Thursday, October 11
Poster Session 4
10:30–12:00

Poster 259
UNIFYING THE EUPHOTIC ZONE DEPTH DETERMINED BY OPTICS AND BIOLOGY

Traditionally the euphotic zone (ZeuPAR) is defined as a layer where the bottom of this layer has 1% of the photosynthetically active radiation (PAR) at the ocean surface. While the euphotic zone (ZeuNPP) in biology term is defined as a layer where there is no net production at the bottom of this layer, also termed as the compensation depth (Zc). Clearly ZeuPAR is very different from ZeuNPP, and there has been debate for decades which one should be used to represent the "euphotic zone". In this study, based on field-measured profiles (14 stations) of primary production in South China Sea, ZeuNPP is first calculated. Further, the compensation irradiance (Ic) corresponding to ZeuNPP is determined from matching profiles of hyperspectral downwelling irradiance. We then evaluated the ratio of Ic to surface PAR and to surface USR (usable solar radiation), respectively, where the latter is the spectrally integrated solar irradiance in the 400-560 nm domain (Lee et al. 2014). It is found that the ratio Ic/PAR(0) is generally ~0.41% (± 0.32%), while the ratio Ic/USR(0) is generally ~0.97% (± 0.12%), which indicates ZeuPAR could be too shallow to represent "euphotic zone". On the other hand, if we use the depth of 1% surface USR (ZeuUSR), it appears ZeuUSR closely matches ZeuNPP. Furthermore, all subsurface chlorophyll maximum are found above ZeuUSR, but can be much deeper than ZeuPAR. These results suggest that ZeuUSR could be a good candidate to unify the determination of the "euphotic zone", at least for such subtropical waters.

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