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Recent Notable FlowCam Studies in Aquatic Research

Zooplankton Size Structure in Relation to Environmental Factors in the Xiangxi Bay of Three Gorges Reservoir, China

Hoaran Li et al. February 2022
Frontiers in Ecology and Evolution, https://doi.org/10.3389/fevo.2022.800025

Scientists from the Institute of Hydrobiology in Wuhan, China investigated the size structure of zooplankton and their relationship to environmental conditions across nitrogen and phosphorus gradients in the Three Gorges Reservoir. These classified images were used in turn to compute the community size (including biovolume) of different groups such as rotifers, protozoans, Cladoceran, and copepods. Researchers were able to quantify how environmental variables like temperature, nitrogen levels, and phosphorus levels affected the size spectrum and diversity of zooplankton in the reservoir.

Environmental Impact of a Series of Flash Flood Events on a Hypersaline Subtropical System in the Northwestern Arabian Gulf

Ahmed et al. February 2022
Marine Pollution Bulletin, https://doi.org/10.1016/j.marpolbul.2022.113394

Researchers at the Kuwait Institute for Scientific Research (KISR) used a series of flash floods in Kuwait to study how coastal phytoplankton responded to the increase in the nutrient supply. FlowCam was used to identify and count phytoplankton and zooplankton 20-300 µm in size. The researchers identified increased phytoplankton growth particularly in diatoms and the photosynthetic ciliate *Myrionecta rubra* during this period of increased nutrient availability. However, zooplankton grazing controlled this phytoplankton growth, resulting in only a short-term increase in phytoplankton abundance.

The Effect of Salinity on the Grazing Rate and Survival of *Daphnia magna* Females Adapted to Different Salinities

Zadereev et al. January 2022
Aquatic Ecology, https://doi.org/10.1007/s10452-021-09941-7

This study investigated the effects of different salinities on the survival, grazing rate, and size-selective feeding of *Daphnia* females in Siberian lakes. Results showed that *Daphnia* adapted to specific salinity environments can temporarily lose the ability to control phytoplankton populations due to salinity fluctuations. FlowCam was used to image phytoplankton approximately 2-60 µm in size and provided concentration, volume, and diameter measurements between control and test vessels. The researchers were able to estimate specific grazing rates for two different populations of *Daphnia*. The resulting data strongly supported the authors' hypothesis that freshwater populations of *Daphnia* show higher grazing rates in freshwater, while saline populations show higher grazing rates at high salinities.

Microplankton Size Structure Induced by a Warm-Core Eddy in the Western Bay of Bengal: Role of *Trichodesmium* Abundance

Karnan, Jyothibabu et al. February 2021
Oceanologia, https//doi.org/10.1016/j.oceano.2021.02.003

Scientists from the National Institute of Oceanography in India investigated how a prolonged warm-core eddy modified the microplankton biomass and size structure of the plankton community. Lugol's preserved samples were analyzed by FlowCam to enumerate, identify, and measure the organisms. FlowCam aspect ratio and biovolume measurements, along with image classification, allowed the researchers to identify that the warm-core eddy facilitated the high abundance of certain cyanobacteria instead of the usual micro-autotrophs such as diatoms and dinoflagellates.

Comparative Analysis of Freshwater Phytoplankton Communities in Two Lakes of Burabay National Park Using Morphological and Molecular Approaches

Malashenkov, Dashkova, Barteneva et al. August 2021
Scientific Reports, https://doi.org/10.1038/s41598-021-95223-z

A team of Kazakstani and Russian researchers analyzed phytoplankton assemblages from two lakes in Burabay National Park using traditional morphological and next-generation sequencing (NGS) approaches. FlowCam was used to capture and identify images of over 250 species of phytoplankton and cyanobacteria and revealed considerable differences in phytoplankton assemblages between the two lakes. In comparing morphological and molecular methods researchers found that microscopy methods (including FlowCam) provide more cumulative information about species richness and phytoplankton abundance, while NGS is favorable for detecting picoplankton and rare species that cannot be detected or identified by microscopy methods. This study demonstrates the high potential of an integrated morphological and molecular approach to provide complete taxonomic characterization of, and deeper insights into phytoplankton communities.

Exploring New Technologies for Plankton Observations and Monitoring of Ocean Health

Hablűtzel et al. January 2022
Oceanography, https://doi.org/10.5670/oceanog.2021.supplement.02-09

Researchers at the Flanders Marine Institute (VLIZ) have initiated a long-term plankton time-series in Belgian coastal waters, using FlowCam to monitor microplankton (50-300 µm). FlowCam allows users to quantify particles, obtain valuable metrics, and create image libraries for a sample in far less time than manual methods would allow. VLIZ has integrated FlowCam data with an automated artificial intelligence classifier. Three and a half years of ongoing FlowCam monitoring has provided 1.4 million particle images which have been categorized into 140 taxonomic groups. By reducing the number of expensive human work hours, FlowCam has helped the team acquire and process more for the same cost, enabling them to increase the spatial and temporal resolution of their observations.