

**Method / Parameters:**  $^{14}\text{C}$  primary production

**Research Vessel :**

- Pourquoi Pas?

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**Brief description of protocol used during APERO :**

Primary production has been quantified according to the experimental protocol described in Moutin & Raimbault (2002). Samples were obtained with 12-l Niskin bottles with silicone rubber closures and tubing that had been carefully checked to avoid introducing toxic metals during sampling. Up to 9 depths of sampling were chosen according to the incident light profiles measured day n°1 on each station. Each sample (320-ml polycarbonate bottle, 3 light and one dark sample per depth) was collected before sunrise, inoculated with 250  $\mu\text{l}$  of the  $^{14}\text{C}$  working solution<sup>a</sup> just before sunrise, and then incubated in deck incubators equipped with adapted screens. After 24h, the samples were filtered on GF/F filters to measure net absorption ( $A_N$   $\text{mgC m}^{-3}$ ). Filters were immediately covered with 500  $\mu\text{l}$  of HCl 0.5 M and store for counting at the laboratory. Each day, 3 samples were filtered immediately after inoculation for to determination, and 250  $\mu\text{l}$  of sample were taken at random from 3 bottles and stored with 250  $\mu\text{l}$  of ethanolamine (Sigma-Aldrich 407267) to determine the quantity of added tracer ( $Q_i$ ). At laboratory, samples were dried during 12 h at 60°C, 10 ml of ULTIMAGOLD-MV (Packard) were added to the filters and dpm were counted after 24h with a Hidex 300 L liquid scintillation analyser.

**Calibration:**

The scintillation counter was calibrated with  $^{14}\text{C}$  standards to convert cpm in dpm

**Uncertainties and quality control concerns:**

Triplicates were done at each depth for light samples

Subsamples are regularly done to verify the concentration of  $^{14}\text{C}$ - bicarbonate working solution.

**Data products originating with this method:**

Net absorption  $A_N$  for dark and light bottles was calculated from :

$A_N$  ( $\text{mgC m}^{-3}$ ) =  $(\text{dpm} - \text{dpm}_{(t_0)}) / (\text{dpm}_{(Q_i)} * 1280) * \text{DIC}^b$  where DIC is the dissolved inorganic carbon concentration

Primary production rates PP (24h from dawn-to-dawn) were obtained from  $\text{PP} (\text{mgC m}^{-3} \text{ j}^{-1}) = A_{N_{\text{light}}} - A_{N_{\text{black}}}$

Integrated primary production IPP ( $\text{mg m}^{-2} \text{ d}^{-1}$ ) was calculated with trapezium method assuming (1) that subsurface (about 5 m) rates are identical to surface rates (not measured) and (2) that rates are zero at 20 m below the deepest sampled depth.

The integrated gross primary production rates IGPP ( $\text{mg m}^{-2} \text{ d}^{-1}$ ) was calculated from light samples  $A_N$  ( $\text{mgC m}^{-3} \text{ j}^{-1}$ ) according to Moutin et al. (1999)

<sup>a</sup> Working solution :  $\text{NaH}^{14}\text{CO}_3$  (5 mCi, 50-60 mCi/mmol, Perkin Elmer (NEC086H005MC) diluted in a  $\text{Na}_2\text{CO}_3$  (Aldrich 20,442-0) solution stored in sealed 15 ml glass flasks.

b DIC = 25 000 mgC m<sup>-3</sup> will be use in absence of DIC measurements or a satisfactory salinity/DIC relationship.

**Key method references:**

Moutin, T., and P. Raimbault. 2002. Primary production, carbon export and nutrients availability in western and eastern Mediterranean Sea in early summer 1996. MATER Special Issue. Ournal. of Mar. Syst. 33-34, 273-288.

Moutin, T., P. Raimbault & J.C. Poggiale. 1999. Production primaire dans les eaux de surface de la Méditerranée occidentale : Calcul de la production journalière. . C. R. Acad. Sci. Paris, Sciences de la vie. 322 : 651-659.