# SO_DYFAMED Time Series - 1991-> ...

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**METHOD | FIGURES**

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## METHOD

The system LET GO used in this study (Manufactured by Technicap, France) was slightly different from that described in Dandonneau and Le Bouteiller (1992). Half spheres (plexiglass, volume 250 ml) were used instead of entire cups, the flat surface which holds the syringe being placed along the main line. The principle of operation was the same: the line fastened to a free floating pole remaining at the surface, was delivered from a weighted bucket which, during sinking, liberated the cups. Then, each incubation cell after the other was closed and at the same time the 14C bicarbonate was injected by the tightening of the line. All the elements of the device were made from non-toxic material; in particular the LET GO contained no rubber or metallic parts which have been shown to induce toxicity problems Incubation cells were made from transparent or black Plexiglas; the main line (100 m) ties and syringes (3.75 ml) were of polyamide.

A stock solution was prepared from 500 µl 14C sodium bicarbonate (activity 18.5 MBq or 500 µCi) diluted to 20 ml with a basic solution (0.1 g NaOH in 1000 ml Milli-Q water). At this pH (# 11), carbon was present only as carbonates ($CO_3$--) and bicarbonates ($HCO_3^-$). The bicarbonate stock solution was prepared the day preceding use, to avoid the development of precipitates. Solution activity was checked at the moment of preparation, by injecting 1 ml of solution in 250 ml filtered sea water and treating in the same way as samples (see below) prior to counting. One ml of this working solution (activity: 0.925 MBq or 25 µCi) was injected to each incubation cell, during the operations at sea.

The system was deployed with 10 transparent incubation cells (TC) and 5 black cells (BC) at the predetermined following depth:

- TC at 5, 10, 15, 20, 30, 40, 50, 60, 75 and 90 m
- BC at 10, 20, 40, 60 and 90 m

The incubation time was 4 hours around midday (from 11h to 15h winter local time). Then, the pole was recovered and the line was hauled onboard manually. The line and the incubation cells were placed in a specially designed frame to avoid tangling. The contents of incubation cells were immediately poured into 250 ml clean dark bottles using a stainless-steel funnel.

Some 12 h (dawn to dusk) incubations were also performed.

At the recovery, an aliquot (50 µl) of each sample was transferred into a glass vial (containing

50 µl of ethanolamine) for liquid scintillation measurements in order to determine the total 14C activity present in the incubation cells. Ethanolamine, as inorganic carbon trapping agent, was added first to obtain a complete and quick mixing. Milli-Q water (500 µl) and Aquasol-II (10 ml) (scintillation cocktail) were subsequently added to the vials.

No measurements of $^{14}C$ dissolved organic production (DOC) were realized in our routine protocol. The samples were filtered on Whatman GF/F glass fibre filters. Filters were rinsed with filtered deep sea water (20 ml) to remove most of the remaining dissolved inorganic 14C. Filters were then transferred into 20 ml glass vials and dried in the oven at 40°C overnight. Filters were then added with 1ml of 0.5 N HCl to remove the remaining inorganic 14C, and placed open on an orbital shaker for 4 hours in a fume hood. Aquasol-II (10 ml) was subsequently added to the vials. Before counting, all the vials were shaken on a vortex. A blank was included for each series of treatments. This blank was obtained by injecting 1 ml of 14C stock solution to a dark bottle containing 250 ml of filtered deep sea water, just before filtering. The treatment was the same as for samples. Only is some cases, when the sea was too rough, samples were kept in freezers and processed immediately at the return of the research vessel in the laboratory, no more than 4 hours after recovery. Radioactivity was counted on a PACKARD Tri-Carb 4000 Series liquid scintillation counter.

The value for the 90 m dark incubation cell was generally comparable to blank and subtracted from the transparent cells data for the whole water column.

Primary production is expressed as the carbon assimilation rates in the light-incubated samples and is not corrected for respiration, grazing losses or dark uptake.

Dandonneau, Y., Le Bouteiller, A., 1992. A simple and rapid device for measuring planktonic primary production by *in situ* sampling, and $^{14}C$ injection and incubation. Deep Sea Research 39, 795-803.

Marty J.C., Chiavérini J., 2002. Seasonal and interannual variations in phytoplankton production at DYFAMED time-series station, north-western Mediterranean sea. Deep Sea Res. II 49/11, 2017-2030.

## FIGURES