Y-I1

Sediment trap for hard bottom community studies

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Résumé

Une méthode pour l'étude de l'influence de la sédimentation sur les communautés de substrat dur est presentée. Dans ce but a été réalisé un modèle de piège à sédiments approprié pour l'échantillonnage dans les eaux cotières.

Several authors have pointed out the trophic role of suspended matter for benthos (Smetacek, 1982), but this relationship was studied essentialy for soft bottom communities.

The quali- quantitative composition of organic and inorganic suspended matter could play a significant role also in determining the structure and functions of the benthic rocky biocoenoses.

To study this less known aspect, samples of particulate matter in the water column and in traps placed along a cliff near the Portofino Promontory (Riviera Ligure di Levante) were carried out during an yearly sampling. The change of traps was effected bimonthly by diving. At the same time biological samples were collected to study the benthic community.

Four non-cylindrical sediment traps were placed vertically at both 16 and 24 m depth in different situations of turbulence and water current.

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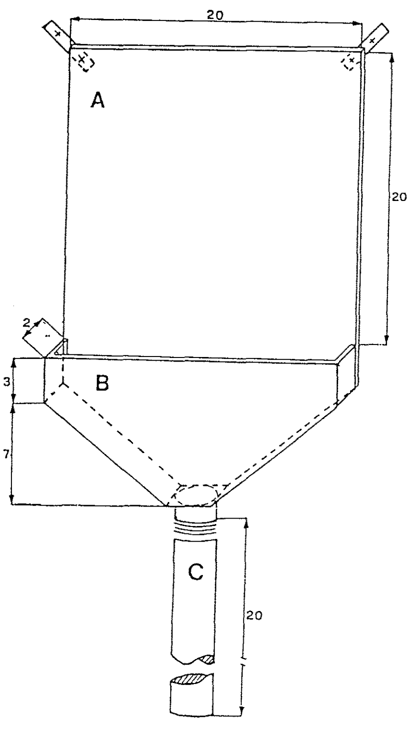

Fig. 1. The proposed sediment trap with baffle (A), rectangular funnel (B) and cylindrical collector(C). Measures are in centimetres.

According to Sato & Sawada (1979), funnel type traps are unsuitable in shallow waters, because water movement strongly influences the sedimentation rate. Also the design is important: generally funnels undertrap while narrow mouths and wide bodies consistently overtrap (Gardner, 1980; Butman et al., 1986).

The proposed trap (Fig. 1) has a square baffle of 400 cm^2 allowing the sediment to fall into a rectangular funnel with a mouth of 2 cm x 20 cm and eventually into a 2 cm Ø, 20 cm long cylinder. The ratio between height and mouth opening (= 10) is important in determing the particle retention and to collect also the silt and clay fraction.

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Y-I2

An application of a portable current meter for flow measurements near bottom by scuba diving

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Hydrodynamic forces have long been recognized to exert a strong influence on distribution and morpho-functional adaptations of benthic organisms. In this framework, interactions between water movement and benthos at the water-bottom interface are of major importance (Nowell & Jumars, 1984). However, due to the difficulties of performing flow measurements on a small scale, benthic studies usually do not include quantitative evaluations of this parameter.

Among the different kinds of instruments available to measure flow on a small spatio-temporal scale, electromagnetic current meters are probably the most suitable for field studies.

In the present paper we report the application of a bi-directional electromagnetic current meter (Marsh-McBirney 500 series instruments; 8595 Grovemont Circle, Gaithersburg, Maryland 20877,U.S.A.) in a study on the flow dynamics in seagrass beds.

The characteristics of the Marsh McBirney 500 series current meters are: ability to measure both X and Y vector components of velocity in the horizontal plane; fast response and/or long-term averaging capability ; small-sized spherical sensors (from 2 to 8cm in diameter) that are easily handled by a SCUBA diver as well as by a boat operator; and last, but not least, they are relatively inexpensive.

The sensor is connected to the meter by a cable of suitable length (Fig.1). Functionality of sensor is not affected by fouling films or contacts with bottom structures (e.g. seagrass leaves). The flow sensing volume is a sphere about three times that of the sensor diameter ; the velocity range detectable varies between 0 and 300cm/sec.

One of us performed a preliminary set of measurements using model 511 of the 500 series within a Zostera marina bed and , as control, outside it in bare sands off San Juan Island (WA,U.S.A.) to evaluate the effect of Zostera canopy on flow. The sensor, attached to a graduated rod inserted into the substrate, was placed, by a SCUBA diver, at varying distances from the bottom and from the Zostera canopy . Orientation of the sensor was controlled by the diver. Readings of the velocity components (three minutes for each point) were recorded by the operator stationed on the boat (Fig.1). Velocity profiles were drawn from the measurements so obtained (Fig.2). Velocity profiles are extremely useful to define flow environment and benthic boundary layer features (Vogel ,1981; Nowell & Jumars,1984).

Our results were similar to those reported by Fonseca et al. (1983) and more recently by Eckman (in press) who used a similar procedure with the same current meter.

Other models of the 500 series are suitable also for flume laboratory studies, others are equipped with a geomagnetic compass and can be interfaced with automatic data recorders.

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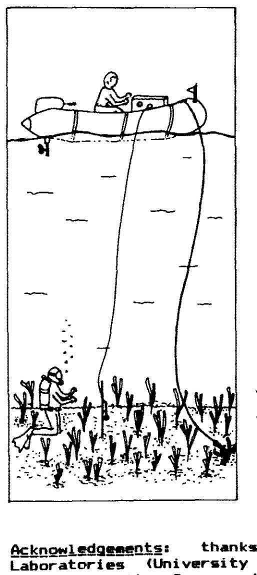
FIG.1



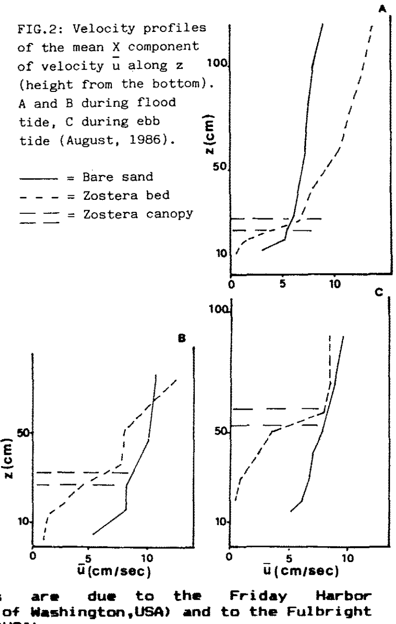


FIG.2: Velocity profiles of the mean X component of velocity ū along z (height from the bottom). A and B during flood tide, C during ebb tide (August, 1986).

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