Dataset name: **Suspended particle size distributions**

|  |  |
| --- | --- |
| Parameters: | * **LISST biomass spectra (1 – 250 µm)** * **LOPC biomass spectra (100 µm – 35 mm)** |

PROJECT TITLE: **MOBYDICK**

Oceanographic cruise: **MOBYDICK**

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

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

Project manager: **Bernard Quéguiner** [bernard.queguiner@mio.osupytheas.fr](mailto:bernard.queguiner@mio.osupytheas.fr)

Address: **Mediterranean Institute of Oceanolography**

**Institut Pytheas - Observatoire des Sciences de l'Univers**

**Bâtiment OCEANOMED, Campus de Luminy, case 901**

**F-13288 Marseille Cedex 09, France**

Chief scientist: **Ingrid Obernosterer** [ingrid.obernosterer@obs-banyuls.fr](mailto:ingrid.obernosterer@obs-banyuls.fr)

Address: **Laboratoire d’Océanographie Microbienne**

**Observatoire Océanologique de Banyuls sur mer**

**66650 Banyuls sur mer, France**

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

Latitude: **49.5°S – 52.5°S**

Longitude: **67,0°E – 74.5°E**

Parameter supervisor: **Meng Zhou**

Institute of Oceanography

Shanghai Jiao Tong University

1954 Huashan Road, Xuhui

Shanghai, 200030, China

+86 15900844160

[meng.zhou@sjtu.edu.cn](mailto:meng.zhou@sjtu.edu.cn)

Dataset contact: **Yiwu Zhu**

Institute of Oceanology,

Shanghai Jiao Tong University,

1954 Huashan Road, Xuhui

Shanghai, 200030, China

+86 15601795053

[yiwuzhu@sjtu.edu.cn](mailto:yiwuzhu@sjtu.edu.cn)

# OPERATIONS

## Sampling device(s)

Two sampling devices were used:

* Laser In Situ Scattering Transmissometry (LISST, Sequoia Scientific, Inc.)
* Laser Optical Plankton Counter (LOPC, Rolls-Royce Canada LTD)

LISST and LOPC use optical scattering and particle shading to measure particle sizes and abundances when particles flow through their measuring windows (Agrawal *et al.,* 2000; Karp-Boss *et al.,* 2007; Herman *et al.,* 2004; Herman & Harvey, 2006), respectively. Both LISST and LOPC were mounted on the CTD-Rosette, and were deployed during CTD-Rosette casts.

## List of stations sampled

**Table 1: Details of sampled stations**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Time (local)** | | **Latitude**  **(°S)** | **Longitude**  **(°E)** | **Station** | **Code of operation** | **LISST Processed file names** | **LOPC Processed file names** | **Cast depth**  **(m)** | **Bottom depth**  **(m)** |
| **start** | **end** |
| 2/21/2018 | 7:43 | 9:14 | 29 02.63 | 59 03.53 | test | CTD\_001 | LISST\_001\_rvs\_10m | LOPC\_001 | 1000 | 4300 |
| 2/26/2018 | 1:30 | 2:37 | 50 36.99 | 71 59.96 | M2\_1 | CTD-002 | LISST-002\_rvs\_10m | LOPC-002 | 450 | 520 |
| 2/26/2018 | 14:04 | 15:00 | 50 36.95 | 72 00.06 | M2\_1 | CTD-005 | LISST-005\_rvs\_10m | LOPC-005 | 450 | 521 |
| 2/26/2018 | 18:00 | 18:36 | 50 36.97 | 72 00.00 | M2\_1 | CTD-006 | LISST-006\_rvs\_10m | LOPC-006 | 450 | 520 |
| 2/26/2018 | 21:35 | 22:21 | 50 36.97 | 72 00.04 | M2\_1 | CTD-007 | LISST-007\_rvs\_10m | LOPC-007 | 450 | 520 |
| 3/1/2018 | 0:40 | 1:15 | 52 36.07 | 67 11.95 | M4\_1 | CTD\_010 |  | LOPC\_010 | 1500 | 4387 |
| 3/1/2018 | 13:41 | 14:40 | 52 36.01 | 67 11.98 | M4\_1 | CTD\_011 | LISST\_011\_rvs\_10m | LOPC\_011 | 1000 | 4207 |
| 3/1/2018 | 20:58 | 22:10 | 52 36.02 | 67 11.98 | M4\_1 | CTD\_013 | LISST\_013\_rvs\_10m | LOPC\_013 | 1000 | 4186 |
| 3/2/2018 | 5:09 | 6:57 | 52 36.01 | 67 12.00 | M4\_1 | CTD\_017 | LISST\_017\_rvs\_10m | LOPC\_017 | 1900 | 4186 |
| 3/2/2018 | 8:35 | 9:49 | 52 36.01 | 67 11.99 | M4\_1 | CTD\_018 |  | LOPC\_018 | 4000 | 4186 |
| 3/4/2018 | 2:50 | 4:14 | 50 41.00 | 68 03.17 | M3\_1 | CTD\_019 | LISST\_019\_rvs\_10m | LOPC\_019 | 1500 | 1546 |
| 3/4/2018 | 12:30 | 13:10 | 50 43.33 | 68 03.21 | M3\_1 | CTD\_021 | LISST\_021\_rvs\_10m | LOPC\_021 | 300 | 1730 |
| 3/4/2018 | 14:00 | 14;54 | 50 44.22 | 68 03.21 | M3\_1 | CTD\_022 | LISST\_022\_rvs\_10m | LOPC\_022 | 1000 | 1747 |
| 3/4/2018 | 21:30 | 22:26 | 50 40.94 | 68 03.47 | M3\_1 | CTD\_023 | LISST\_023\_rvs\_10m | LOPC\_023 | 1000 | 1747 |
| 3/5/2018 | 2:50 | 4:20 | 50 40.97 | 68 03.50 | M3\_1 | CTD\_026 | LISST\_026\_rvs\_10m | LOPC\_026 | 1500 | 1747 |
| 3/6/2018 | 12:00 | 13:00 | 50 37.24 | 72 00.35 | M2\_2 | CTD\_027 | LISST\_027\_rvs\_10m | LOPC\_027 | 500 | 525 |
| 3/6/2018 | 15:16 | 15:50 | 50 37.71 | 72 01.09 | M2\_2 | CTD\_028 | LISST\_028\_rvs\_10m | LOPC\_028 | 500 | 517 |
| 3/6/2018 | 20:14 | 21:20 | 50 37.67 | 72 01.06 | M2\_2 | CTD\_030 | LISST\_030\_rvs\_10m | LOPC\_030 | 500 | 519 |
| 3/7/2018 | 14:05 | 15:00 | 50 36.89 | 72 00.36 | M2\_2 | CTD\_034 | LISST\_034\_rvs\_10m | LOPC\_034 | 500 | 519 |
| 3/9/2018 | 4:45 | 7:00 | 49 51.00 | 74 54.10 | M1 | CTD\_035 | LISST\_035\_rvs\_10m | LOPC\_035 | 2500 | 2728 |
| 3/9/2018 | 9:18 | 10:20 | 49 57.01 | 74 54.10 | M1 | CTD\_036 | LISST\_036\_rvs\_10m | LOPC\_036 | 1000 | 2723 |
| 3/9/2018 | 19:05 | 20:09 | 49 50.98 | 74 54.46 | M1 | CTD\_038 | LISST\_038\_rvs\_10m | LOPC\_038 | 1000 | 2723 |
| 3/9/2018 | 22:45 | 23:46 | 49 50.98 | 74 54.07 | M1 | CTD\_039 | LISST\_039\_rvs\_10m | LOPC\_039 | 1000 | 2717 |
| 3/12/2018 | 19:00 | 20:05 | 52 36.16 | 67 12.32 | M4\_2 | CTD\_042 | LISST\_042\_rvs\_10m | LOPC\_042 | 1000 | 4382 |
| 3/13/2018 | 11:29 | 12:14 | 52 36.13 | 67 11.55 | M4\_2 | CTD\_045 | LISST\_045\_rvs\_10m | LOPC\_045 | 600 | 4346 |
| 3/13/2018 | 15:05 | 17:50 | 52 35.96 | 67 12.09 | M4\_2 | CTD\_047 | LISST\_047\_rvs\_10m | LOPC\_047 | 3500 | 4346 |
| 3/16/2018 | 11:30 | 12:15 | 50 36.95 | 72 00.08 | M2\_3 | CTD\_049 | LISST\_049\_rvs\_10m | LOPC\_049 | 500 | 527 |
| 3/16/2018 | 17:10 | 17:50 | 50 36.95 | 72 00.07 | M2\_3 | CTD\_052 | LISST\_052\_rvs\_10m | LOPC\_052 | 500 | 510 |

**Table 1: Details of sampled stations (cont'd)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Time (local)** | | **Latitude**  **(°S)** | **Longitude**  **(°E)** | **Station** | **Code of operation** | **LISST Processed file names** | **LOPC Processed file names** | **Cast depth**  **(m)** | **Bottom depth**  **(m)** |
| **start** | **end** |
| 3/16/2018 | 20:20 | 21:10 | 50 36.99 | 72 00.11 | M2\_3 | CTD\_053 | LISST\_053\_rvs\_10m | LOPC\_053 | 500 | 527 |
| 3/17/2018 | 2:00 | 2:40 | 50 37.06 | 71 59.88 | M2\_3 | CTD\_054 | LISST\_054\_rvs\_10m | LOPC\_054 | 500 | 527 |
| 3/17/2018 | 17:15 | 18:05 | 50 37.05 | 71 59.94 | M2\_3 | CTD\_055 | LISST\_055\_rvs\_10m | LOPC\_055 | 500 | 520 |
| 3/18/2018 | 9:40 | 11:12 | 50 41.24 | 68 03.98 | M3\_3 | CTD\_057 | LISST\_057\_rvs\_10m | LOPC\_057 | 1500 | 1720 |
| 3/19/2018 | 9:50 | 10:30 | 50 41.71 | 68 03.19 | M3\_3 | CTD\_058 | LISST\_058\_rvs\_10m | LOPC\_058 | 300 | 1720 |
| 3/19/2018 | 17:26 | 18:30 | 50 41.94 | 68 03.06 | M3\_3 | CTD\_060 | LISST\_060\_rvs\_10m | LOPC\_060 | 1000 | 1720 |
| 3/20/2018 | 1:10 | 1:39 | 50 40.94 | 68 03.62 | M3\_3 | CTD\_061 | LISST\_061\_rvs\_10m | LOPC\_061 | 100 | 1720 |

# INSTRUMENTS

Instrument Type: **LOPC (Laser Optical Plankton Counter)**

Manufacturer: **Rolls Royce Canada LTD**

Model: **LOPC–DEEP**

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

Instrument Type: **LISST (Laser In Situ Scattering Transmissometry)**

Manufacturer: **Sequoia Scientific, Inc.**

Model: **LISST–DEEP**

Instrument Features / Calibration: LISST was calibrated on Feb 20 2018 by collecting the background using Milli–Q water

# DESCRIPTION of PARAMETERS

## Measurement details

Both LISST and LOPC were mounted on the CTD-Rosette frame, and powered by a battery package. Particle sizes and concentrations were measured continuously along the CTD profiles from the surface to the cast depth. The size ranges were between 1 and 250 µm and between 100 µm to 35 mm by LISST and LOPC, respectively.

## Analytical procedure

Biovolume size spectra were computed by averaging data into a fixed depth-bin for each size class, normalizing by the size interval of each size class, and also normalizing by volume filtered for the unit of:

## Units

* LISST normalized biomass spectrum (1 – 250 µm): 1/L
* LOPC normalized biomass spectrum (100 µm – 35 mm): 1/m3

## Sensor precision

* LISST normalized spectrum (1–250 µm) in 32 classes (acquisition rate: 1 Hz)
* LOPC normalized spectrum (100µm–35 mm) in 1028 classes (acquisition rate: 2 Hz)

## Post-cruise data analysis/treatment required

N/A

## Estimated Date of Delivery

30 June 2018

# BIBLIOGRAPHY

Agrawal Y.C., Pottsmith H.C., 2000. Instruments for particle size and settling velocity observations in sediment transport. *Marine Geology*, **168**, 89–114.

Karp-Boss L., Azevedo L., Boss E., 2007. LISST-100 measurements of phytoplankton size distribution: evaluation of the effects of cell shape. Limnology & Oceanography: Methods, **5**, 396–406.

Herman A.W., Beanlands B., Phillips E.F., 2004. The next generation of Optical Plankton Counter: The Laser-OPC. *Journal of Plankton Research*, **26**, 1135-1145.

Herman A.W., Harvey M., 2006. Application of normalized biomass size spectra to laser optical plankton counter net intercomparisons of zooplankton distributions. *Journal of Geophysical Research*, **111**, 1-9.