

Application of the Laser Optical Plankton Counter, LOPC, in ecology studies and comparison with other usual methods



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INTRODUCTION & OBJETIVES

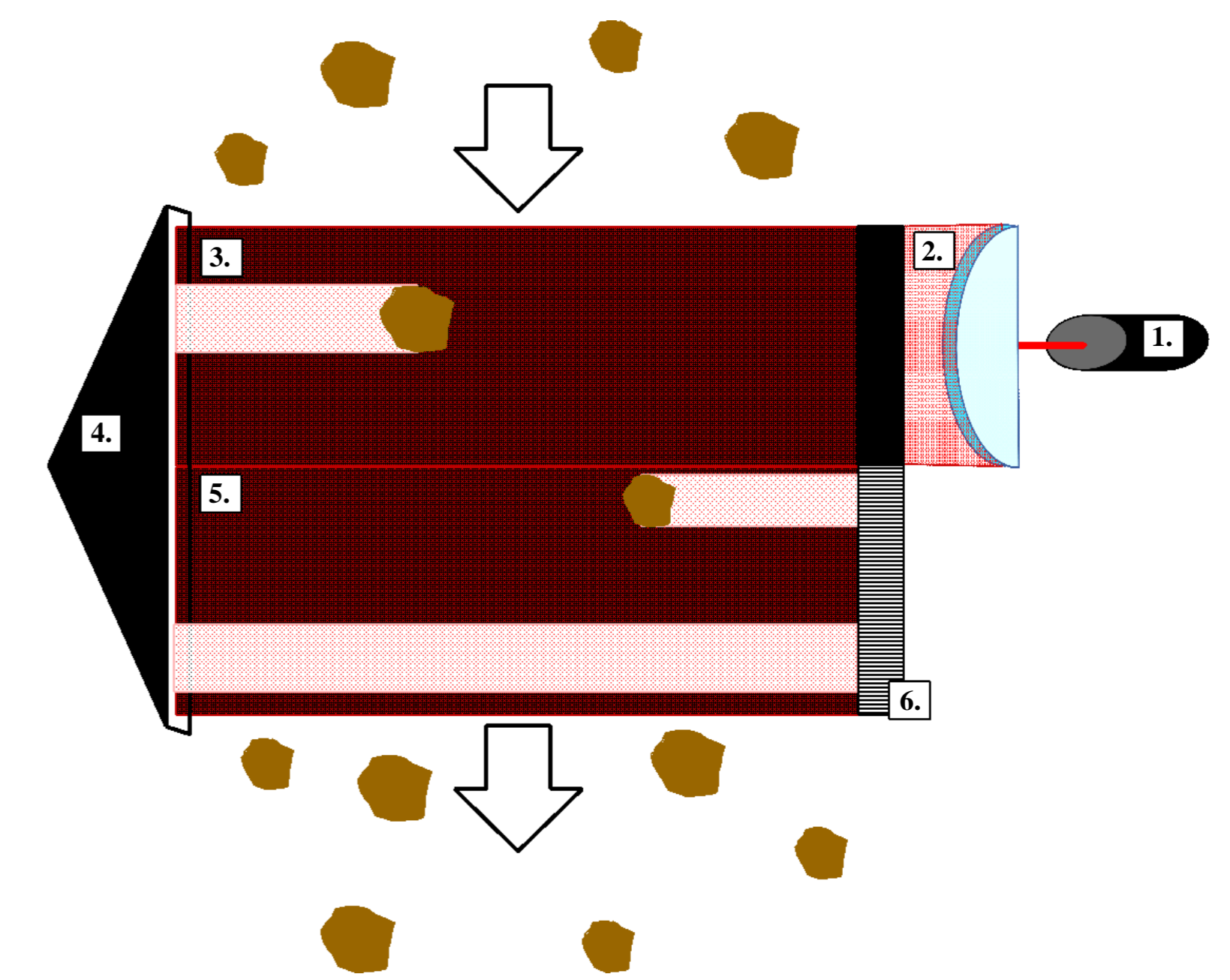
The Laser Optical Plankton Counter, LOPC, developed by Herman *et al.* (2004) is an oceanographic equipment that allows to quantify the size and abundance of the particles present in the water in real time. This equipment can be used in two ways: analyzing samples in the laboratory or directly analyzing the particles in the water.

The main objective of this work is to set up the LOPC team, belonging to the Structure and Dynamics of Aquatic Ecosystems (EDEA) research group of the Department of Biology of the University of Cádiz, both in desktop mode and in *in situ* measurement mode, in order to use it in future work of the research group. To achieve this main objective, the following specific objectives have been set:

1. Comparative study of the main variables of the measurement process.
2. Evaluation of this methodology in real practical cases.

LOPC's Technical Characteristics	
Type of measure	Equivalent spherical diameter, ESD (μm)
Minimum particle size	100 μm
Maximum particle size	1920 μm , in practice 1600 μm
Data distribution	Intervals of 15 μm
Sampling frequency	5 seconds
Maximum particle concentration	10 ⁶ particles / m ³
Maximum flow velocity	0.8 liters / second
Maximum depth	660 meters

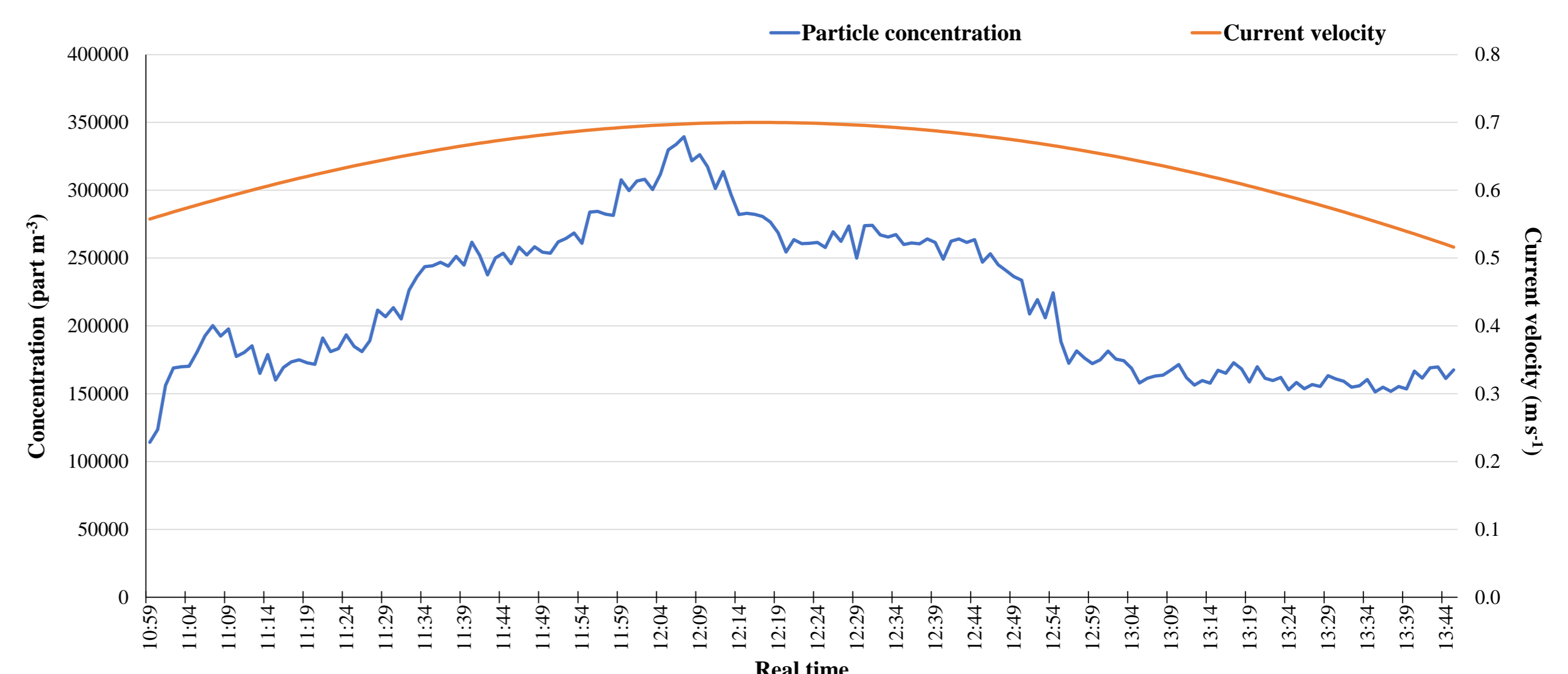
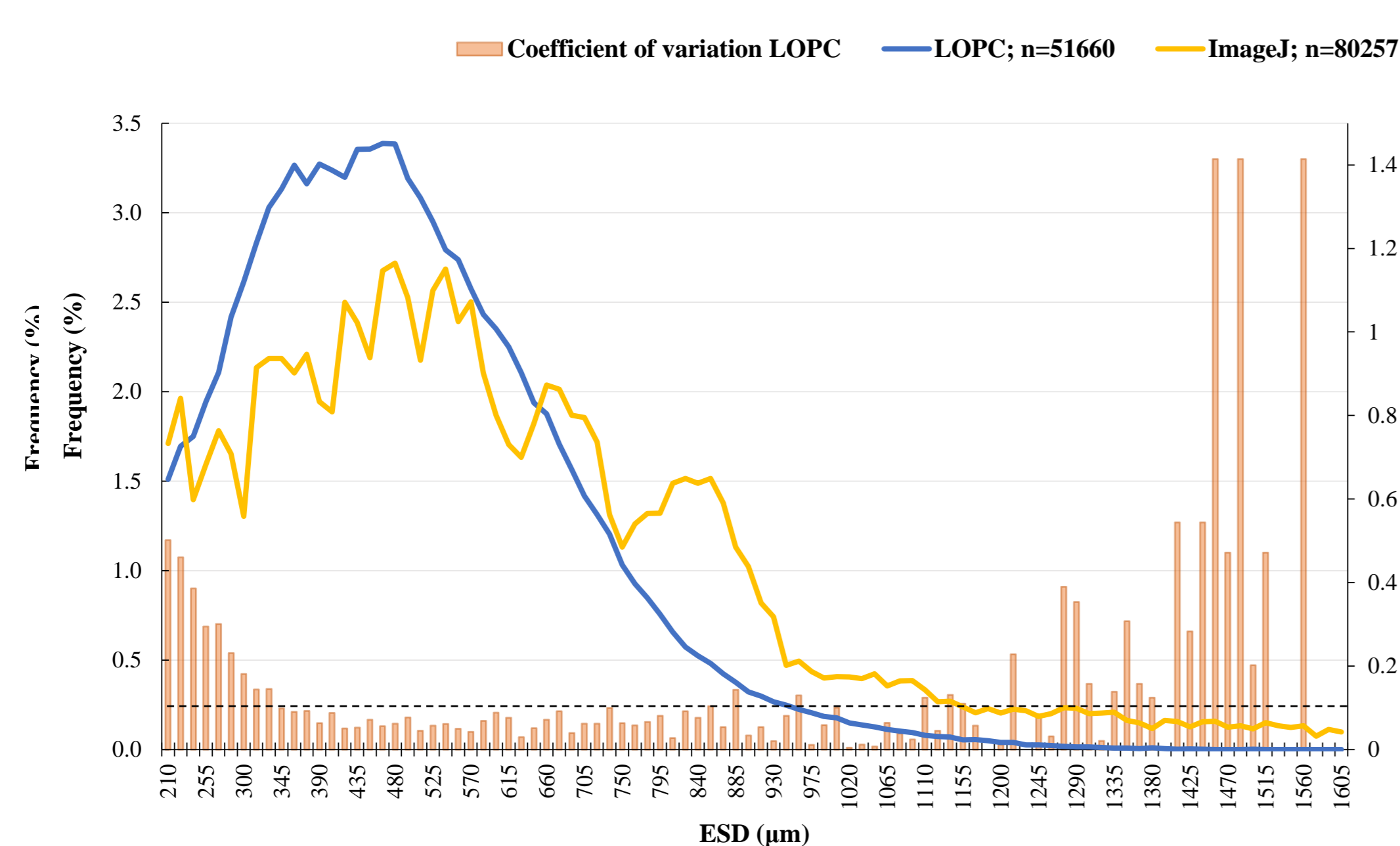
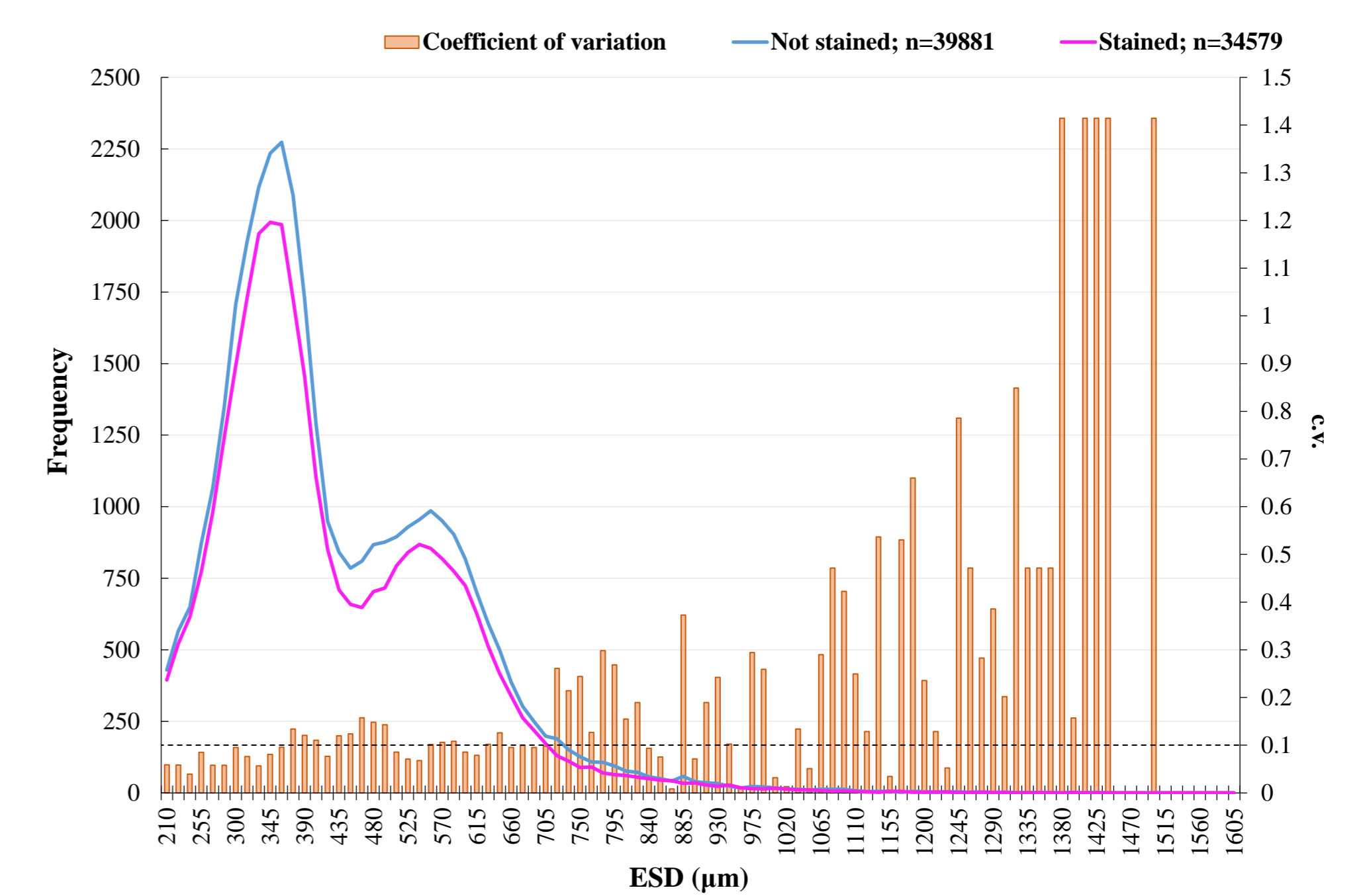
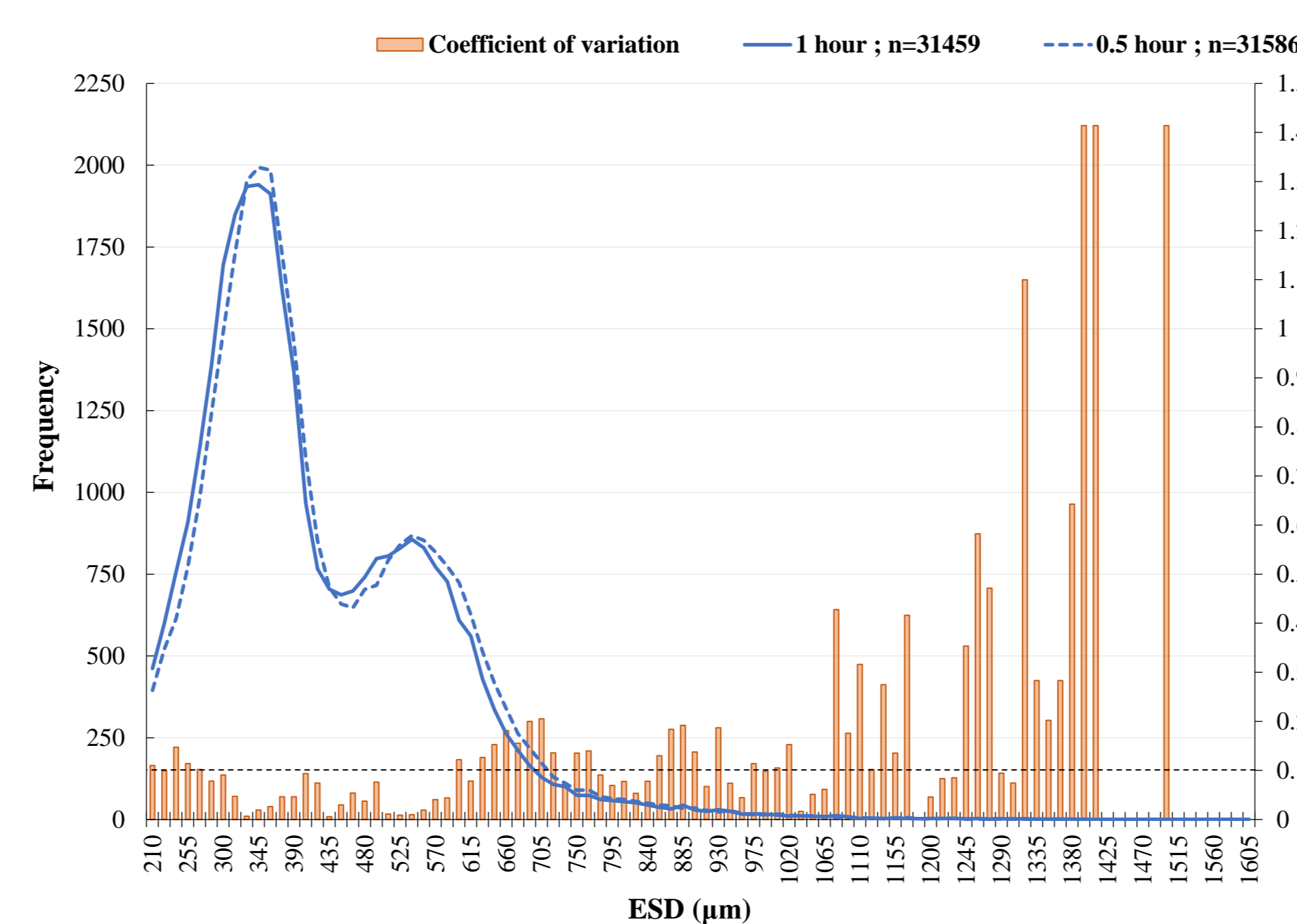
METHODOLOGY



(1) Laser diode. (2) Lens and mirror system. (3) Emitted light beam. (4) Reflecting prism. (5) Reflected light beam. (6) Photodiode.

RESULTS & DISCUSSION

Sample	Repetitions made	Total number of particles		
		Average	Standard deviation	Variation coefficient
1	6	33920	3301	0,097
2	6	101150	5967	0,059
3	6	30661	1242	0,041
4	6	50427	5233	0,104
5	6	33107	1645	0,050



- ⊕ Its **repeatability** is optimal, since few variations occur when measuring the same sample several times. In addition, it allows the analysis of samples used in other studies (stained or not stained), provided that the minimum dilution factor that the sample must have for the LOPC to work properly is respected.
- ⊕ It only allows us to know the **particle sizes** and not their nature. The information that cannot be obtained can be completed with analyses obtained by other methodologies in a relatively simple way.

CONCLUSIONS

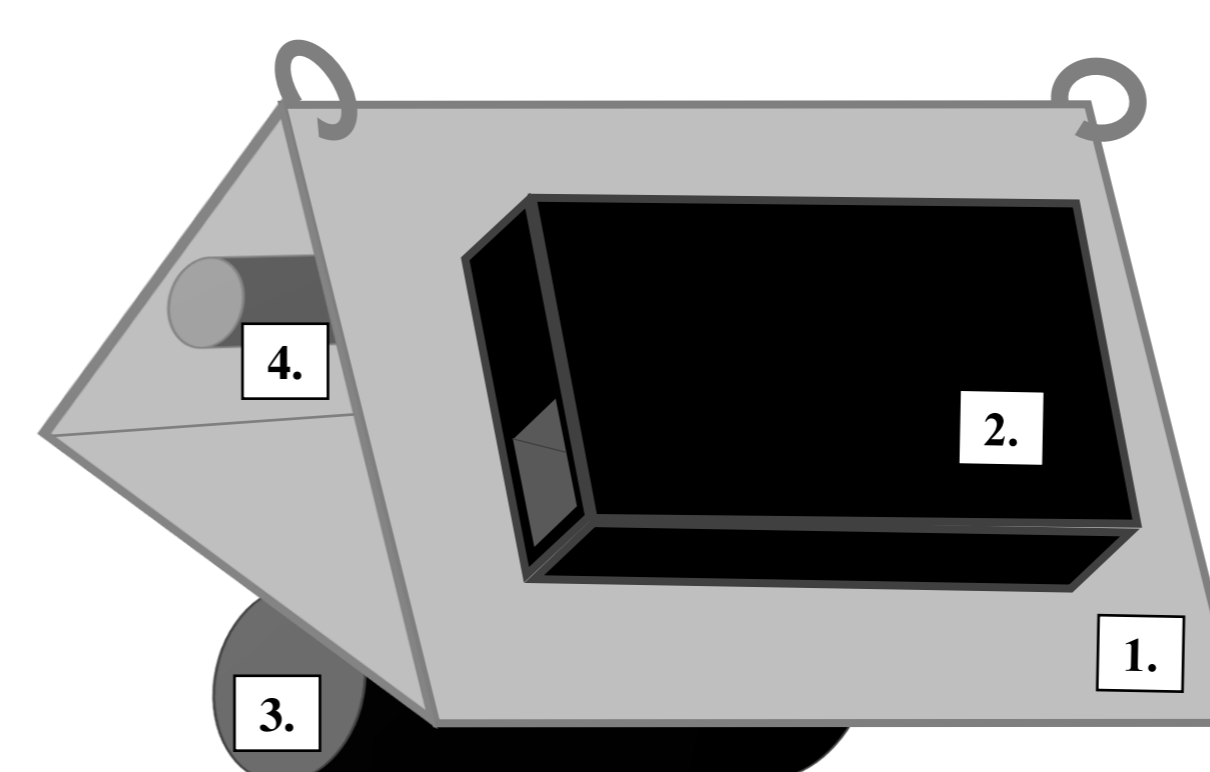
- ⊕ The **metric resolution** provided by its laser optics technology is much **higher** than that of other plankton size analysis instruments, such as image analysis.
- ⊕ The greatest potential of the LOPC is in its use **directly in the water**. It allows data to be obtained on a much **smaller spatial scale** than other ordinary methods, such as plankton nets.
- ⊕ The LOPC has **high spatial and temporal resolution** and allows large volumes of water to be analyzed more **quickly and accurately** than usual. It represents a great saving of time compared to other methodologies.

REFERENCES

Herman, A. W., Beanlands, B., & Phillips, E. F. (2004). The next generation of Optical Plankton Counter: The Laser-OPC. *Journal of Plankton Research*, 26(10), 1135–1145.

ACKNOWLEDGMENTS

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(1) Metallic structure. (2) LOPC. (3) Datalogger. (4) Battery.

