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FLUPAC, a contribution to equatorial Pacific JGOFS (Abstract)

Aubert LE BOUTEILLER*

Oceanographers at the ORSTOM Centre de Nouméa, New Caledonia, are organizing a study in the western eqatorial Pacific as part of JGOFS. The FLUPAC programme (Flux in western equatorial Pacific) aims at assessing the amount of carbon of photosynthetic origin being exported from the photic layer down to the deeper layers. The effort, therefore, will concentrate on the upper layer of the open ocean, neglecting other aspects of JGOFS programmes such as sedimentation of particles on the ocean floor.

Process studies

The FLUPAC programme focuses on the region west of the international dateline, an area where the major scale of variability is the interannual one related to El Niño-Southern Oscillation (ENSO) events. We have asked for shiptime aboard R/V Atalante for the beginning of 1994. The FLUPAC cruise will consist of two eight-day stations along the equator between 155° E and 180° E. One other cruise abroad R/V Atalante is planned for the end of 1993, which is the OLIPAC cuise asked by our colleagues of JGOFS-France.

A combination of different methods will be used to estimate the flux of exported carbon during specific cruises planned for 1993. The downward carbon flux leaving the photic zone may be shared into (1)the sinking of small particles, as sampled by sediment traps; (2)the loss of carbon, ingested by zooplankton during its vertical migrations; (3)the release of dissolved carbon from sinking particles as assessed from the comparison of particulate and dissolved C/N/O/P ratios.

New primary production, which is another estimate of the downward flux, will be determined from NO_3-N and N_2 uptake measurements. ^{14}C uptake, oxygen production, daytime increase in particulate carbon and nitrogen, chlorophyll and number of phytoplankton cells, will be measured to provide various assessments of total primary productivity, a key-parameter for JGOFS. Phytoplankton biomass will be obtained from chlorophyll analyses, transmissometry, particulate carbon and nitrogen and cell counts by microscopy and flow cytometry.

Finally, new production will be assessed also from nitrate inputs to the photic zone through vertical advection and mixing, two processes taking place in the equatorial area. Specific cruises are planned for that purpose and should consists of ADCP, CTD hydrocasts and rosette samplings for nutrients and pigments during TOGA-COARE intensive observation period (Nov.1992 - Feb. 1993): inputs and outputs of nitrate will be quantified for a "box", several degrees wide.

Monitoring studies

Temperature, salinity, current, wind, nutrients, chlorophyll and zooplankton biomass have been measured since 1985 by bi-annual SURTROPAC cruises along 165° E from 20° S to 10° N and will continue until 1995. Besides XBT's, surface salinity and CO_2 are measured from ships of opportunity. Ocean

*ORSTOM, B. P. A5, Nouméa, New Caledonia

colour sensors, such as CZCS in the past (for the 1978-1984 period), should allow the monitoring of the western extension of the phytoplanktonic equatorial enrichment area, to be made. A processing is presently being done at ORSTOM/Nouméa on CZCS imagery to test the feasibility of remote sensing in the western equatorial Pacific. One main goal is to calculate total and new production from satellite data, especially from the future Sea Wifs imagery.