We thank Reviewer #1 for the useful comments. The point by point response is provided below in blue font and the proposed text modifications in red.

Anonymous Referee #1

The work entitled “Assessment of the spectral downward irradiance at the surface of the Mediterranean Sea using the OASIM ocean-atmosphere radiative model” by Lazzari et al., 2020 assessed the surface spectral downward irradiance over the Mediterranean Sea using OASIM ocean-atmosphere radiative model with high temporal resolution BOUSSOLE buoy data and BGC-Argo data. The article presented the spatiotemporal analysis of the downward planar irradiance at the ocean-atmosphere interface. This work emphasizes the need of a good quality controlled in situ data such as from BOUSSOLE buoy and growing network of BGC-Argo floats data in model evaluations. Availability of such data is highly relevant in addressing both the climatological as well as day-to-day impacts of light variability on ocean biology. This work will be a very good contribution towards utilizing and the significance of high resolution data (both spatial and temporal), towards data assimilation into biogeochemical models. In my view this work definitely paves a way in considering the aspects of spatial and temporal variability considering the model resolutions and how they can be improved in future. Specifically, towards the role of light input to the models. The methodology and the representation of the data were substantially given in explaining the scientific concepts. The proposed scientific approach and the methods applied are very well represented by the authors. The explanation of the results, discussion and conclusions are not exhaustive and very appropriately given in a more concise manner in relation to the model design in accordance with both the in situ data sets. All the explanations of results and discussion were well referenced emphasizing the role of different parameters in towards the model errors and biases. The quality of the figures, and their explanations were very much appropriate, clear and concise. I think the manuscript would be considered for publication after making the following small corrections.

Thanks for the encouraging comments.

Specific comment:

Comment 1: I suggest the addition of a table explaining the abbreviations used in the article (different models, model parameters etc.,). Even though having explained them in the text looks fine, but still having a Table is highly appreciated.

We agree with the reviewer, we propose to add a table in the Appendix with the definitions of the abbreviations, an example is shown below.

Abbreviation	**Long name**
OASIM	Ocean–Atmosphere Spectral Irradiance Model
BOUSSOLE	BOUée pour l’acquiSition d’une Série Optique à Long termE
BGC-Argo float	Biogeochemical Argo float
OCR-VC	Ocean Colour Radiometry Virtual Constellation
MedBFM	Mediterranean Sea biogeochemical operational model system within CMEMS
CMEMS	Copernicus Marine Environment Monitoring Service
ECMWF	European Centre for Medium-Range Weather Forecasts
ERA-Interim	ECMWF reanalysis
…	

Minor corrections:

1. P1Line 21: Table 1 shows that except for 670 nm for BOUSSOLE buoy, and DPAR values 0.79 for buoy and 0.71 for BGC-Argo, the correlation values (R) are higher than 0.8 and with removing the day-to-day they are higher than 0.9. This should be mentioned in the abstract.
   Thanks for the comment we propose to add this text in the Abstract.
   The correlations (R) between the data and model are always higher than 0.6. With the exception of DPAR and the 670 nm channel, correlation values are always higher than 0.8 and, when removing the inter-daily variability, they are higher than 0.9.

2. Please correct the correlation r as R.

Thanks, we will correct.

3. P5Line 141: correct QC-ed as QC-Ed (comment, no need to response)

4. Figure 4. shows that the wind speeds are very much underestimated compared to ECMWF. It can be seen that the wind speeds go as high as 20 m/s, and a high variability is observed. Considering OSAIM model at the ocean atmosphere interface, what possible impact does this have on model simulations? I just wanted to know.

Sensitivity test to meteorological inputs were performed by Gregg and Carder (1990), showing that pressure and mean wind speed produced differences in surface spectral irradiance less than 1% in terms of RMS model error over the 350-700 nm range, much less than air-mass type, visibility and total ozone. More specifically, their Fig. 5 shows that the ratio Ed(0-)/Ed(0+) mainly remains larger than 0.90 for wind speed ranging 0-15 m/s and two visibility values (5 and 25 km). The ratio decreases to 0.85 only for visibility equal to 25 km, absence of wind and solar zenith angle around 80 degree.

Furthermore, according to Gregg and Carder (1990), direct and diffuse sea surface reflectance can be decomposed in specular and sea foam-dependent reflectance. Foam reflectance is affected by sea-surface roughness, which in turn has previously been related to wind stress and, secondarily, to wind speed (Koepke, 1984). We will add this information in the methods Section.

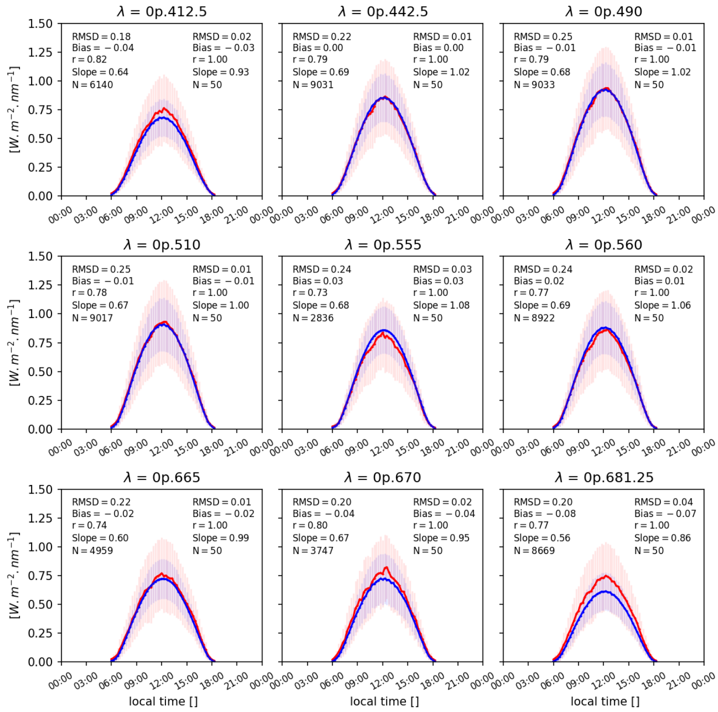

Figure R1. Multispectral downward planar irradiance **Ed(λ,0+)** simulated by OASIM (blue lines) and measured at BOUSSOLE (red lines). The wavelengths considered are those measured by the BOUSSOLE sensors for the average March data derived from the time series. For each panel, the reported statistics (RMSD, Bias, r, and regression slope) are related both to the high-frequency signal (with a temporal resolution of 15'; top left) and to the average day in the considered month (top right). The vertical bars indicate the variance in the monthly averaged values of the average day.

In order to estimate the impact of surface pressure and wind in the model-observation comparison, we show in Fig. R1 the multispectral downward planar irradiance (**Ed(λ,0+)**) simulated by OASIM (blue lines) and measured at BOUSSOLE (red lines)

for the month of March. Comparing Fig. R1 with Fig. 6 proposed in the submitted version for **Ed(λ,0-)**, we show that differences, related to the atmospheric parameters have in general a low impact on the results, otherwise we would observe a much higher deterioration in model performance when computing **Ed(λ,0-)** from **Ed(λ,0+)**.
In order to provide a general overview of the impact of the parameters indicated by the Reviewer, we extracted Ed(**λ,0+**) from model and from BOUSSOLE and reported the skill in Tab. R1 in analogy to Tab. 1 proposed in the manuscript. The differences in the skill (e.g. percentual RMSD and BIAS) between computation of **Ed(λ,0-)** from **Ed(λ,0+)** indicates that the model is in general slightly better in computing **Ed(λ,0+)** than **Ed(λ,0-)** but the differences are, in any case of second order, so is the impact of surface pressure and wind. RMSD is only marginally affected with <1% differences. The BIAS for **Ed(λ,0+)** shows <5% differences.

Table R1. Summary of the model skill compared to the available data from the BOUSSOLE buoy (from 2004 to 2012) and BGC-Argo floats (from 2012 to 2017) for the irradiance (**Ed(λ,0+)**) at the different wavelengths (WL) and for DPAR. RMSD, bias, and Y-int are expressed in W m-2 nm-1, while all the other indicators (regression R and slope) are dimensionless, where N is the number of match-ups between the model and observations. For the BOUSSOLE comparison, the green numbers are derived by filtering out the day-to-day variability (i.e., the intra-monthly variability). Given the large number of samples, all statistics are significant (p-value < 0.05). For the RMSD and BIAS, the percentage values normalized by average data are reported in parentheses.

BOUSSOLE vs OASIM-ECMWF [2004-2012]						
WL	**RMSD**	**BIAS**	**R**	**SLOPE**	**Y-int**	**N**
412.5	0.15 (34.1%)	-0.04 (-9.5%)	0.83	0.66	0.08	55239
	0.04 (10.0%)	-0.04 (-9.6%)	0.99	0.88	0.00	
442.5	0.18 (33.6%)	0.00 (0.6%)	0.84	0.77	0.09	111010
	0.04 (7.2%)	0.00 (0.5%)	0.99	1.00	-0.01	
490	0.20 (34.4%)	0.00 (-0.1%)	0.84	0.76	0.10	112186
	0.04 (7.4%)	0.00 (-0.2%)	0.99	1.00	-0.02	
510	0.20 (34.6%)	-0.01 (-2.0%)	0.83	0.74	0.10	112071
	0.04 (7.2%)	-0.01 (-2.1%)	0.99	0.98	-0.02	
555	0.20 (33.4%)	0.03 (5.1%)	0.85	0.83	0.10	55309
	0.05 (8.6%)	0.03 (5.0%)	0.99	1.05	-0.03	
560	0.20 (35.5%)	0.01 (2.3%)	0.83	0.76	0.11	106660
	0.04 (7.9%)	0.01 (2.3%)	0.99	1.02	-0.02	
665	0.18 (34.1%)	-0.02 (-3.0%)	0.84	0.75	0.09	76247
	0.04 (7.1%)	-0.02 (-3.1%)	0.99	0.99	-0.03	
670	0.17 (39.6%)	-0.04 (-9.3%)	0.79	0.63	0.08	32733
	0.04 (10.1%)	-0.04 (-9.5%)	0.98	0.92	-0.02	
681.25	0.17 (36.4%)	-0.08 (-16.4%)	0.81	0.62	0.07	110418
	0.05 (10.3%)	-0.07 (-16.6%)	0.99	0.85	-0.02	