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MEAN CHLOROPHYLL CONCENTRATIONS AT THE
SURFACE OF THE TROPICAL PACIFIC (1978-1981)

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Our knowledge of the primary productivity (or related properties) in the Tropical Pacific Ocean has been mostly provided by coastal periodic surveys or oceanographic cruises. The sea areas close to the laboratories have thus been intensively described on time series basis ; but these series are not intercalibrated, due to the difficulty of standardization in biological oceanography ; furthermore, the laboratories in the tropical Pacific are rare. Non-standardization also prevails offshore, where the results of the cruises are only representative of one area during one short period. However, such results have been processed by Koblents-Mishke et al. (1970) whose chart of the phytoplankton production in the world has been published in the FAO Atlas of the living resources of the seas.

An experiment has been started in 1978 to get more data randomly distributed in time and space across the tropical Pacific, as a part of the SURTROPAC programm of the Centre ORSTOM de Nouméa. Filtrations of 20cm³ of surface sea water are made, by the crews of 15 merchant ships calling regularly at Noumea, the filters are stored, and the chlorophyll concentration is measured in the laboratory according to the method of Dandonneau (1982). More than 16000 data have been collected since January 1978. The mean values per 2° in latitude and 5° in longitude are presented here, together with the number of data in each rectangle.

Large trends appear which will probably be confirmed by future data :

- The equatorial belt exhibits high chlorophyll concentrations, mainly in the eastern part, in accordance with Koblents-Mishke et al. (1970), but also in the western part.

- The coasts of Australia, Papua-New Guinea, and the islands area including the Solomon Islands, Vanuatu, and New Caledonia, also indicate high chlorophyll concentrations.

- South of 24°S in the western part, high concentrations appear, which are probably related to the winter enrichment in this area (Dandonneau and Gohin, in preparation).

- The Northern Tropical Pacific far around Hawaii, and between Japan and the equator, the Coral sea, and the large zone between Tonga and Tuamotu islands appear to be very poor areas.

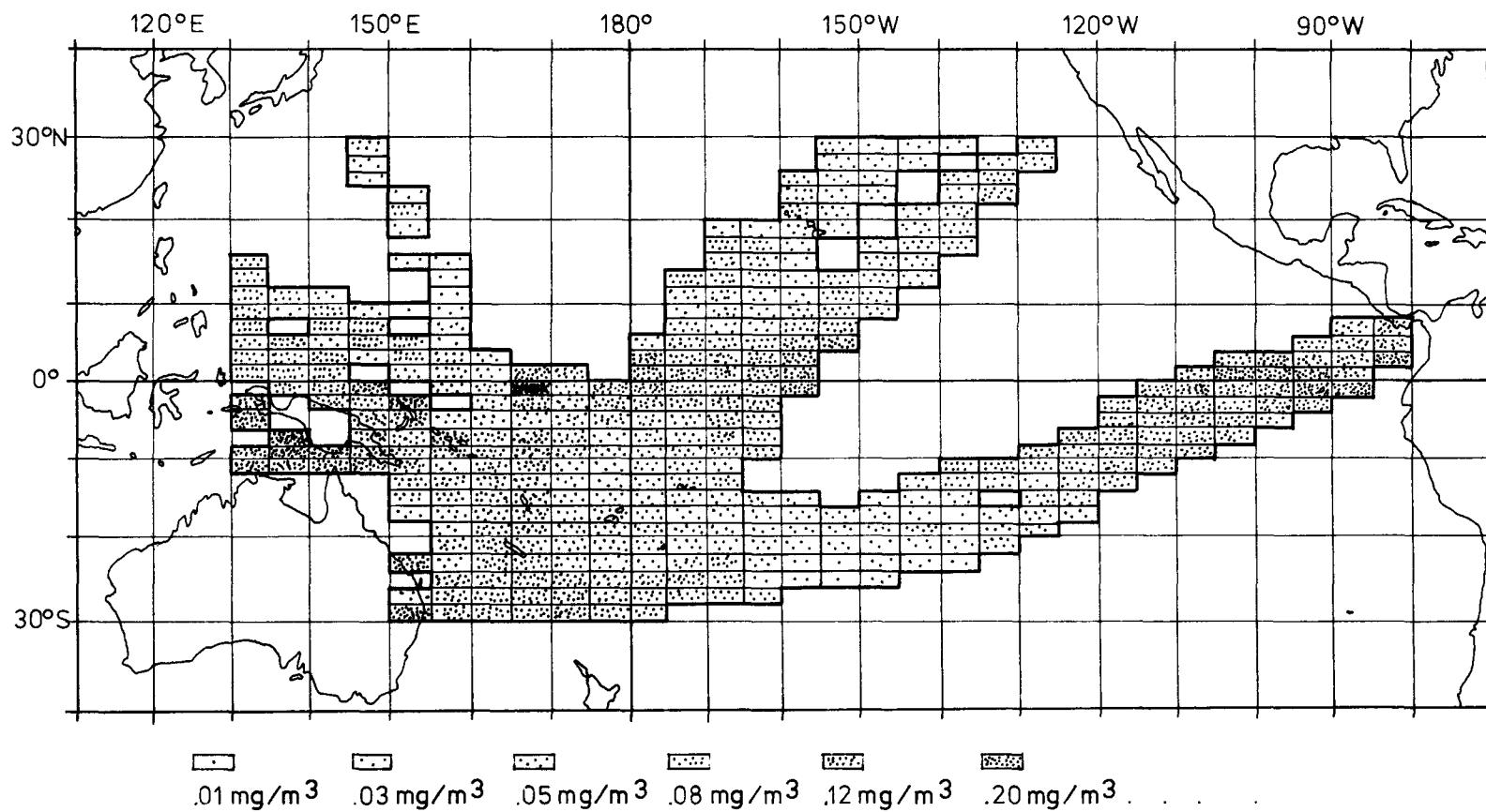
Some areas have been intensively sampled due to the sea traffic, such as New Caledonia and Fiji areas. Wide parts of the Pacific remain non-sampled. In some other areas, only a few data are available, so that the mean chlorophyll concentration indicated may change with further data. For instance, the very high concentration indicated by 167°E, 01°S corresponds to an isolated observation.

The chlorophyll concentrations used here are representative of surface conditions, while the phytoplankton is distributed in the whole euphotic layer, and generally exhibits a maximum around 50 to 100 m, associated to the thermocline. However, the correlation between the chlorophyll concentration at the sea surface, and the chlorophyll content in the euphotic layer is generally high. It is high too with the primary production per square meter. The relations between the chlorophyll concentration at the sea surface, and other aspects of the primary production in the euphotic layer have to be studied in each area and according to the seasons, as they may present various features.

It must be underlined that the years 1978 to 1981 are not fully representative of the normal conditions in the Pacific : it seems that the equatorial upwelling has not been as well developed during this period as it is usually. Thus we can predict that further data will increase the mean values in the equatorial and eastern Pacific.

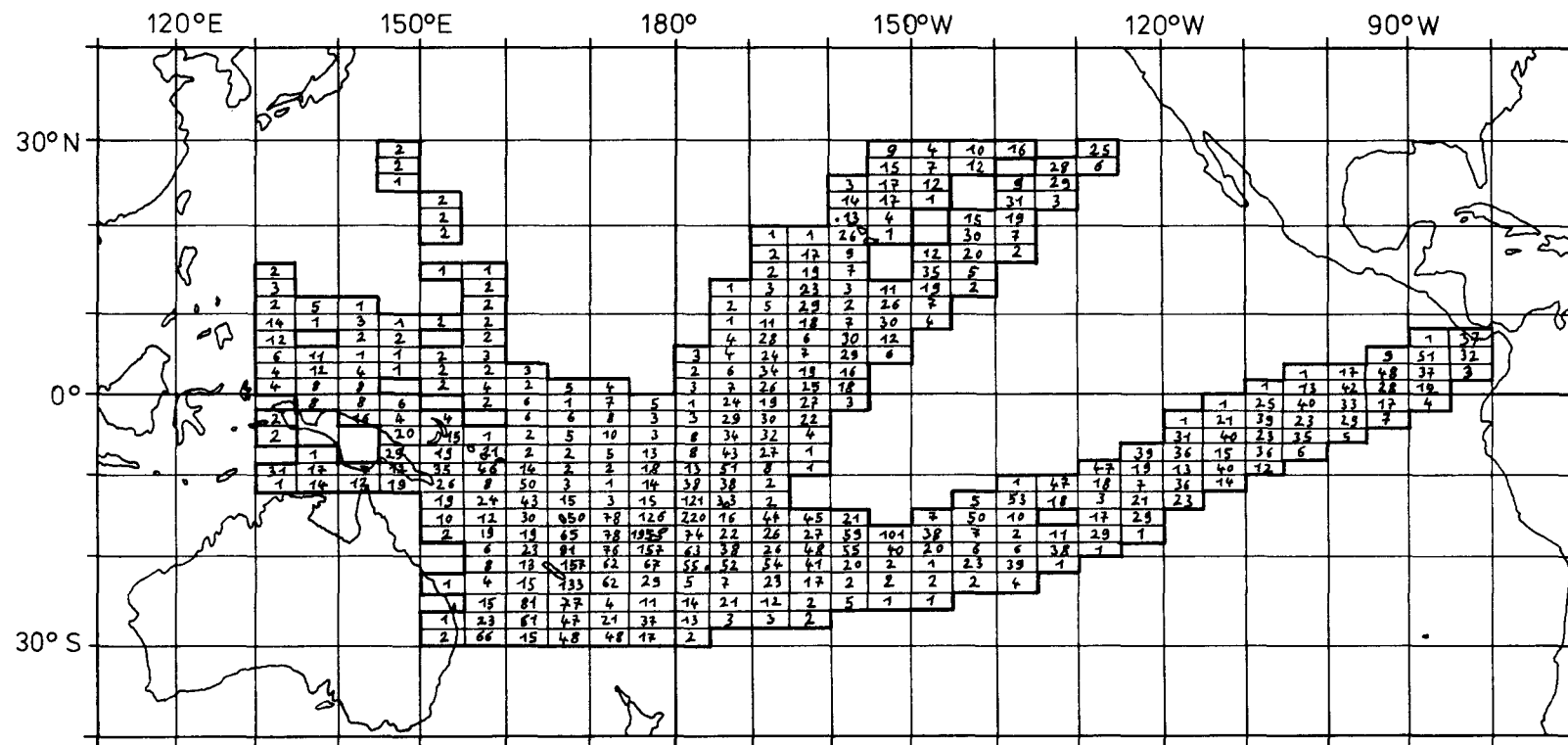
REFERENCES

- DANDONNEAU, Y., 1982 - A method for the rapid determination of chlorophyll plus phaeopigments in samples collected by merchant ships. Deep-Sea Research, 29, 5 : 647-654.
- DANDONNEAU, Y., GOHIN, F., in preparation : An objective analysis of the latitude and time variations of the sea surface chlorophyll concentration around New Caledonia.
- KOBLENTS-MISHKE, O.I., VOLKOVINSKY, V.V., KABANOVA, Yu.G., 1970 - Plankton primary production of the world ocean. SCOR. symp. Sci. Explor. South Pacific, W.S. Wooster Ed., Washington DC., 183-193.
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Concentrations moyennes en chlorophylle a la surface de l'océan (données du programme SURTROPAC , de 1978 a 1981)

Mean chlorophyll concentration at the sea surface (SURTROPAC data ,1978 to 1981)



Donnees de chlorophylle du programme SURTROPAC : nombre d observations de 1978 a 1981

Chlorophyll data from SURTROPAC : number of observations (1978 to 1981)