



Development of a new low-cost multispectral radiometer for land and marine applications

Alice Madonia¹, Swati Suman², Viviana Piermattei¹, Marco Marcelli³, and Riccardo Valentini²

¹Centro Euro-Mediterraneo sui Cambiamenti Climatici, Global Coastal Ocean Division, GOCO, Lecce Italy

(alice.madonia@cmcc.it)

²University of Tuscia, Department for Innovation in Biological, Agro-food and Forest systems (DIBAF), Viterbo, Italy

³University of Tuscia, Laboratory of Experimental Oceanology Marine Ecology, Department of Ecological and Biological Sciences (DEB), Civitavecchia, Italy

To face the need of mitigation and adaptation measures in order to reduce climate change impacts and improve the robustness of climate projections it is necessary to implement long-term and low-cost observing systems.

One of the main problem is the acquisition of in situ optical data, fundamental to understand the functioning of natural ecosystems since light is the primary source of energy for both terrestrial and marine life. In fact, light directly affects the photosynthetic processes and its availability represents a key factor for primary production.

In this context, there is a lack of spectro-radiometric and PAR measures in the marine environment to retrieve key bio-optical variables for the validation of remote sensing observations, providing useful information on the effects of anthropogenic activities and climate change.

Commercial high-performance spectrometers are characterized by high costs thus limiting the acquisition of a great amount of data for remote sensing and numerical models validation. In the last decades, a big effort was dedicated to the development of miniaturized and autonomous systems to reduce the costs of both land and marine observations while maintaining adequate performance and significant data quality.

In this work we present the development of a new low-cost multichannel spectrometer designed and developed as a fast, accurate and effective device for spectral response monitoring.

To optimise the selection of the optical components and to assess the performance of the developed system, a series of experimental tests were performed both in laboratory and in field. This work shows the results of the developed technology and its applications.