In situ plankton imaging with a UVP (*Underwater Vision Profiler*)

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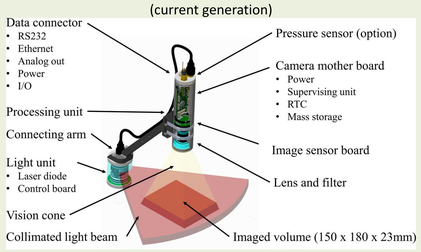
UVP - Background

The UVP (**Underwater Vision Profiler**) was developed by Gaby Gorsky's lab in Villefranche-sur-mer, France (Picheral et al. 2010) and has evolved to the current generation, UVP6 (Picheral et al. 2022). In the CCE-LTER *California Current Ecosystem* Long-Term Ecological Research site, we have been using the UVP5 on our process cruises since 2008. Here we present a few of the results from our use of that instrument, thanks largely to Tristan Biard, a former SIO postdoc who has worked extensively with UVP images and data.

CCE-LTER has recently purchased a **UVP6-HF** (high-frequency sampling) for deployment on a CTD-rosette, thus permitting a vertical profile of images of zooplankton and larger suspended particles to be made each time the CTD is lowered.

UVP6-HF

(current generation)



Picheral et al. (2022) *LOM*

UVP5

The Opportunity

CCE-LTER seeks to collaborate with CalCOFI to make **regular deployments of the UVP6-HF on CalCOFI cruises**. No additional wire time or ship time is required for such deployments, which will enable in situ imaging of zooplankton and detrital material with each CTD cast. This addition would make it possible to resolve vertical structure of planktonic organisms critical to the food web and to biogeochemical cycles. These analyses would be complementary to the vertically integrated plankton tows (210-0 m), for which only a small subset of the samples can currently be analyzed. The UVP6-HF can resolve suspended marine particles as small as 0.1 mm, size spectra of the plankton community, and provides a better assessment of fragile, gelatinous zooplankton than conventional net samples.

Advanced Machine Learning tools (e.g., Ellen et al. 2019, 2022) are now available to facilitate the rapid classification of plankton images.

Representative Images and Results

Metazoans

Copepods

Euphausiids

Appendicularian

house

Pyrosome colony

Ostracods

Ctenophores

Polychaetes

Chaetognaths

Poeobius

Siphonophore

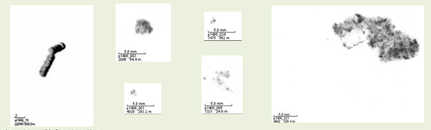
Hydrozoan medusae

Salps

(aggregate generation)

Amphipod

Large Particulate Matter

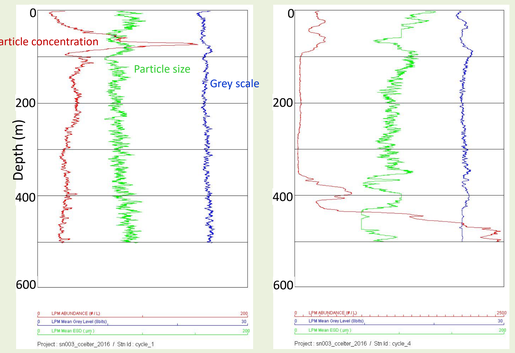


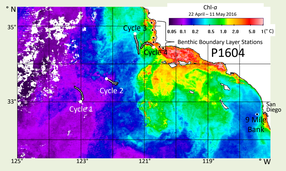
(Anchovy?) fecal pellets

P1908

Cycle 1
(offshore)

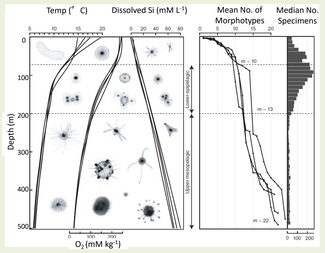
Cycle 4
(Benthic Boundary Layer)



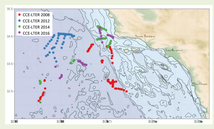


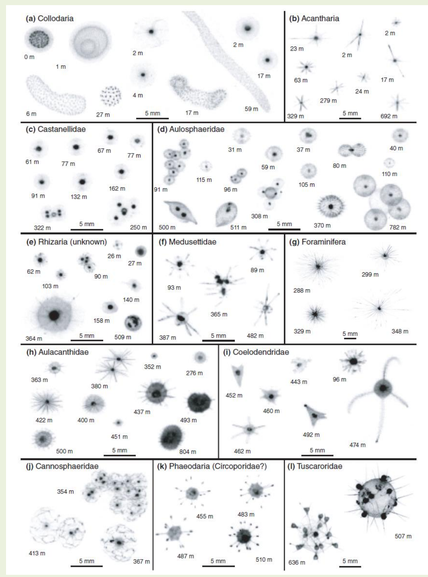
Rhizaria (Protists)

Vertical niches of planktonic Rhizaria



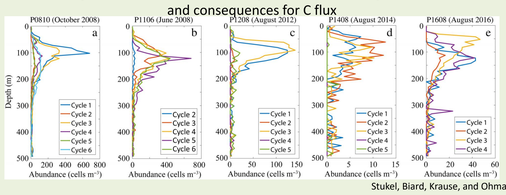
Biard & Ohman (2020) *L&O*





Vertical profiles of Aulosphaeridae (Phaeodaria)

and consequences for C flux



Stukel, Biard, Krause, and Ohman (2018) *L&O*

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