Breakout Workshop:

In water radiometry on autonomous profiling floats in support of satellite ocean colour validation activities

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Scope and Goals

The ocean remains a challenging environment to access using traditional sampling methods, leading to global under-sampling of both physical and biogeochemical parameters. The development of autonomous profiling floats has had a huge impact on the capability of monitoring the open ocean at global scale. As an example, the Argo program, launched in the 2000' enhanced the observational capacity of ocean temperature and salinity at depth greater than 1000 m by at least a factor of 5 in any of the 161 area of the ocean as divided in 1° squares (Roemmich et al., 2022).

In the 2010' profiling floats started to be equipped with multispectral radiometric sensors (Ed, Lu) and used for validation of satellite remote sensing reflectance for the first time (Gerbi et al. 2016, Leymarie et al. 2017). However, these versions of floats did not evolve into operational programmes.

More recently, new profiling floats were developed with improved radiometric capabilities. The HyperNav float was specifically designed for system vicarious calibration of the NASA/PACE satellite mission (Barnard et al. 2024), whereas off-the-shelf hyperspectral radiometers were successfully integrated on new generation Argo floats (Organelli et al. 2021) with the objective to operationally integrate the BGC-Argo mission within the Argo (and the next OneArgo) programme (Thierry et al, submitted). The BGC-Argo mission targets a fleet size of 1000 floats to monitor BioGeoChemical ocean properties, including chlorophyll-a and backscattering coefficient. This global sampling effort provides an unprecedented opportunity to collect data relevant for both current multispectral sensors and the new era of hyperspectral missions (e.g., PACE/OCI, SBG, CHIME). With ongoing efforts to standardize floats data processing and to quantify measurement uncertainty, these datasets hold significant potential for ocean colour satellite validation.

Objectives: present state-of-the-art radiometry on board profiling floats, discuss the contribution of hyperspectral BGC-Argo data to satellite data validation.

Key Questions

1. Are current radiometry float protocols a good trade-off between the operational BGC-Argo mission constraints and best practices for satellite ocean colour validation? Which improvements are mandatory / recommended / accessory towards integration into the IOCCG protocol series?

2. What are the recommendations of the Ocean Colour community to the BGC-Argo mission for an effective implementation plan towards a potential use of the BGC-Argo fleet as an open ocean network for satellite ocean colour validation?

3. How can hyperspectral BGC-Argo data be effectively integrated into the validation workflows for current and upcoming satellite missions (e.g., Sentinel-3, VIIRS, PACE, SBG, CHIME), particularly during commissioning phases?