



Figure 1. The Underwater Video Profiler (UVP) instrument package presented here includes the underwater imaging system, an SBE CTD, a fluorometer and nephelometer both from Chelsea Instruments.

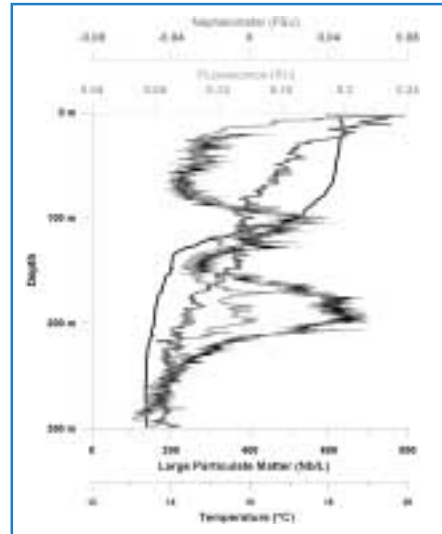


Figure 2. Vertical profile data obtained by the UVP instrument package.

published in various scientific journals, such as:

Echevarría, F., *et al.* (2002) Physical- biological coupling in the Straits of Gibraltar. *Deep Sea Res.* 49, 10-9, in press.

Gomez F., *et al.* (2001) Ecological implications of the interface oscillation and the North Atlantic Central Water in the Strait of Gibraltar. *J. Mar. Syst.*, 30: 207-220.

Gorsky, G., *et al.* (in press) Marine snow latitudinal distribution in the equatorial Pacific along 180°. *J. Geophys. Res.*

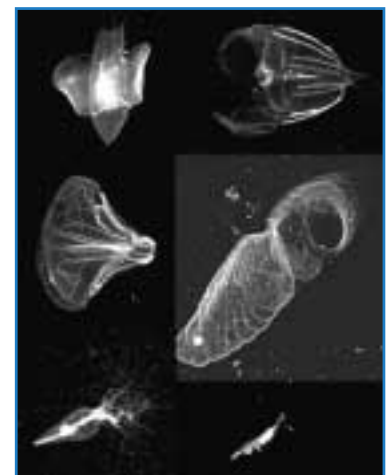
Gorsky, G., *et al.* (2002) Large particulate matter (LPM) in the western Mediterranean. (2002) 1- LPM distribution related to hydrodynamics. *J. Mar. Syst.*, 33-34: 274-289.

Gorsky G., *et al.* (2000) Use of the underwater video profiler for the study of aggregate dynamics in the North Mediterranean. *Estuar. Coast. Shelf Sci.*, 50: 121-128.

Gorsky, G., *et al.* (2000) Zooplankton distribution in four western Norwegian fjords. *Estuar. Coast. Shelf Sci.*, 50: 135-141.

Stemmann, L., *et al.* (2002) Four years survey of Large Particles (>0.15 mm) vertical distribution (0-1000 m) in the NW Mediterranean. *Deep-Sea Res. II*, 49: 2143-2162.

Figure 3. Macrozooplankton from the northeast Atlantic Ocean recorded during the French POMME oceanographic cruises in 2001.



Stemmann L., *et al.* (2000) Diel changes in the vertical distribution of suspended particulate matter in the NW Mediterranean Sea investigated with the Underwater Video Profiler. *Deep Sea Res. I*, 47: 505-531.

## Video Plankton Recorder reveals environmental problems of marine copepod

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The copepod *Pseudocalanus spec.* is an important link in the energy transfer between primary and fish production in the Central Baltic deep basins. It is an essential food item for pelagic planktivorous herring and sprat, and strongly influences growth, survival, and eventually recruitment of fish in the area (Möllmann and Köster 2002, Hinrichsen *et al.* 2002). Consequently, *Pseudocalanus* is one of the target species of the German Globec Project ([www.globec-germany.de](http://www.globec-germany.de), funded by the German Federal Ministry for Education and

Research), whose goal is the clarification of trophodynamic interactions between zooplankton and planktivorous fish in relation to reproductive success under the impact of physical forcing.

Previous long-term investigations documented large interannual fluctuations in the standing stock of *Pseudocalanus* with a pronounced decrease especially in the 1990s (Figure 1). This development has been attributed to significant changes in the hydrographic

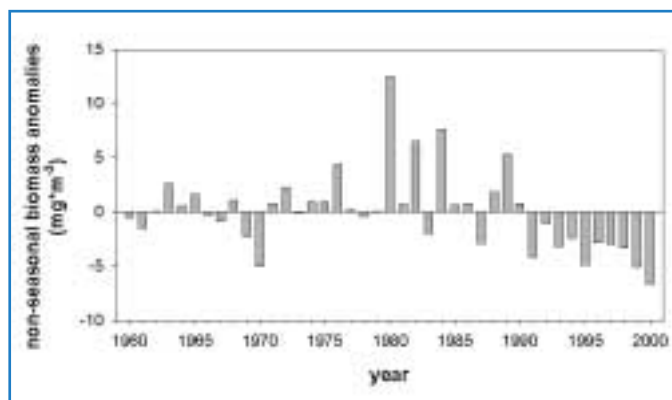


Figure 1. Long-term development of *Pseudocalanus* biomass in the Central Baltic Sea (Data by the Latvian Fisheries Research Institute, Riga).

environment over the last two decades, such as decreasing salinity due to reduced frequency of salt water intrusions from the North Sea and increased temperatures due to a series of mild winters (Möllmann *et al.* 2000). The mechanisms and processes behind this remain, however, unknown and are now a main focus of the German Globec Studies.

Spatio-temporal patterns of zooplankton have been investigated in 2002 in the Bornholm Basin by conventional net sampling as well as by operating the Seascan Videoplanktonrecorder (VPR, Fig. 2). First trial runs on board of the RVs *ALKOR* and *HEINCKE* in April and May 2002 revealed a surprisingly deep and narrow band of distribution of reproducing *Pseudocalanus* females in the permanent halocline of the Bornholm Basin. Figure 3 shows a VPR-picture of these animals which are easy to identify as they are the only copepods with egg-sacs in the area. So, *Pseudocalanus*, a marine species dwelling in the brackish water of the Baltic Sea, tries to stick to high salinity layers whereby it is forced to endure extremely poor oxygen conditions of  $< 1 \text{ ml}^{-1}$



Figure 2. The Seascan Videoplanktonrecorder (VPR) towed from the German RV HEINCKE.

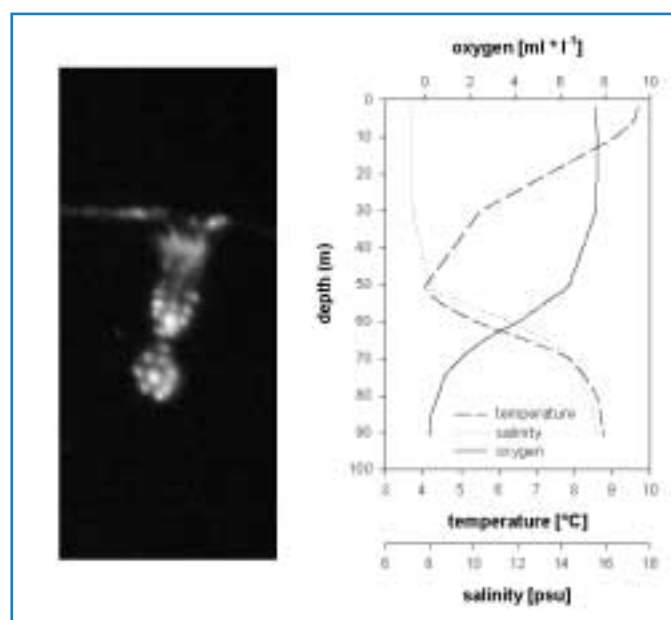


Figure 3. VPR-Image of *Pseudocalanus* female with eggs (left) recorded in May 2002 at  $55^{\circ}16.60'N$  and  $15^{\circ}43.77'E$  in the Bornholm Basin, and hydrographic profile (right) with arrow indicating oxygen content ( $0.77 \text{ ml}^{-1}$ ) at depth of the animal (76.5 m).

(Figure 3). This indicates that the decrease of salinity and oxygen concentrations as observed over the last decades in the deep basins of the Baltic has resulted in a degradation of suitable habitat for reproduction of *Pseudocalanus* and most likely diminished survival chances. This hypothesis will be further addressed in the context of climate variability by targeted process studies within the German Globec Project. The new findings would not have been detected by using conventional plankton samplers. Only the operation of sophisticated equipment such as the VPR gives insight into the impact of sharp physical gradients on the life history of zooplankton.

#### References

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- Möllmann, C., and Köster, F.W. 2002. Population dynamics of calanoid copepods and the implications of their predation by clupeid fish in the Central Baltic Sea. *J. Plank. Res.* 24(10): in press.
- Möllmann, C., Kornilovs, G., and Sidrevics, L., 2000. Long-term dynamics of main zooplankton species in the Central Baltic Sea. *J. Plank. Res.* 22: 2015-2038.