

## **The biological carbon pump in the western tropical South Pacific from a 1D physical-biogeochemical coupled model (OUTPACE cruise)**

AUDREY GIMENEZ<sup>1</sup>, MÉLIKA BAKLOUTI<sup>1</sup>, THIERRY MOUTIN<sup>1</sup>

<sup>1</sup> Aix Marseille Université, CNRS, Université de Toulon, IRD, OSU Pythéas, Mediterranean Institute of Oceanography (MIO), UM 110, 13288, Marseille, France

The biological carbon pump refers to the transfer of carbon from the upper ocean to the ocean interior by biological processes, which are mainly regulated by the nutrients availability in the upper ocean. The OUTPACE cruise aimed to study the biological production in the photic zone towards a zonal gradient of nutrients availability in the Western tropical South Pacific (WTSP) and its subsequent fate throughout the water column. During the cruise, a lagrangian strategy was used in order to follow and sample the same water mass during 7 days at 3 contrasting locations during the strongest stratified period. The OUTPACE project also includes a modelling component. Modelling can indeed help in a better understanding of the processes involved in the biological pump by enhancing and complementing the observed results obtained from the different experimental approaches. We used a one-dimensional vertical coupled physical-biogeochemical mechanistic model implemented in the Eco3M tool [1] to draw upper surface budgets on short time scales (i.e. during the stratified period) as well as annual budgets in this area considered as the hot spot of N<sub>2</sub> fixation in the world [1]. The biogeochemical model is a flexible-stoichiometry model. It represents a complex planktonic trophic web including bacteria, phyto- and zoo- plankton as well as two types of nitrogen-fixing organisms: the unicellular type UCYN-C and the metazoan type *Trichodesmium* sp. This model will also allow to study the main pathways of the nitrogen fluxes, showing a more rapid transfer of fixed nitrogen throughout the trophic web than previously thought.

[1] Baklouti et al. (2006), *Progress in Oceanography*, 71, 34-58. [2] Bonnet et al. (2017), *PNAS*, doi: 10.1073/pnas.1619514114