

# Particulate organic matter in sixteen Tuamotu atoll lagoons (French Polynesia)

Loïc Charpy<sup>1,\*</sup>, Philippe Dufour<sup>1</sup>, Nicole Garcia<sup>2</sup>

<sup>1</sup>ORSTOM, Centre d'Océanologie de Marseille, Rue de la Batterie des Lions, F-13007 Marseille, France

<sup>2</sup>LOB OSU, Luminy, 163 Av. de Luminy, F-13288 Marseille Cedex 09, France

**ABSTRACT:** The standing stock and chemical composition of suspended particles were monitored in 16 Tuamotu atoll lagoons and surrounding oceanic water between 1983 and 1996. Temporal and spatial variability was estimated from 18 surveys performed in Takapoto. Atoll lagoon particulate organic matter (POM) concentrations were compared using data taken during the same months (March and November) and at the same time (morning). It appears that the lagoonal particulate organic carbon concentration depends on the latitude of each lagoon. We interpret this result as an influence of the waters deriving from the Peruvian and equatorial upwellings. Phytoplankton biomass (chlorophyll) concentration was inversely related to the water exchange between lagoon and ocean. Therefore, the best atolls for pearl oyster farming seem to be those located north of the Tuamotu Archipelago and with small exchange with the ocean. POM concentration was 2 to 5 times higher in the atoll lagoons than in the surrounding oceanic water, with a higher C:N ratio and a lower N:P ratio. The small size of organic particles (70% < 3 µm) and the low contribution of phytoplankton to particulate organic carbon (POC) (5 to 19%) in the lagoons must be taken into account when calculating the potential of pearl oysters, which cannot exceed the nutritional potential of Tuamotu atoll lagoons.

**KEY WORDS:** Particulate matter · Atoll · Geomorphology · Pacific · Carbon · Nitrogen · Phosphorus · Pigments