

## Publication MIO : Luciane Rafaele Favareto, Natália Rudorff, Milton Kampel, Robert Frouin, Rüdiger Röttgers , David Doxaran, Hiroshi Murakami and Cécile Dupouy (MIO) - Bio-Optical Characterization and Ocean Colour Inversion in the Eastern Lagoon of New Caledonia, South Tropical Pacific

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Beau doublé pour les 3 campagnes Alis CALIOPE que Cécile Dupouy (MIO) avait organisé entre 2011 et 2016 dans le cadre du projet EC2CO TREMOLO sur la Côte Est de la Nouvelle-Calédonie,

Ces deux articles ont été élaborés par des étudiantes, Luciane Favareto qui avait participé à la campagne CALIOPE 02 et Chloé Martias qui avait participé à CALIOPE 03.

L'article dans *Remote Sensing* concrétise la collaboration très solide initiée par Cécile Dupouy avec l'INPE (Institut National de la Recherche Spatiale du Brésil) et la JAXA japonaise qu'elle souhaite encore faire fructifier dans le très proche futur.



### Abstract

The Eastern Lagoon of New Caledonia (ELNC) is a semi-enclosed system surrounded by an extensive coral reef barrier. The system has been suffering impacts from climate variability and anthropogenic activities, including mining exploitation. Satellite monitoring is thus an essential tool to detect such changes. The present study aimed to assess the bio-optical variability of the ELNC and examine the applicability of ocean colour algorithms, using in situ bio-optical and radiometric data, collected during the March 2014 CALIOPE 2 cruise. The chlorophyll a concentration (Chla) varied from 0.13–0.72 mg·m<sup>-3</sup>, and the coastal stations were spectrally dominated by non-algal particles (NAP) and coloured dissolved organic matter (CDOM) (>80% of the total non-water absorption at 443 nm), due to the contribution of allochthonous sources. The phytoplankton specific absorption was generally lower (mean, 0.049 m<sup>2</sup>·mg Chla<sup>-1</sup>) than typical values observed for the corresponding Chla range, as well as the spectral slopes of the absorption of CDOM plus NAP (adg) (mean, 0.016 nm<sup>-1</sup>) and of the particle backscattering coefficient (bbp) (mean, 0.07 nm<sup>-1</sup>). The remote sensing reflectance obtained using two in-water approaches and modelled from Inherent Optical Properties (IOPs) showed less than 20% relative percent differences (RPD). Chla estimates were highly biased for the empirical (OC4 and OC3) and semi-analytical (GSM, QAA, GIOP, LMI) algorithms, especially at the coastal stations. Excluding these stations, the GSM01 yielded the best retrievals with 35–40% RPD. adg(443) was well retrieved by all algorithms with 18% RPD, and bbp(443) with 40% RPD. Turbidity algorithms also performed reasonably well (30% RPD), showing the capacity and usefulness of the derived products to monitor the water quality of the ELNC, provided accurate atmospheric correction of the satellite data. Regionally tuned algorithms may potentially improve the Chla retrievals, but better parameterization schemes that consider the spatiotemporal variability of the specific IOPs are still needed.

Keywords : marine remote sensing reflectance ; bio-optical properties ; ocean colour algorithms ; eastern lagoon of New Caledonia ; Southwest Tropical Pacific Ocean

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