton, Bacteria, and Viruses in Marine Samples. Current Protocols in Cytometry, 10: 11.11.1-11.11.15. https://doi.org/10.1002/0471142956.cy1111s10

Marie, D., Brussaard, C.P.D., Thyrhaug, R., Bratbak, G., and Vaulot, D. 1999. Enumeration of marine viruses in culture and natural samples by flow cytometry. Appl. Environ. Microbiol. 65:45-52.

Pumping : nanomolar phosphate

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: elvira.pulido@mio.osupytheas.fr
Responsible of the data analysis : elvira.pulido@mio.osupytheas.fr
Responsible of the workpackage : elvira.pulido@mio.osupytheas.fr

~~~~~~

Last update of this README : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr

~~~~~~

Last update of the folder : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr

~~~~~~

Sampling methods
Sampling from the pumping system 4 times per station between 2 and 50 m with a vertical resolution of 2, 3 or 4 meters. Inline filtration during sampling through 0.2 µm. Samples stored at -20°C.

~~~~~~

Analysis methods:
Analytical basis: reaction of phosphate with molibdate in an acidic solution to form a 12-molybdophosphoric acid. Subsequent reduction to the phosphomolybdenum blue complex. Absorbance is measured at 710 nm. To increase absorbance, an auto-analyzer system (SFA, segmented flow analyzer) is coupled to a 1 m length LWCC (long waveguide capillary cell) and connected to a USB-Flame spectrophotometer. The protocol is based on Zhang and Chi, 2002 and Patey et al. 2008. Material used: A Liquid Waveguide Capillary Cell (LWCC) made of quartz capillary tubing (length = 1 m) + spectrophotometer (USB-Flame Preconfigured for General Lab Use, 200 -850 nm, Ocean Optics) and a light source (FO-6000).

Pumping : NH_4

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection:
sandra.nunige@mio.osupytheas.fr/elvira.pulido@mio.osupytheas.fr
Responsible of the data analysis :
sandra.nunige@mio.osupytheas.fr/elvira.pulido@mio.osupytheas.fr
Responsible of the workpackage : elvira.pulido@mio.osupytheas.fr
~~~~~~

Last update of this README : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr
~~~~~~

Last update of the folder : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr
~~~~~~

Sampling methods
Sampling from the pumping system once per station between 2 and 50 m with a vertical resolution of 3 or 4 meters. Twenty-ml samples collected into PC 60ml Nalgene Oak Ridge bottles. The orthophtaldialdehyde (OPA) reagent was then added and samples were incubated for 4 hours in the dark before fluorescence measurements.
~~~~~~

Analysis methods:
Analysis was performed on board using a Fluorimeter TD-700 Turner Designs using Holmes et al method based on the reaction of ammonia with orthophtaldialdehyde and sulfite.
Holmes, R.M., Aminot, A., Kérouel, R., Hooker, B.A., Peterson, B.J. 1999. A simple and precise method for measuring ammonium in marine and freshwater ecosystems. Can. J. Fish. Aquat. Sci. 56 : 1801-1808.
~~~~~~

Pumping : nutrients

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection:
sandra.nunige@mio.osupytheas.fr/elvira.pulido@mio.osupytheas.fr
Responsible of the data analysis :
sandra.nunige@mio.osupytheas.fr/elvira.pulido@mio.osupytheas.fr
Responsible of the workpackage : elvira.pulido@mio.osupytheas.fr

~~~~~~

Last update of this README : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr

~~~~~~

Last update of the folder : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr

~~~~~~

Sampling methods
Sampling from the pumping system 4 times per station between 2 and 50 m with a vertical resolution of 2, 3 or 4 meters. Samples stored at 4°C until analysis on board within 1-2 days.

~~~~~~

Analysis methods:
Analysis for nitrite, nitrate, phosphate and silicate were performed on board using an automated colorimetric procedure (Aminot and Kerouel, 2007). Aminot, A., Kérouel, R., 2007. Dosage automatique des nutriments dans les eaux marines : méthodes en flux continu. Ed. Ifremer, Méthodes d'analyse en milieu marin 188 pp.

Ship Acoustic Doppler Current Profiler (SADCP) OS38

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: anne.petrenko@univ-amu.fr
Responsible of the data analysis : anne.petrenko@univ-amu.fr
Responsible of the workpackage : anthony.bosse@univ-amu.fr

~~~~~~

Last update of this README : ###DATE###
by : anne.petrenko@univ-amu.fr

~~~~~~

Last update of the folder : ###DATE###
by : anne.petrenko@univ-amu.fr

~~~~~~

Sampling methods

ADCP currents measured by the RDI Ocean Surveyor 38 KHz
CB811 = baud rate 115200 bps (bits per second)
Transducer alignment 45.31°
Salinity ES 37 (ES 35 until April 29, 2023 7:18 UTC 7:14 for os150)
Transducer depth = 4.4 m

a) Deep configuration (> 2000 m from April 21 14h19 to May 1st 9:25 UTC and
from May 3rd 13:09 UTC to XXX)
55 cells in BroadBand
WS2000 = 20 m
Blank = 24 m
Threshold = 390 m/s
Interping 2s
Interensemble 2s

b) Shallow configuration (< 2000 m from May 1st 9:28 UTC to May 3rd 13:09 UTC)
80 cells in BroadBand
WS2000 = 12 m
Blank = 24 m
Threshold = 390 m/s
Interping 2s
Interensemble 4s

Different tests until April 21st, 16h30 UTC
But overpassed by OSEA forcing at frequency of 3 sec both OS150 and OS38 (with echosounders in between)
Nortek 500 KhZ unsynchronized
~~~~~~

more details see Annexe

Refs web site RDI : http://www.teledynemarine.com/rdi/
http://www.teledynemarine.com/ocean-surveyor-adcp
https://www.bodc.ac.uk/data/documents/nodb/pdf/RDI_ocean_surveyor_REV0108.pdf
~~~~~~
Analysis methods:

CODAS* processing refers to the ADCP data processing software and procedures that have evolved over more than 30 years,
and that still use the CODAS format. The processing steps have become increasingly automated, but human judgement is still
required for the final product. The software is highly flexible in allowing manual configuration and execution of individual steps,
as needed.

*CODAS (Common Ocean Data Access System) is software built around a database originally developed by Ramon Cabrera in
the late 1980's as a portable, self-describing format for oceanographic data, motivated by the advent of ship-mounted ADCPs.

Complete description of the analysis method detailed in:
https://currents.soest.hawaii.edu/docs/adcp_doc/
https://currents.soest.hawaii.edu/docs/adcp_doc/codas_doc/index.html

In our case (python processing):
a) q_py.cnt

```
   --yearbase 2023                ## required, for decimal day conversion
   --cruisename BIOSWOT23          ## always required; used for titles
   --dbname Atalante               ## database name; in adcpdb.  eg. a0918
   --datatype sta                 ## datafile type
   --sonar os38                   ## instrument letters, frequency, [ping]
   --ens_len  040                  ## specify correct ensemble length  deep waters sampling rate 3 sec
   --pgmin 30                  ## percentage good
```

b) quick_adcp.py --cntfile q_py.cnt --auto
c) adcp_nc.py adcpdb contour BIOSWOT23 os38

~~~~~~
Annexe A
Configuration file for deep bottom

```
;-------------------------------------------------------------------------\
; ADCP Command File for use with VmDas software.
```

```
;
; ADCP type:     38 Khz Ocean Surveyor ATALANTE
;
; ADCP 38 AT GRAND FOND BB SYNC TYPE
; Version 2.0
; Modification du cb711 en cb811
; Version 3.1
; Suite Recette + modif cb octobre 2017
; Version 4.0
; adaptée à la Phins 1 (347)
; Version 5.0
; adaptéenouveau EA après arrêt technique et descente base
; Version 5.1
; rajout CB811 pour augmentation cadence acquisition 06/03/2020
; Version 6.0
; Calibration suite au changement de la base le 28/03/2021, nouvel EA
; Version 7.0
; Calibration suite à l'arrêt technique décembre 2021, nouvel EA le 25/01/2022
;-------------------------------------------------------------------------------/

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 38400 bps,
; avec la nouvelle version de VmDAS la commande cb811 qui
;met le baud rate à 115200 bps est lancée automatiquement
;cb611
cb811

; Set for broadband single-ping profile mode (WP),
; WPnnn: nombre de ping broad band de courant par ensemble
; WP1 = 1 ping de courant bb
WP1

; WNnnn: nombre de cellules de courant broad band (de 001 à 128)
; WN055 = 55 cellules broad band
WN055

; WSnnnn: longeur d'une cellule boad band en cm
; WS2400 = cellule de 24m
WS2000

; WFnnnn: longeur du blanc après transmission en cm
; WF2400 = blanc de 24m
WF2400

; WVnnn: seuil sur la vitesse radiale en cm/s. Valeur par défaut pour le
; broad band 390 cm/s
```

; WV390 = seuil de 390 cm/s toujours laisser cette valeur par défaut
WV390

; Set for narrowband single-ping profile mode (NP)
;NPnnn: nombre de ping narrow band de courant par ensemble
;NP000 = aucun ping de narrow band (configuration broad band)
NP000

; **********

; CW0 commande non commentee par RDI met qui permet de pallier les défauts
; des versions de VmDAS
CW0

; SYNCHRO externe
; CXa,b définit les trigger in et out
; a = 0 trigger in off, mode maître ou autonome
; a = 1 trigger in on sur front montant, mode esclave
; b = 0 trigger output off, mode esclave ou autonome
; b = 1 trigger output transmis niveau haut, mode maître
; cx0,1: adcp en autonome ou maître (avec emission trigg out)
; cx1,0: adcp en mode esclave
cx1,0

; Enable single-ping bottom track (BP),
; Emission d'un "bottom ping" (1 = Yes, 0 = No):
; BPn: nombre de ping de bottom-track par ensemble
; BP1 = 1 ping de bottom-track par ensemble
BP0

; output velocity, correlation, echo intensity, percent good
; WDadcde0000 définit des paramètres enregistrés par l'appareil
WD111100000

; TPmmssff : Temps inter ping (minute seconde centième)
; TP000200 = 2s
TP000200

; TEhhmmssff : Temps inter ensemble (heure minute seconde centieme)
; TE00000200 = 2s
TE00000200

; Set to calculate speed-of-sound, no depth sensor, external synchro heading
; Capteur des paramètres "environnements": EZabcdefg
; calcul de la vitesse du son: a=1
; pas de Sondeur interne: b=0
; attitude gérée par VMDas: cde = 000

; Pas de capteur de conductivité: f=0
; capteur de température interne: g=1
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04531

; Set transducer depth to (decimeters)
; EDnnnnn profondeur de la base en décimètre
; ED00044 = base à 4,4m de profondeur
ED00044

; Set Salinity (ppt)
ES37

; save this setup to non-volatile memory in the ADCP
CK

Annexe B
Configuration file for shallow bottom
;---\
; ADCP Command File for use with VmDas software.
;
; ADCP type: 38 Khz Ocean Surveyor ATALANTE
;
; ADCP 38 AT PETIT FOND BB SYNC TYPE
; LAST UPDATE 17/07/12 suite Mission Pandora
; Version 2.0
; Modification du cb711 en cb811
; Modification du Blank Dist WF1600 en WF2400
; Version 3.0 (Suite Recette juillet 2017)
; Version 3.1 passage à cb611 octobre 2017
; Version 4.0
; adaptée à la Phins 1 (347)
; Version 5.0
; adaptée nouveau EA après arrêt technique et descente base
; Version 5.1
; rajout CB811 pour augmentation cadence acquisition 06/03/2020
; Version 6.0
; Calibration suite au changement de la base le 28/03/2021, nouvel EA
; Version 7.0
; Calibration suite à l'arrêt technique décembre 2021, nouvel EA le 25/01/2022

```
;-----------------------------------------------------------------------------/

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 38400 bps,
; avec la nouvelle version de VmDAS la commande cb811 qui
;met le baud rate à 115200 bps est lancée automatiquement
;cb611
cb811

; Set for broadband single-ping profile mode (WP),
; WPnnn: nombre de ping broad band de courant par ensemble
; WP1 = 1 ping de courant bb
WP1

; WNnnn: nombre de cellules de courant broad band (de 001 à 128)
; WN070 = 70 cellules broad band
WN080

; WSnnnn: longeur d'une cellule boad band en cm
; WS1600 = cellule de 16m
WS1200

; WFnnnn: longeur du blanc après transmission en cm
; WF2400 = blanc de 24m
WF2400

; WVnnn: seuil sur la vitesse radiale en cm/s. Valeur par défaut pour le
; broad band 390 cm/s
; WV390 = seuil de 390 cm/s toujours laisser cette valeur par défaut
WV390

; Set for narrowband single-ping profile mode (NP)
;NPnnn: nombre de ping narrow band de courant par ensemble
;NP000 = aucun ping de narrow band (configuration broad band)
NP000

; CW0 commande non commentee par RDI met qui permet de pallier les défauts
; des versions de VmDAS
CW0

; SYNCHRO externe
; CXa,b définit les trigger in et out
; a = 0 trigger in off, mode maître ou autonome
; a = 1 trigger in on sur front montant, mode esclave
; b = 0 trigger output off, mode esclave ou autonome
; b = 1 trigger output transmis niveau haut, mode maître
```

; cx0,1: adcp en autonome ou maître (avec emission trigg out)
; cx1,0: adcp en mode esclave
cx1,0

; Enable single-ping bottom track (BP),
; Emission d'un "bottom ping" (1 = Yes, 0 = No):
; BPn: nombre de ping de bottom-track par ensemble
; BP1 = 1 ping de bottom-track par ensemble
BP01

; Limite de detection du fond dans la limite des 2000m (en dm)
; BXnnnn profondeur maximale de recherche de fond en décimètres
; BX20000 = recherche de fond jusqu'à 2000 m
BX20000

; output velocity, correlation, echo intensity, percent good
; WDadcde0000 définit des paramètres enregistrés par l'appareil
WD111100000

; TPmmssff : Temps inter ping (minute seconde centième)
; TP000100 = 2s
TP000100

; TEhhmmssff : Temps inter ensemble (heure minute seconde centieme)
; TE00000400 = 4s
TE00000200

; Set to calculate speed-of-sound, no depth sensor, external synchro heading
; Capteur des paramètres "environnements": EZabcdefg
; calcul de la vitesse du son: a=1
; pas de Sondeur interne: b=0
; attitude gérée par VMDas: cde = 000
; Pas de capteur de conductivité: f=0
; capteur de température interne: g=1
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04510

; Set transducer depth to (decimeters)
; EDnnnnn profondeur de la base en décimètre
; ED00044 = base à 4,4m de profondeur

ED00044

; Set Salinity (ppt)
ES37

; save this setup to non-volatile memory in the ADCP
CK

Ship Acoustic Doppler Current Profiler (SADCP) POS150

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: anne.petrenko@univ-amu.fr
Responsible of the data analysis : anne.petrenko@univ-amu.fr
Responsible of the workpackage : anthony.bosse@univ-amu.fr

~~~~~~

Last update of this README : May 13, 2023
by : anne.petrenko@univ-amu.fr

~~~~~~

Last update of the folder : May 14, 2023
by : anne.petrenko@univ-amu.fr

~~~~~~

The courantology work was carried out using three ship or hull-mounted ADCPs: RDI Ocean Surveyor (OS) 38kHz, RDI OS 150 kHz and Nortek Signature 500 kHz. Most of the cruise data were collected with the deep water configuration (apart for the os38 during the two periods close to Minorque). The OS data, acquired at 1/3 Hz frequency, were treated with CODAS (either short-time averaged over 2 minutes (sta) or long-time averaged over 10 minutes (lta)) and the Signature with the Nortek Review software. They were further analysed with LATEXTools.

Frequency 150 kHz
Vertical resolution 4 m
Range 15 :311 m
Number of bins 75

OS data provided horizontal and vertical velocities from the Ocean Survey configuration.

Sampling methods

ADCP currents measured by the RDI Ocean Surveyor 150 KHz
CB811 = baud rate 115200 bps (bits per second)
Transducer alignment 43.20°
Salinity ES 37 (ES 35 until April 29, 2023 7:14 UTC)
Transducer depth = 4.5 m

Deep configuration (> 2000 m from April 21 14h19 to May 14 XXX UTC)
WN40 40 cells; in fact 75 cells in BroadBand
WS0600 cells 6m; in fact cells 4m
Blank = 8 m
Threshold = 390 m/s
Interping 1s
Interensemble 1s
~~~~~~

Different tests until April 21st, 16h30 UTC
But overpassed by OSEA forcing at frequency of 3 sec both OS150 and OS38 (with echosounders in between)
Nortek 500 KhZ unsynchronized

more details see Annexe

Refs web site RDI : http://www.teledynemarine.com/rdi/
http://www.teledynemarine.com/ocean-surveyor-adcp
https://www.bodc.ac.uk/data/documents/nodb/pdf/RDI_ocean_surveyor_REV0108.pdf
~~~~~~
Analysis methods:

Raw files can be found in L0.
In L1, the sta and lta *.nc files can be found. They do not contained the vertical velocity estimates that can be found in
in matlab format allbins_w.mat in respectively: matlab_sta and matlab_lta directories.

CODAS* processing refers to the ADCP data processing software and procedures that have evolved over more than 30 years,
and that still use the CODAS format. The processing steps have become increasingly automated, but human judgement is still
required for the final product. The software is highly flexible in allowing manual configuration and execution of individual steps,
as needed.

*CODAS (Common Ocean Data Access System) is software built around a database originally developed by Ramon Cabrera in
the late 1980's as a portable, self-describing format for oceanographic data, motivated by the advent of ship-mounted ADCPs.

Complete description of the analysis method detailed in:
https://currents.soest.hawaii.edu/docs/adcp_doc/
https://currents.soest.hawaii.edu/docs/adcp_doc/codas_doc/index.html

In our case (python processing):
a) q_py.cnt

```
   --yearbase 2023                ## required, for decimal day conversion
   --cruisename BIOSWOT23          ## always required; used for titles
   --dbname Atalante               ## database name; in adcpdb.  eg. a0918
   --datatype sta                 ## datafile type
   --sonar os150                  ## instrument letters, frequency, [ping]
   --ens_len  040                  ## specify correct ensemble length  deep waters sampling rate
3 sec
                                  (for sta 40*3=120 sec = 3 mn)
   --ens_len  200                  ## specify correct ensemble length  deep waters sampling rate
3 sec
```
~~~~~~

(for lta 200*3=600 sec = 10 mn)
--pgmin 30 ## percentage good

b) quick_adcp.py --cntfile q_py.cnt --auto
c) adcp_nc.py adcpdb contour BIOSWOT23 os150

~~~~~~

Annexe A
Configuration file for deep bottom

```
;-------------------------------------------------------------------------\
;-------------------------------------------------------------------------\
; ADCP Command File for use with VmDas software.
; Fichier de commande utilisé par le logiciel VMDas
;-------------------------------------------------------------------------\
; ADCP Command File for use with VmDas software.
;
; ADCP type:     150 Khz Ocean Surveyor
;
;  ADCP 150 AT GRAND FOND BB SYNC TYPE
;  LAST UPDATE  12/12/12 suite essais BT
;  Version 3.0
;  Modification de l'angle d'alignement, passage de 45.69° à 45.1°
;  Version 4.0
;  Modification de l'angle d'alignement, passage de 45.1° à 45.04°
;  Version 5.0 07/02/2018
;  Modification de l'angle d'alignement, adaptation à la Phins 1 (347)
;  Version 6.0
;  Modification de l'angle d'alignement le 28/03/2021
;  Version 7.0
;  Modification de l'angle d'alignement le 25/01/2022 suite à la réparation du capteur
;-------------------------------------------------------------------------/

; Restauration des paramètres usines:
cr1

; Forçage de la communication à 115200bps (no parity, one stop bit, 8 data bits)
; VMDas modifie éventuellement les vitesses de dialogue par lui même:
cb811


; Pas de tir Broad Band (commande à conserver impérativement même en mode NB)
; WPnnn: nombre de ping broad band de courant par ensemble
; WP1 = 1 ping de courant bb
WP1

; WNnnn: nombre de cellules de courant broad band (de 001 à 128)
; WN040 = 40 cellules broad band
WN40
```
~~~~~~

; WSnnnn: longeur d'une cellule boad band en cm
; WS0800 = cellule de 8m
WS0600

; WFnnnn: longeur du blanc après transmission en cm
; WF0800 = blanc de 8m
WF0800

; WVnnn: seuil sur la vitesse radiale en cm/s. Valeur par défaut pour le
; broad band 390 cm/s
; WV390 = seuil de 390 cm/s toujours laisser cette valeur par défaut
WV390

; ****** Commandes NarrowBand *******
; choix du mode NarrowBand (1 = Yes, 0 = No et invalide les commandes liées au BB):
;NPnnn: nombre de ping narrow band de courant par ensemble
;NP1 = 1n ping de narrow band par ensemble
NP0

; **********

; Emission d'un "bottom ping" (1 = Yes, 0 = No):
; BPn: nombre de ping de bottom-track par ensemble
; BP0 = aucun ping de bottom-track mode water track
BP0

; WVnnn: seuil sur la vitesse radiale en cm/s. Valeur par défaut pour le
; broad band 390 cm/s
; WV390 = seuil de 390 cm/s toujours laisser cette valeur par défaut
WV390

; SYNCHRO externe
; CXa,b définit les trigger in et out
; a = 0 trigger in off, mode maître ou autonome
; a = 1 trigger in on sur front montant, mode esclave
; b = 0 trigger output off, mode esclave ou autonome
; b = 1 trigger output transmis niveau haut, mode maître
; cx0,1: adcp en mode autonome ou maître (avec emission trigg out)
; cx1,0: adcp en mode esclave
CX1,0

; TPmmssff : Temps inter ping (minute seconde centième)
; TP000100 = 1s
TP000100

; TEhhmmssff : Temps inter ensemble (heure minute seconde centième)

; TE00000100 = 1s
TE00000100

; Capteur des paramètres "environnements": EZabcdefg
; calcul de la vitesse du son: a=1
; pas de Sondeur interne: b=0
; attitude gérée par VMDas: cde = 000
; Pas de capteur de conductivité: f=0
; capteur de température interne: g=1

EZ1000001

; valeur de salinité (bain d'eau douce sur le PP?):
ES37

; Set transducer misalignment (hundredths of degrees)
EA04320

; Immersion du transducteur (en dm)
; EDnnnnn profondeur de la base en décimètre
; ED00068 = base à 4,5m de profondeur
ED00045

; Sauvegarder ces commandes dans la ROM del'ADCP:
CK

; FIN

Annexe B
Configuration file for shallow bottom
;---\
;---\
; ADCP Command File for use with VmDas software.
;
; ADCP type: 150 Khz Ocean Surveyor Atalante
;
; ADCP 150 AT PETIT FOND SYNC TYPE
; LAST UPDATE 12/12/12 suite essais BT
; Version 3.0
; Modification de l'angle d'alignement, passage de 45.69° à 45.1°
; Version 4.0
; Modification de l'angle d'alignement, passage de 45.1° à 45.04°
; Version 5.0
; Modification de l'angle d'alignement, adaptation à la Phins 1 (347)
; Version 6.0
; Modification de l'angle d'alignement le 28/03/2021
; Version 7.0
; Modification de l'angle d'alignement le 25/01/2022 suite à la réparation du capteur

```
;-------------------------------------------------------------------------/

; Restore factory default settings in the ADCP
cr1

; Forçage de la communication à 115200bps (no parity, one stop bit, 8 data bits)
; VMDas modifie éventuellement les vitesses de dialogue par lui même:
cb811

; Pas de tir Broad Band (commande à conserver impérativement même en mode NB)
; WPnnn: nombre de ping broad band de courant par ensemble
; WP1 = 1 ping de courant bb
WP1

; WNnnn: nombre de cellules de courant broad band (de 001 à 128)
; WN075 = 75 cellules broad band
WN75

; WSnnnn: longeur d'une cellule boad band en cm
; WS0400 = cellule de 4m
WS0400

; WFnnnn: longeur du blanc après transmission en cm
; WF0800 = blanc de 8m
WF0600
; WVnnn: seuil sur la vitesse radiale en cm/s. Valeur par défaut pour le
; broad band 390 cm/s
; WV390 = seuil de 390 cm/s toujours laisser cette valeur par défaut
WV390

;NPnnn: nombre de ping narrow band de courant par ensemble
;NP000 = aucun ping de narrow band (configuration broad band)
NP0

;*********************************

; CW0 commande non commentee par RDI met qui permet de pallier les défauts
; des versions de VmDAS
CW0

;  SYNCHRO externe
; CXa,b définit les trigger in et out
; a = 0 trigger in off, mode maître ou autonome
; a = 1 trigger in on sur front montant, mode esclave
; b = 0 trigger output off, mode esclave ou autonome
; b = 1 trigger output transmis niveau haut, mode maître
; cx0,1: adcp en autonome ou maître (avec emission trigg out)
; cx1,0: adcp en mode esclave
```

```
CX1,0

; Enable single-ping bottom track (BP),
; BPn: nombre de ping de bottom-track par ensemble
; BP01 = 1 ping de bottom-track mode water track par ensemble
BP01

; BXnnnn profondeur maximale de recherche de fond en décimètres
; BX08000 = recherche de fond jusqu'à 800 m
; (attention! commande non prise en compte: mode water track)
BX04000

; output velocity, correlation, echo intensity, percent good
WD111100000

; TPmmssff : Temps inter ping (minute seconde centième)
; TP000100 = 1s
TP000100

; TEhhmmssff : Temps inter ensemble ( heure minute seconde centième)
; TE000200 = 2s
TE00000200

; Set to calculate speed-of-sound, no depth sensor, external synchro heading
; sensor, no pitch or roll being used, no salinity sensor, use internal transducer
; temperature sensor
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04320

; Set transducer depth (decimeters)
; EDnnnnn profondeur de la base en décimètre
; ED00045 = base à 4,5m de profondeur
ED00045

; Set Salinity (ppt)
ES37

; save this setup to non-volatile memory in the ADCP
CK
```

Ship Acoustic Doppler Current Profiler (SADCP) sn500

~~~~~~
This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: anne.petrenko@univ-amu.fr
Responsible of the data analysis : anne.petrenko@univ-amu.fr
Responsible of the workpackage : anthony.bosse@univ-amu.fr
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Last update of this README : May 13, 2023
by : anne.petrenko@univ-amu.fr
~~~~~~

Last update of the folder : May 14, 2023
by : anne.petrenko@univ-amu.fr
~~~~~~

The courantology work was carried out using three ship or hull-mounted ADCPs: RDI Ocean Surveyor (OS) 38kHz, RDI OS 150 kHz and Nortek Signature 500 kHz. Most of the cruise data were collected with the deep water configuration (apart for the os38 during the two periods close to Minorque). The OS data, acquired at 1/3 Hz frequency, were treated with CODAS (either short-time averaged over 2 minutes (sta) or long-time averaged over 10 minutes (lta)) and the Signature with the Nortek Review software. They were further analysed with LATEXTools.

Frequency 500 kHz
Vertical resolution 1 m
Range 8:68 m
Number of bins 61

Sampling methods

Despite being a 5 beam ADCP, the Nortek Signature has been installed on the Atalante for navigation
purpose; hence its 5 th beam is used for the altimeter and echo sounder. Indeed the signature 500 measures
at a frequency of 8Hz. It has 8 slots available for each measurement. 1 slot is used for the bottom track, 1
other is used for the altimeter, 2 slots are reserved for the echo sounder and the last 4 are used for the current
profile via the 4 inclined beams. The 4 measurements are then averaged to improve the data. Hence they
provide the classical horizontal velocities and vertical estimate using the pair beams (Beams 1 and 3 providing
w1, Beams 2 and 4 providing w2, and an average w being calculated as (w1+w2)/2, with an error estimate as
~~~~~~

(w1-w2). The 5th beam is not used to measure oceanic velocity directly as is done with the Sentinel ADCP of
our FF-ADCP (deployed for example during BioSWOT-Med 2023).

Different tests until April 21st, 16h30 UTC
But overpassed by OSEA forcing at frequency of 3 sec both OS150 and OS38 (with echosounders in between)
Nortek 500 KhZ unsynchronized and not slaved of OSEA

Methodology
The raw files (in L0) have for extension *.SigVM. They are zipped files containing all the data in for example:
ATALANTE_SN-103948_20230513T021401UTC0.nmea
ATALANTE_SN-103948_20230513T021401UTC1.nmea
ATALANTE_SN-103948_20230513T021401UTC.AD2CP
ATALANTE_SN-103948_20230513T021401UTC.xml
Suggestion of readings to treat them directly:
https://www.rdocumentation.org/packages/oce/versions/1.7-10/topics/read.adp.ad2cp
https://dankelley.github.io/oce/reference/read.adp.ad2cp.html
https://github.com/dankelley/oce/issues/1219
https://support.nortekgroup.com/hc/en-us/articles/360030966632-Introduction-to-AD2CP-turbulence-measurements
(Thanks Nicolas Pansiot, Officier Electronicien Navire Atalante)

They can be converted to *.csv, *.mat or *kml files using the Nortek Review software.
In the new version 2.6 of Signature VM Review software, you can convert multiple files at the same time in the tab
"Tools" to "Batch processing". In our case, they were converted to *.mat files (L1). In the mat files, the data are included in a
structure A; and the velocity contained in A.Wat (for the Water part of the data). All the data information are detailed in
the SigVM Review manual.

Refs web site Nortek :
https://www.nortekgroup.com
https://www.nortekgroup.com/software (to download software such as the Nortek VM Review necessary to
process the raw files *.SigVM)
https://support.nortekgroup.com/hc/en-us/articles/360029513932-Operations-Manual-Signature-VM
(on the instrument Signature 500 VM)

Triplenet omics

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: Magali Lescot - magali.lescot@mio.osupytheas.fr and Véronique Cornet-Barthaux - veronique.cornet-barthaux@mio.osupytheas.fr
Responsible of the data analysis : Magali Lescot - magali.lescot@mio.osupytheas.fr + Eric Pelletier - eric.pelletier@genoscope.cns.fr + Karine Leblanc - karine.leblanc@mio.osupytheas.fr + François Carlotti
Responsible of the workpackage : Magali Lescot - magali.lescot@mio.osupytheas.fr

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~~~~~~

Last update of the folder : 09/05/2023
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~~~~~~

Sampling methods:

At each station at 12:00, a triple net with 3 different meshes (64, 200 and 500 microns) is deployed twice at 400 and 200 m (speed 1 m/s). The content of the collector is split with motoda box and half of it is immediately sieved to 2 mm.
The live fraction is then used for DNA/RNA filtration and ethanol fixation for single cell morpho molecular.
1) Filtration DNA/RNA: Two third of each size fraction are filtered in less than 15 min on a 10 µm PC filter using 47 mm filtration unit and a peristaltic pump. Once the samples are done, they are flash frozen in liquid nitrogen and stored onboard in a -80°C freezer.
2) Fixation Ethanol for single cell morpho molecular: One third of each size fraction (PVC sieve) is sieved through a sieve as the net mesh. The biological material retained on the sieve is rinsed using 99% molecular grade EtOH and recovered from the sieve into a 50ml falcon tube, using EtOH and a funnel. The tube is filled up to 40 mL and store at -20°C.
Details of each data collection can be found in the BIOSWOT_Med_Samples.xls file which is regularly updated.
All samples are labelled with appropriate barcode and printed label.

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Analysis methods:

All the samples will be used for DNA and RNA extraction and send for sequencing to Genoscope. The bioinformatics analysis will be done at MIO and Genoscope.

Triplenet zooplankton biomass

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: Francois Carlotti - francois.carlotti@mio.osupytheas.fr
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Responsible of the workpackage : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
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Last update of the folder : 10/05/2023
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~~~~~~

Sampling methods

SHORT DESCRIPTION, BIBLIO REFS

Tool: Triple net with three nets of different mesh sizes (64 µm, 200 µm, 500 µm)
Operations : Three Vertical net tows with the triple net for 3 different layers: 400m-surface; 200m-surface; 100 m-surface
On board: Cod-end contents fractionnated for further analysis: biomass), taxonomy and size spectrum (see file TripleNet_1_Taxonomy, omics (see TripleNet_omics)
Plankton sample for biomass filtered on GFF Filters
~~~~~~

Analysis methods:
- In the lab: weighting filters (Loic Guilloux)

SHORT DESCRIPTION, BIBLIO REFS
Total zooplankton biomass in each net tows. Values delivered in mg dry weight.m-3
~~~~~~

Triplenet zooplankton isotope biochemistry

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: Francois Carlotti - francois.carlotti@mio.osupytheas.fr
Responsible of the data analysis : Daniela Banaru - daniela.banarui@mio.osupytheas.fr
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Last update of the folder : 10/05/2023
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~~~~~~

Sampling methods
Tool: Triple net with three nets of different mesh sizes (64 µm, 200 µm, 500 µm)
Operations : One Vertical net tows with the triple net 100 m-surface
On board: Cod-end contents fractionnated for further analysis isotopy and biochemistry in five size fractions: 60-200 µm; 200-500 µm; 500-1000 µm; 1000-2000 µm; 2000-5000 µm

Triple net zoo taxonomy

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: Francois Carlotti - francois.carlotti@mio.osupytheas.fr
Responsible of the data analysis : Francois Carlotti - francois.carlotti@mio.osupytheas.fr ; Loïc Guilloux - Loic.Guilloux@mio.osupytheas.fr
Responsible of the workpackage : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
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Last update of this README : 10/05/2023
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Last update of the folder : 10/05/2023
by : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
~~~~~~

Sampling methods

SHORT DESCRIPTION, BIBLIO REFS

Tool: Triple net with three nets of different mesh sizes (64 µm, 200 µm, 500 µm)
Operations : Three Vertical net tows with the triple net for 3 different layers: 400m-surface; 200m-surface; 100 m-surface
On board: Cod-end contents fractionnated for further analysis: biomass (see file TripleNet_1_Biomasses), taxonomy and size spectrum, omics (see TripleNet_omics)
~~~~~~

Analysis methods:
- In the lab: taxonomic species determination with binocular (Loic Guilloux)
- In the lab: Zooscan and Flowcam (or Planktoscope) imagery treatment for size spectrum by large taxonomic groups

SHORT DESCRIPTION, BIBLIO REFS
Taxonomy: values delivered in number/m3 for a list of species
Zooscan/Flowcam: size spectrum in number / size classes and normalized biomass size spectrum
~~~~~~

Underway cytometry

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for each instruments containing a README file,
~ a sub~subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1, L2, L3).

~~~~~~

Responsible of the data collection: Gérald Grégori - gerald.gregori@univ-amu.fr
Responsible of the data analysis : Laurina Oms - laurina.oms@mio.osupytheas.fr
Co-responsible : Morgane Didry - morgane.dirdy@mio.osupytheas.fr

~~~~~~

Last update of this README : 03 May 2023
by : laurina.oms@mio.osupytheas.fr

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Last update of the folder : 03 May 2023
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Sampling methods and Analysis:

An automated CytoSense flow cytometer (CytoBuoy b.v.) is connected to the seawater circuit of the thermosalinometer (THS or TSG) to perform scheduled automated sampling and analysis of phytoplankton at high frequency (up to every 15 min).
Three distinct protocols have been run sequentially every 30 min and then during the cruise every 15 min. The first protocol (FLR8) has a trigger threshold fixed at 8 mV on the red fluorescence signal (FLR8) and analyzes a volume of 0.5 cm3. It was dedicated to the analysis of the smaller phytoplankton (picopankton). The second protocol (FLR25) has a trigger threshold fixed at 25 mV on the red fluorescence signal. It is set up to target the nano- and microphytoplankton and to analyze a bigger volume (5 cm3).
The data were acquired thanks to the USB software (Cytobuoy b.v.) but were analyzed with the CytoClus 4 software (Cytobuoy b.v.).

For a general ovewiew, refer to:

Tzortzis, R., Doglioli, A. M., Barrillon, S., Petrenko, A. A., d'Ovidio, F., Izard, L., Thyssen, M., Pascual, A., Barceló-Llull, B., Cyr, F., Tedetti, M., Bhairy, N., Garreau, P., Dumas, F., and Grégori, G. (2021). Impact of moderate energetic fine-scale dynamics on the phytoplankton community structure in the western Mediterranean Sea, Biogeosciences, 18, 6455–6477. https://doi.org/10.5194/bg-18-6455-2021
Marrec P., Grégori G., Doglioli A.M., Dugenne M., Della Penna A., Bhairy N., Cariou T., Helias Nunige S., Lahbib S., Rougier G., Wagener T., Thyssen M. 2018. Coupling physics and biogeochemistry thanks to high resolution observations of the phytoplankton community structure in the North-Western Mediterranean Sea. Biogeosciences., doi:10.5194/bg-2017-343.
Thyssen M., Tarran G.A., Zubkov M., Holland R.J., Gregori G., Burkill P.H., Denis M. (2008) The emergence of automated high frequency flow cytometry : revealing temporal and spatial phytoplankton variability. Journal of Plankton Research. 30 (3), 333-343.
~~~~~~

Dubelaar B.J., Geerders P.J.F., Jonker R. (2004) High frequency monitoring reveales phytoplankton dynamics. Journal of Environmental Monitoring 6, 946 – 952.

Underway Inlet Equilibrator Mass spectroscopy net community production (EIMS NCP)

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection:
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Responsible of the data analysis :
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Last update of the folder : 09/05/2023
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Sampling methods
Sampling from the underway TSG feeding water line during the cruise.

~~~~~~

Analysis methods:
Sea water samples were analysed on a mass spectrometer for O2 and Ar according to Cassar et al 2009 EIMS (Equilibrator Inlet Mass Spectrometer) protocole and setup. Net community production (NCP) is derived from the O2 supersaturation in the mixed layer.

Underway sample isotopes

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection: Francois Carlotti - francois.carlotti@mio.osupytheas.fr
Responsible of the data analysis : Daniela Banaru - daniela.banarui@mio.osupytheas.fr
Responsible of the workpackage : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
~~~~~~

Last update of this README : 10/05/2023
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Last update of the folder : 10/05/2023
by : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
~~~~~~

Sampling methods
Sequential filtration device with Four filters (60 µm, 20 µm, GFD and GFF) is connected to the seawater circuit of the thermosalinometer (THS or TSG) to perform scheduled automated sampling and analysis of phytoplankton at high frequency (up to every 15 min).
for one hour, filtering around 10 m3 of sea water

Underway microscopie

~~~~~~

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection: Véronique Cornet- veronique.cornet-barthaux@mio.osupytheas.fr
Responsible of the data analysis : Véronique Cornet - veronique.cornet-barthaux@mio.osupytheas.fr and Karine Leblanc - karine.leblanc@mio.osupytheas.fr
Responsible of the workpackage : Magali Lescot - magali.lescot@mio.osupytheas.fr

~~~~~~

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~~~~~~

Last update of the folder : 09/05/2023
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~~~~~~

Sampling methods:
At the same time that the Rosette Cast, 2X 250 ml of surface water was collected from to the seawater circuit of the thermosalinometer (THS or TSG) into 250 ml amber glass bottles.
Immediatly after sampling, the samples are fixed; one with acidified Lugol's iodine solution and one with neutral formalin solution.
Once the all the samples have been prepared, they have been stored on board in the cold lab in the dark then, in the cold room at 4 °C in the MIO

~~~~~~

Analysis methods:

The samples will be analyzed by optical microscopie to address the diversity and abundances of the community of micro-phytoplankton in the differents stations
All the analysed will be performed by Utermöhl method.

Ref ; Utermöhl, von H. (1931) Neue Wege in der quantitativen Erfassung des Planktons. (Mit besondere Beriicksichtigung des Ultraplanktons). Verh. Int. Verein. Theor. Angew. Limnol., 5, 567–595.

Underway nanomolar phosphate

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

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Last update of the folder : 09/05/2023
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Sampling methods
Sampling from the underway system. Inline filtration during sampling through 0.2 µm. 1 sample per hour between waypoints T22 and T24. Samples stored at -20°C.

~~~~~~

Analysis methods:
Analytical basis: reaction of phosphate with molibdate in an acidic solution to form a 12-molybdophosphoric acid. Subsequent reduction to the phosphomolybdenum blue complex. Absorbance is measured at 710 nm. To increase absorbance, an auto-analyzer system (SFA, segmented flow analyzer) is coupled to a 1 m length LWCC (long waveguide capillary cell) and connected to a USB-Flame spectrophotometer. The protocol is based on Zhang and Chi, 2002 and Patey et al. 2008. Material used: A Liquid Waveguide Capillary Cell (LWCC) made of quartz capillary tubing (length = 1 m) + spectrophotometer (USB-Flame Preconfigured for General Lab Use, 200 -850 nm, Ocean Optics) and a light source (FO-6000).

Underway Net Community Production (NCP)

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).

~~~~~~

Responsible of the data collection:
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Last update of the folder : 09/05/2023
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~~~~~~

Sampling methods
Sampling from underway 1 times per station and during transit. Coupled with sampling from carousel.

~~~~~~

Analysis methods:

Samples were incubated in a bath with temperature controlled. Each bottle has an optode for dissolved oxygen sensor aquisition. The light was controlled by 2 leds system to make a ramp.

Underway nutrients

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~

Responsible of the data collection:
sandra.nunige@mio.osupytheas.fr/elvira.pulido@mio.osupytheas.fr
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Last update of the folder : 09/05/2023
by : elvira.pulido@mio.osupytheas.fr
~~~~~~

Sampling methods
Sampling from the underway system. 1 sample per hour between waypoints T22 and T24. Samples stored at 4°C until analysis on board within 1-2 days.
~~~~~~

Analysis methods:
Analysis for nitrite, nitrate, phosphate and silicate were performed on board using an automated colorimetric procedure (Aminot and Kerouel, 2007). Aminot, A., Kérouel, R., 2007. Dosage automatique des nutriments dans les eaux marines : méthodes en flux continu. Ed. Ifremer, Méthodes d'analyse en milieu marin 188 pp.
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Underway Omics

~~~~~~
This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
~~~~~~
Responsible of the data collection: Magali Lescot - magali.lescot@mio.osupytheas.fr and Véronique Cornet-Barthaux - veronique.cornet-barthaux@mio.osupytheas.fr
Responsible of the data analysis : Magali Lescot - magali.lescot@mio.osupytheas.fr and Eric Pelletier - eric.pelletier@genoscope.cns.fr
Responsible of the workpackage : Magali Lescot - magali.lescot@mio.osupytheas.fr
~~~~~~
Last update of this README : 09/05/2023
by : Magali Lescot - magali.lescot@mio.osupytheas.fr
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Last update of the folder : 09/05/2023
by : Magali Lescot - magali.lescot@mio.osupytheas.fr
~~~~~~
Sampling methods:
At the same time that the Rosette Cast, 20L of surface water was collected from to the seawater circuit of the thermosalinometer (THS or TSG) with a 200 µm mesh into a 25L carboy. Details of each data collection can be found in the BIOSWOT_Med_Samples.xls file which is regularly updated.
A peristaltic pump is passing the seawater through the system. Seawater is first passing through a 142 mm filtration tripode equipped with a 3 µm PC filter and subsequently through another 142 mm filtration unit equipped with a 0.2 µm PC filter (based on MetaBGTomics – S320: protocol modified with a mesh of 200µm instead of 20µm; MetaBGTomics – S023 and EMO-BON). A first filtration taking no longer the 15 min allows to make metaT samples. Then a second filtration with the rest of seawater, taking no longer than one hour, allows to make the metaG samples. Once the samples are done, they are flash frozen in liquid nitrogen and stored onboard in a -80°C freezer. The seawater resulting of the 2 filtrations, inferior of 0.2 µm, is treated by Iron Chloride (2.82 g FeCL3 in 50 mL ultrapure water) for virus precipitation and after one hour at room temperature the seawater is filtered on a 0.8 µm PC filters and should not take more than one hour. These virus samples are stored at +4°C (Matthew Sullivan and Raffaella Casotti).
All samples are labelled with appropriate barcode and printed label.
~~~~~~
Analysis methods:

All the samples will be used for DNA and RNA extraction and send for sequencing to Genoscope. The bioinformatics analysis will be done at MIO and Genoscope.

Ref :

MetaBGTomics – S320 - targeting unicellular eukaryotes - Patrick Wincker, CEA Genoscope France (pwinker@genoscope.cnrs.fr)
MetaBGTomics – S023 - targeting prokaryotes - Patrick Wincker, CEA Genoscope France (pwinker@genoscope.cnrs.fr)
MetaBGTomics – S<02 – targeting viruses - Matthew Sullivan, Ohio State University, USA (mbsulli@gmail.com) - https://www.protocols.io/view/Iron-Chloride-Precipitation-of-Viruses-from-Seawat-x54v981pl3eq/v1?step=4
Raffaella Casotti- NEREA – SOP: Viruses - https://www.nerea-observatory.org/_files/ugd/044fbd_743e50d7e3d54584a5bb6ede605a76f7.pdf
Raffaella Casotti- EMO-BON - https://www.embrc.eu/newsroom/publications/european-marine-omics-biodiversity-observation-network-emo-bon-handbook

Underway thermosalinograph (TSG)

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for each instruments containing a README file,
~ a sub~subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1, L2).

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Responsible of the data collection: laurina.oms@mio.osupytheas.fr
Responsible of the data analysis : laurina.oms@mio.osupytheas.fr
Co-responsible :

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Last update of this README : 03 May 2023
by : laurina.oms@mio.osupytheas.fr

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Last update of the folder : 03 May 2023
by : laurina.oms@mio.osupytheas.fr

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Sampling methods and Analysis:

High frequency analysis of temperature and conductivity (SBE21, SBE380) of the underway water pumped under the ship

For a general ovewiew, see the cruise proposal
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Visual observations

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
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Responsible of the data collection: Cédric Cotté - cedric.cotte@locean.ipsl.fr
Responsible of the data analysis :
Responsible of the workpackage : Francois Carlotti - francois.carlotti@mio.osupytheas.fr
~~~~~~

Last update of this README : 12/05/2023
by : Cédric Cotté - cedric.cotte@locean.ipsl.fr
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Last update of the folder : 12/05/2023
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Sampling methods

Visual observations are performed from naked eyes and binoculars during the 10 first minutes of each hours during transit time

Vertical Microstructure Profiler

This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one sub~subfolder(s) (L1) for the processed data non yet validated.
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Responsible of the data collection: pascale.bouruet-aubertot@locean.ipsl.fr
Responsible of the data analysis : pascale.bouruet-aubertot@locean.ipsl.fr
Responsible of the workpackage : anthony.bosse
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Last update of this README : 08/03/2023
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Last update of the folder :
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Sampling methods

SHORT DESCRIPTION, BIBLIO REFS
VMP, vertical microstructure profiler, "free-falling" instrument equipped with microstructure shear and temperature sensors and with a SBE.
see https://rocklandscientific.com/products/profilers/vmp-250/ for a general presentation of the vmp
see https://rocklandscientific.com/support/technical-notes/ for technical notes
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Analysis methods:

SHORT DESCRIPTION, BIBLIO REFS
The matlab package developped by rockland scientific, odas, is used to perform the analysis of the microstructure data.
The dissipation rate of turbulent kinetic energy is computed from the shear variance in the inertial range.
The processed data (in L1) are next validated.
see https://doi.org/10.5194/bg-15-7485-2018
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Vertical Velocity Profiler

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This folder contains the dataset collected
during the cruise organized as follows:
~ a subfolder for the raw data (L0) and
~ one (or more) sub~subfolder(s) for the analyzed data (L1,...).
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Responsible of the data collection: jean-luc.fuda@mio.osupytheas.fr
Responsible of the data analysis : jean-luc.fuda@mio.osupytheas.fr
Responsible of the workpackage : anthony.bosse@mio.osupytheas.fr
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Last update of this README : 13/05/23
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Last update of the folder : 13/05/23
by : jean-luc.fuda@mio.osupytheas.fr
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Sampling methods

SHORT DESCRIPTION, BIBLIO REFS
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Analysis methods:

The VVP uses an electric thruster that drives it down to a predefined setpoint depth. Once the depth is reached,
the thruster is stopped and the profiler then rises slowly (~0.1 m/s) to the surface under the sole effect of its
slightly positive buoyancy. The mechanical balance between buoyancy and hydrodynamic drag results in a constant
vertical speed of ascent in water at rest. Any deviation from this theoretical speed is then interpreted as an
oceanic vertical velocity signal.

Ref:

Fuda, J.-L., Barrillon, S., Doglioli, A., Petrenko, A., Gregori, G., Tzortzis, R., Comby, C., Thyssen, M.,
Lafont, M., Bhairy, N., Malengros, D., Guillemain, D., and Grenz, C.: A new approch for measuring ocean vertical velocities, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-9371, https://doi.org/10.5194/egusphere-egu21-9371, 2021