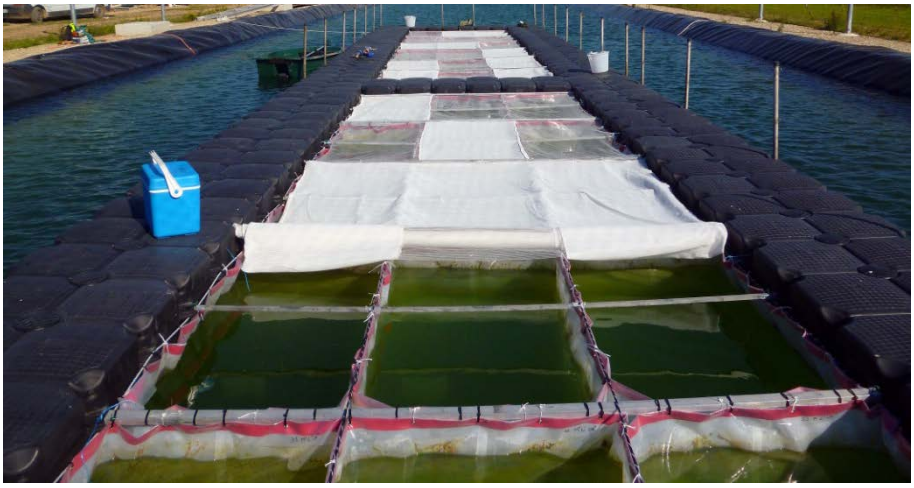
Aquatic mesocosms datasheet - CEREEP-Ecotron IleDeFrance

Summary and figures

The aquatic mesocosms platform is divided into several groups of outdoor water tanks of different volumes, materials and technologies (see detailed list in the specification tables below and Figure 1). We currently propose **(1) standard outdoor freshwater tanks** with and without drainage systems for research work on stagnant water bodies. These tanks have a volume ranging from 65 L to 12 m3, for depths ranging from a few tens of centimetres to 1.5 m. A further set of **(2) 12 large outdoor freshwater tanks (10 m long, 12 m3) is equipped with a wave beater**, which generates waves of varying amplitude and frequency. A movable rolling bridge is located on top of each basin to facilitate water sampling, and a movable plastic lid allows to increase water temperature for warming experiments. In addition, **(3) standard floating mesocosms** can be installed on a permanent floating structure of the stocking lake from the artificial lake platform. This makes it possible to run mesocosm experiments requesting a deep and naturally stratified water column. The floating pontoon can accommodate *in situ* experiments with enclosures of a maximum depth of 3 m and with variable numbers and volumes. The platform offers a **full set of field instruments** including (i) two fluorescent probes for *in situ* measurements as well as a work station for laboratory measurements; (ii) a probe to measure chlorophyll benthic algae concentrations directly on the substrate; (iii) a multi-parameter probe for point measurements in aquatic environments; and (iv) a set of field samplers and small field-laboratory equipments for the processing and temporary storage of samples. A fish breeding facility is located nearby the platform and includes two temperature-controlled breeding rooms of 17m2 each. See details on animal breeding facilities and more information on laboratory, analytical instrumentation in dedicated data sheets.

Figure 1. Photographs of existing facilities. Top, overview of the set of standard mesocosms and mesocosms equipped with wave beaters. Bottom, the floating pontoon equipped with 72 enclosures. All photographs © CNRS UMS 3194.



Specification table of standard outdoor mesocosms (CEREEP)

	Standard outdoor mesocosms - CEREEP	
General characteristics		
Design	Independent outdoor freshwater tanks	
Dimensions	From 65 L to 12 m^3	
Replicates	From 8 to 90 units per size class	
Confinement	Open top in outdoor conditions. Optional water drainage systems in some mesocosms.	
Class 1 - mesocosms*		
Design	Rectangular, polyethylene	Photograph 1 below
Dimensions	0.065 m^3, 70 x 30 x 30 cm	
Replicates	40	
Class 2 - mesocosms*		
Design	Rectangular, polyethylene	Photograph 1 below
Dimensions	0.090 m^3, 70 x 40 x 30 cm	
Replicates	40	
Class 3 - mesocosms*		
Design	Rectangular, polyethylene	Photograph 1 below
Dimensions	0.150 m^3, 80 x 60 x 35 cm	
Replicates	30	
Class 4 - mesocosms*		
Design	Circular, polyethylene	Photograph 2 below
Dimensions	0.350 m^3, diameter : 100 cm, height : 90 cm	
Replicates	90	
Class 5 - mesocosms*		
Design	Circular, polyethylene	Photograph 2 below
Dimensions	1 m^3, diameter : 140 cm, height : 100 cm	
Replicates	12	
Class 6 - mesocosms*		
Design	Circular, fiberglass	Photograph 3 below
Dimensions	3 m^3, diameter : 200 cm, height : 120 cm	
Replicates	16	
Class 7 - mesocosms*		
Design	Circular, sheet metal with liner	Photograph 4 below
Dimensions	9 m^3, diameter : 270 cm, height : 150 cm	
Replicates	12	
Class 8 - mesocosms*		
Design	Circular, sheet metal with liner	Photograph 4 below
Dimensions	12 m^3, diameter : 340 cm, height : 110 cm	
Replicates	12	
Environment control		
Climate	None, outdoor conditions	
Atmospheric conditions	None, outdoor conditions	
Instrumentation		
Pelagic algae	FluoroProbe (BBE-Moldaenke)	
Benthic algae	BentoTorch probe (BBE-Moldaenke)	
Multiparametric	YSI EXO 2 parameters : Temperature / Dissolved O2 / Conductivity / pH/ ORP/ Chlorophyll a / Phycocyanin / Turbidity / Water pressure	
Study systems		
Plants	Up to small aquatic vascular plants (benthic species or vegetation rafts)	
Animals	Up to small animal predators including insects or planktivorous fishes	
Communities	Aquatic freshwater ecosystems including small planktivorous fishes at the top of the food chain	

* These mesocosms are available for TransNational Access call of the EU network AQUACOSM (https://www.aquacosm.eu/)

Photograph 1 : the three size classes of smaller mesocosms

Photograph 2 : circular polyethylene class 4 and 5 mesocosms (here class 4 mesocosms is illustrated)

Photograph 3 : circular fiberglass class 5 mesocosms

Photograph 4 : example of circular, sheet metal mesocosms (here, class 8 mesocosms)

Specification table of outdoor mesocosms with a wave beater (CEREEP)

	Mesocosms with a wave beater - CEREEP
General characteristics	
Design	Independent outdoor freshwater tanks, rectangular shape Fiberglass and stainless steel alloy structure Green coloration of inside walls, movable bridge for sampling
Dimensions	12 m^3, 1000 x 100 x 180 cm
Replicates	12 units
Confinement	Open top mesocosms in outdoor conditions. Optional water drainage system.
Environment control	
Water turbulence*	Wave flume designed to emulate effects of surface waves on biological processes in shallow water column. Coherent water motions in a 1 m deep water column: wavelength of 0.1-5 m, amplitude of 1-5 cm, frequency of 0.5 to 3 Hz.
Climate	Temperature increase with a manually movable transparent lid (greenhouse effect), other climate conditions not controlled in outdoor conditions
Atmospheric conditions	None, outdoor conditions
Instrumentation	
Pelagic algae	FluoroProbe (BBE-Moldaenke)
Benthic algae	BentoTorch probe (BBE-Moldaenke)
Multiparametric	YSI EXO 2 parameters : Temperature / Dissolved O2 / Conductivity / pH/ ORP/ Chlorophyll a / Phycocyanin / Turbidity / Water pressure
Study systems	
Plants	Up to small aquatic vascular plants (benthic species or vegetation rafts)
Animals	Up to small animal predators including insects or planktivorous fishes
Communities	Aquatic freshwater ecosystems including small planktivorous fishes at the top of the chain

* See detailed technical publication in the references list below.

Figure 2. Detailed view of mesocosms with a wave beater showing wave flumes (right hand side), tanks with green coloration inside and movable bridges for sampling. All photographs © CNRS UMS 3194.

Specification table of standard floating mesocosms (CEREEP)

	Standard floating mesocosms - CEREEP
General characteristics	
Design	Independent outdoor floating freshwater mesocosms Floating pontoon installed on a large water reservoir (126 m x 15 m x 3 m deep, 4000 m3) with natural water thermal gradient and mixing typical of shallow lakes
Dimensions	Floating pontoon: 24 m x 3 m Depth: 3 m deep including 2.5 m water column and 50 cm atmospheric compartment
Replicates	From 8 to 288 units per size class depending on configuration (see examples below)
Confinement	Open top in outdoor conditions. Fully sealed (polyethylene bags) or partially sealed (mesh bags).
Configuration 1 - smallest mesocosms	
Design	Polyethylene bags with a metallic support (circular cross-section)
Dimensions	600 L (50 cm x 50 cm x 2.5 m deep)
Replicates	288 units
Configuration 2 - intermediate size mesocosms	
Design	Polyethylene bags with a metallic support (circular cross-section)
Dimensions	5.5 m3 (1.5 m x 1.5 m cm x 2.5 m deep)
Replicates	32 units
Configuration 3 - largest mesocosms	
Design	Polyethylene bags with a metallic support (circular cross-section)
Dimensions	22 m3 (3 m x 3 m x 2.5 m deep)
Replicates	8 units
Environment control	
Climate	None, outdoor conditions; natural thermal gradient of the water column
Atmospheric conditions	None, outdoor conditions
Instrumentation	
Pelagic algae	FluoroProbe (BBE-Moldaenke)
Benthic algae	BentoTorch probe (BBE-Moldaenke)
Multiparametric	YSI EXO 2 parameters : Temperature / Dissolved O2 / Conductivity / pH/ ORP/ Chlorophyll a / Phycocyanin / Turbidity / Water pressure
Study systems	
Plants	Up to small aquatic vascular plants (vegetation rafts)
Animals	Up to small animal predators including insects or planktivorous fishes
Communities	Aquatic freshwater ecosystems including small planktivorous fishes at the top of the chain and thermal stratification of water column

References

Standard outdoor mesocosms - representative studies

Sotton B., Paris A., Le Manach S., Blond A., Lacroix G., Millot A., Duval C., Huet H., Qiao Q., Labrut S., Chiappetta G., Vinh J., Arnaud Catherine A. and, Marie B. 2017. Metabolic changes in Medaka fish induced by cyanobacterial exposures in mesocosms: an integrative approach combining proteomic and metabolomic analyses. Scientific Reports 7: 4051

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Mesocosms with wavemakers

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