

# PROSOPE

[H. CLAUSTRE](#) : head of mission and project leader

PVM : [M. PICHERAL](#)

---

[METHODOLOGIE PVM3B](#) | [DATA acquisition](#) | [DATA processing](#)

[INSTRUMENT/METHOD - PVM3](#)

[INSTRUMENT/METHOD - SBE19](#)

[DATA set HIS](#) | [DATA set TTD](#) | [fichiers INFO](#)

---

## Methodology PVM 3B

### ● Data Acquisition

Data acquisition includes all methodologies involved in the collection, processing and analysis of raw material or raw data up to the point where data are generated.

#### A. Data Collection

Describe the gear/instrumentation used giving name, gear code and details of its deployment.

See InstrumPVM3b file for calibration date and instrument references.

The moored system The Underwater Video Profiler (UVP) was constructed in the Laboratoire d'Océanographie Biologique et d'Ecologie du Plancton Marin in Villefranche sur mer, France (UPMC/CNRS) with the support of the CNRS (Centre National de la Recherche Scientifique) and the European MAST II and III programs. The UVP has been developed for the acquisition of large-particle (> 90 µm) abundance and size distribution data from 0 to 1000 m. Three models have been constructed since 1990 (Gorsky et al. 1992). They were designed to minimize the disturbance of the illuminated volume in order to reduce a possible disruption of imaged particles. All models are autonomous and can be lowered on any hydrological cable. The third model is described here.

The UVP model IIIb is a vertically lowered instrument mounted on a galvanized steel frame (1.1 x 0.9 x 1.25 m). The lighting is based on two 54W Chadwick Helmuth stroboscopes. Two stainless steel mirrors spread the beams into a structured 10 cm thick slab. The strobes are synchronized with two Exavision XC 644 black-and-white CCD video cameras with 24 and 6 mm C-mount lenses. The illuminated particles in a volume of respectively 0.6 and 9.3 liters are recorded simultaneously onto two Hi8 recorders. The cameras are positioned perpendicular to the light slab and only illuminated particles in dark background are recorded. The short flash duration (pulse duration = 30 µs) allows a fast lowering speed (up to 1,5 m/s) without the deterioration of image quality. Four 100 W spotlights can be used instead of the stroboscopes for continuous observations of a larger non structured water volume. In this case the lowering speed is slower. Depth, temperature and conductivity data are acquired using a Seabird Seacat 19 CTD probe (S/N 1539) with fluorometer and nephelometer (both from Chelsea Instruments Ltd.). The system is powered by four 24V batteries and is piloted by a Texas 370 microprocessor. The data acquisition can be time or depth related and programmed prior to the immersion.. The UVP is well adapted to count and measure fragile aggregates such as marine snow as well as delicate zooplankton.

### Describe the techniques used for positioning the instrumentation.

The depth of the images is obtained with the SBE19 probe fixed in the main frame and geographical position by the ships instruments (mainly GPS).

### Please comment on any limitations associated with using this sampling strategy.

Daylight can modify the optical properties of particles in the upper 10-80 meters. The depth range of this layer depends on the characteristics of the light penetration. Therefore, data analysis starts at depth where the measured background value of daylight remains identical to that of night profiles or to that of deep layers, not influenced by changing light regimes.

## B. Sample Processing

### State whether sample was processed in-situ, shipboard or laboratory.

Samples consist of Hi8 video tapes and CTD data, see data processing below.

### ● Data Processing

Data processing, modelling and analysis includes the further manipulation, processing or enhancement of this generated data.

## C. Data Processing, Modelling/Analysis

### 1. Describe clearly the different stages in processing and analysing the data.

The UVP has two important features: a) it does not disturb the recorded particles or organisms and b) it allows quick data retrieval and processing. Processing of images obtained by the UVP in the structured light beam is automated. Onboard, a rapid image analysis is carried out (depending on the computer specifications). The recorded profile is digitised without compression using a Imaging Technology frame grabber (765 x 560 x 256 pixel matrix). The images are analysed and treated automatically by custom-made software. The objects (> than 2 pixels) in each image are detected and enumerated. The area and maximum length of every individual object is measured. Data are stored in an ASCII file and can be combined with the associated CTD, fluorometer and nephelometer data (Seasoft Software) using a spreadsheet software. Vertical profiles can be printed out onboard, approximately 30 min. after the recovery of the UVP.

The complete profile, consisting of approximately 25 000 images (0-1000 m profile at a 1m/s lowering speed and at the acquisition rate of 25 images/s) is treated in the laboratory by two custom built programs. The first, written in Visual C++ (Microsoft), digitises the images from a Hi8 player at normal speed and without compression and performs the image analysis. Data concerning the number of particles per image and their attributes are stocked in an ASCII file. The second program (MATLAB, Scientific Software) is used for data treatment and presentation.

The results of the calibrations indicate that the tested configuration can detect 90 µm-sized particles (under validation 15/5/2000). The metric surface as a function of the pixel surface for the 24 mm and 6 mm lens cameras can be expressed by the following equations:

$$24 \text{ mm} : Y = 0.0024 X 1.3728, r^2 = 0.7784;$$

$$6 \text{ mm} : Y = 0.008 X 1.556, r^2 = 0.828.$$

The metric length as function of the maximum pixel length for the 24 mm camera can be expressed as below :

$$L_m = L_P \times 0.1212, r^2 = 0.9347$$

The calibrations were carried out in a dark test tank filled with 3 m<sup>3</sup> filtered (20 µm) sea water. The

brightness measured in the test tank was similar to that in the aphotic layers. A calibration grid, placed at different depths of the light slab, was used to estimate the recorded water volume. The dimensions and volume of the parallel light beam recorded by the 24 mm and the 6 mm cameras are 100 x 75 x 79 mm representing 0.6 litre, and 408 x 307 x 74 mm representing 9.3 litres respectively. The pixel/mm relationship was calibrated in a test tank by injection of biological particles (range 90 µm - 20 mm) measured prior to their use with a stereomicroscope (Gorsky et al., Estuarine, Coastal and Shelf Science, in press).

Bodies of zooplankton might be recorded and considered as particles. We analysed and compared zooplankton profiles with profiles of particles at sea (Stemmann et al., Deep-Sea Research, in press). The number of living organisms was found to be one or two orders of magnitude lower than that of large non-living particles.

## **INSTRUMENT/METHOD** .....Optical & CTD sensors.. IDENTIFIER : (given by the data center)

**NAME :** Underwater Video Profiler 3 (U.V.P.3b)

**project:**MTP II-MATER

**Description of the main instruments/methods used at sea and in the laboratory during the project**

**Examples :** CTD, Current meter, salinometer, sediment trap, spectrometer ...

**Laboratory (Owner of the instrument or who performs the method ):**

Laboratoire d'Océanographie Biologique et Ecologie du Plancton Marin (LOBEPM)

**Address :**

Station Zoologique

BP 28

06234 Villefranche sur mer

**Tel :** 0493763816 **Fax :** 0493763834

**Email :** Gorsky@obs-vlfr.fr

### **Contact Scientist :**

**Gabriel GORSKY**

**INSTRUMENT NAME** (60) : Underwater Video Profiler III b(U.V.P.IIIb)

**MANUFACTURER** (60) : **LOBEPM**

**MANUFACTURING DATE** (10) : June 1996

**SERIAL NUMBER** (20) : CTD S/N 1539

**DESCRIPTION** (240) :

Version 3b of the UVP. Built for the study of MARINE SNOW and ZOOPLANKTON.

Coupled with SBE19 pumped CTD and Chelsea Fluorometer and Nephelometer.

### **TECHNICAL CHARACTERISTICS** (240) :

1000 m operational depth / 2 CCD B&W cameras (24 & 6 mm lenses) / In situ recordings at 25 Hz

Marine snow mode with structured strobes lights : 0.6 & 9.3 litres analysed volume per image for

90 & 240  $\mu\text{m}$  ESD detection limits. (>90 & >460  $\mu\text{m}$  available data set.)  
 Zooplankton mode with continuous 400 W spots : viewed surface :  
 425 x 325 mm at 500 mm from the lenses.

Time synchronisation with CTD.

See SBE for SBE19 probe characteristics ( <http://www.seabird.com/> )

See Chelsea for Aquatracka Nephelometer & Fluorometer characteristics  
 ( <http://www.chelsea.co.uk/> )

## COMMENTS (120)

**INSTRUMENT TYPE** (circle the main type) :

**In situ Sensor (default) Transmitter/Receiver On board recorder**  
**Drifter Towed platform Expendable sensor**

**OTHER ATTACHED EQUIPEMENT** (in case of complex multi sensor:Platform equipment) (10) :

**DATE** (of updating this form) : 05-17-00

MEASURED PARAMETER 1	CALIBRATION DATE	CRUISES	COMMENTS
Temperature S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	03-05-00		SBE Lab.
MEASURED PARAMETER 2	CALIBRATION DATE	CRUISES	COMMENTS
Conductivity S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	03-05-00		SBE Lab.

MEASURED PARAMETER 3	CALIBRATION DATE	CRUISES	COMMENTS
Pressure S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	03-05-00		SBE Lab.

MEASURED PARAMETER 4	CALIBRATION DATE	CRUISES	COMMENTS
Nephelometer S/N 88/167	9-24-96		Chelsea Lab.
MEASURED PARAMETER 5	CALIBRATION DATE	CRUISES	COMMENTS
Fluorometer S/N 88/2615/123	1-5-95		Chelsea Lab.
MEASURED PARAMETER 6	CALIBRATION DATE	CRUISES	COMMENTS
24 mm camera for particles > 100 µm	6/99 under process		LOBEPM
MEASURED PARAMETER 7	CALIBRATION DATE	CRUISES	COMMENTS
6 mm camera for particles > 460 µm	6/99 under process		LOBEPM

### **BIBLIOGRAPHICAL REFERENCES (METHODOLOGY) :**

Gorsky, G., Aldorf, C., Picheral, M., Kage, M., Garcia, Y. and J. Favole (1992) Vertical distribution of suspended aggregates determined by a new Underwater Video Profiler. Ann. Inst. oceanogr., Paris, 68 (1-2): 275-280.

Gorsky, G., Picheral, M. and L. Stemmann (2000) Use of the Underwater Video Profiler for the Study of Aggregate Dynamics in the North Mediterranean. Estuarine, Coastal and Shelf Science.

Picheral, M., Grisoni, J-M., Stemmann, L. and G. Gorsky (1998) Underwater Video Profiler for the "in situ" study of suspended particulate matter. OCEANS 98, 28 September- 1 October, IEEE/OES conference, Nice, p. 171-174.

Picheral, M., Stemmann, L. et G. Gorsky (1995) Système multiparamétrique pour la mesure et la quantification de la matière particulaire en suspension dans la colonne d'eau. 3e Colloque Européen Des Capteurs pour l'Environnement, Grenoble, 30-31 Mars 1995. pp. 162-165.

Stemmann, L. (1998) Analyse spatio-temporelle de la matière particulaire. Thèse Doctorale, Université Paris 6, pp 178.

Stemmann, L., Picheral, M. and G. Gorsky. (2000) Diel changes in the vertical distribution of suspended particulate matter in the NW Mediterranean Sea investigated with the Underwater Video Profiler. Deep-Sea Research.

---

**INSTRUMENT/METHOD** ..... CTD sensors.. IDENTIFIER : (given by the data center)NAME : **SBE19**project: **MTP II-MATER***Description of the main instruments/methods used at sea and in the laboratory during the project.**Examples : CTD, Current meter, salinometer, sediment trap, spectrometer ...***Laboratory** (Owner of the instrument or who performs the method ):

Laboratoire d'Océanographie Biologique et Ecologie du Plancton Marin (LOBEPM)

**Address :**Station Zoologique  
BP 28  
06234 Villefranche sur merTel : **0493763816** Fax : **0493763834**Email : **Gorsky@ccrv.obs-vlfr.fr****Contact Scientist :****Gabriel GORSKY****INSTRUMENT NAME** (60) : **SBE19****MANUFACTURER** (60) : **SeaBird** (<http://www.seabird.com/>)**MANUFACTURING DATE** (10) :**SERIAL NUMBER** (20) : **CTD : S/N 1539, Fluorometer Chelsea 88/2615/123, Nephelometer Chelsea: 88/167****DESCRIPTION** (240) : **CTD, Fluorometer (E : 430 nm, R : 685 nm) and****Nephelometer (E : 430 nm, R : 430 nm) probe****TECHNICAL CHARACTERISTICS** (240) :See SBE for SBE9 probe characteristics ( <http://www.seabird.com/> )See Chelsea for Aquatracka Nephelometer & Fluorometer characteristics  
( <http://www.chelsea.co.uk/> )**COMMENTS** (120)**INSTRUMENT TYPE** (circle the main type) :**In situ Sensor (default) Transmitter/Receiver On board recorder****Drifter Towed platform Expendable sensor**

**OTHER ATTACHED EQUIPEMENT** (in case of complex multi sensor: Paltform equipment) (10) :

**DATE** (of updating this form) : 05-17-00

MEASURED PARAMETER 1	CALIBRATION DATE	CRUISES	COMMENTS
Temperature S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	3-5-2000		SBE Lab.
MEASURED PARAMETER 2	CALIBRATION DATE	CRUISES	COMMENTS
Conductivity S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	3-5-2000		SBE Lab.
MEASURED PARAMETER 3	CALIBRATION DATE	CRUISES	COMMENTS
Pressure S/N 1539	11-2-94		SBE Lab.
	10-11-97		SBE Lab.
	5-5-99		SBE Lab.
	3-5-2000		SBE Lab.
MEASURED PARAMETER 4	CALIBRATION DATE	CRUISES	COMMENTS
Nephelometer S/N 88/167	9-24-96		Chelsea Lab.
MEASURED PARAMETER 5	CALIBRATION DATE	CRUISES	COMMENTS
Fluorometer S/N 88/2615/123	1-5-95		Chelsea Lab.

**BIBLIOGRAPHICAL REFERENCES** (METHODOLOGY) :

