



Supplement of

Evaluation of ocean dimethylsulfide concentration and emission in CMIP6 models

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3 Modern mean climate

3.1 DMS surface ocean concentrations

3.1.1 Spatial pattern analysis

To supplement the maps of annual mean difference provided in the main text, we propose here another plot showing the logarithm (base 10) of the ratio between the annual mean (1980–2009) of modelled DMS concentration and the annual mean of L11 DMS concentration. The choice of providing this logarithm of a ratio, instead of more common relative difference, is based on the fact that modelled and climatological DMS concentrations show large discrepancies, which are not satisfactorily described by relative differences. Indeed, a relative difference defined as $100 * \frac{model-ref}{ref}$ is not symmetrical: its lower bound is -100 %, but there is no upper bound.

In order to ease the reading of this scale:

- on the upper right corner of each panel, the minimum, weighted median and maximum *ratio* (not its logarithm) is provided

- one should note that the central white colour, which covers the log range from -0.1 to 0.1 , corresponds to a relative difference of roughly -20% to 25% while the maximums on the scale of ± 0.8 correspond to a division or multiplication by a factor of 6.3.

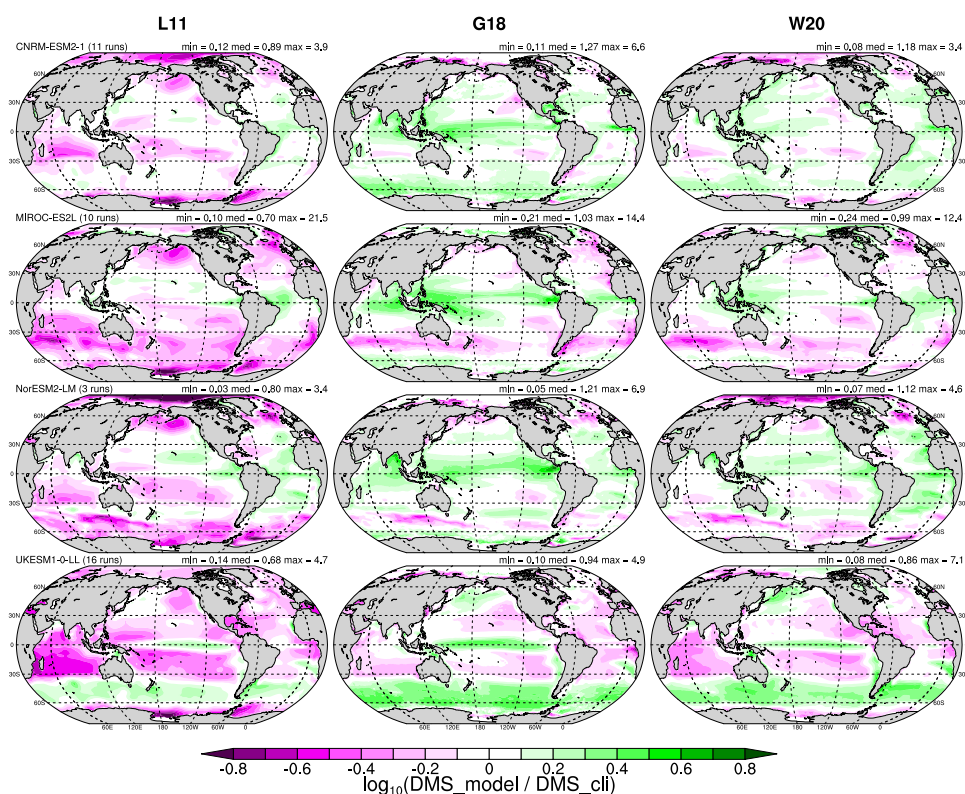


Figure S1. Logarithm of the ratio between annual mean (1980–2009) of modelled DMS concentration and annual mean of L11, G18 and W20. See Fig. 2 for the difference.

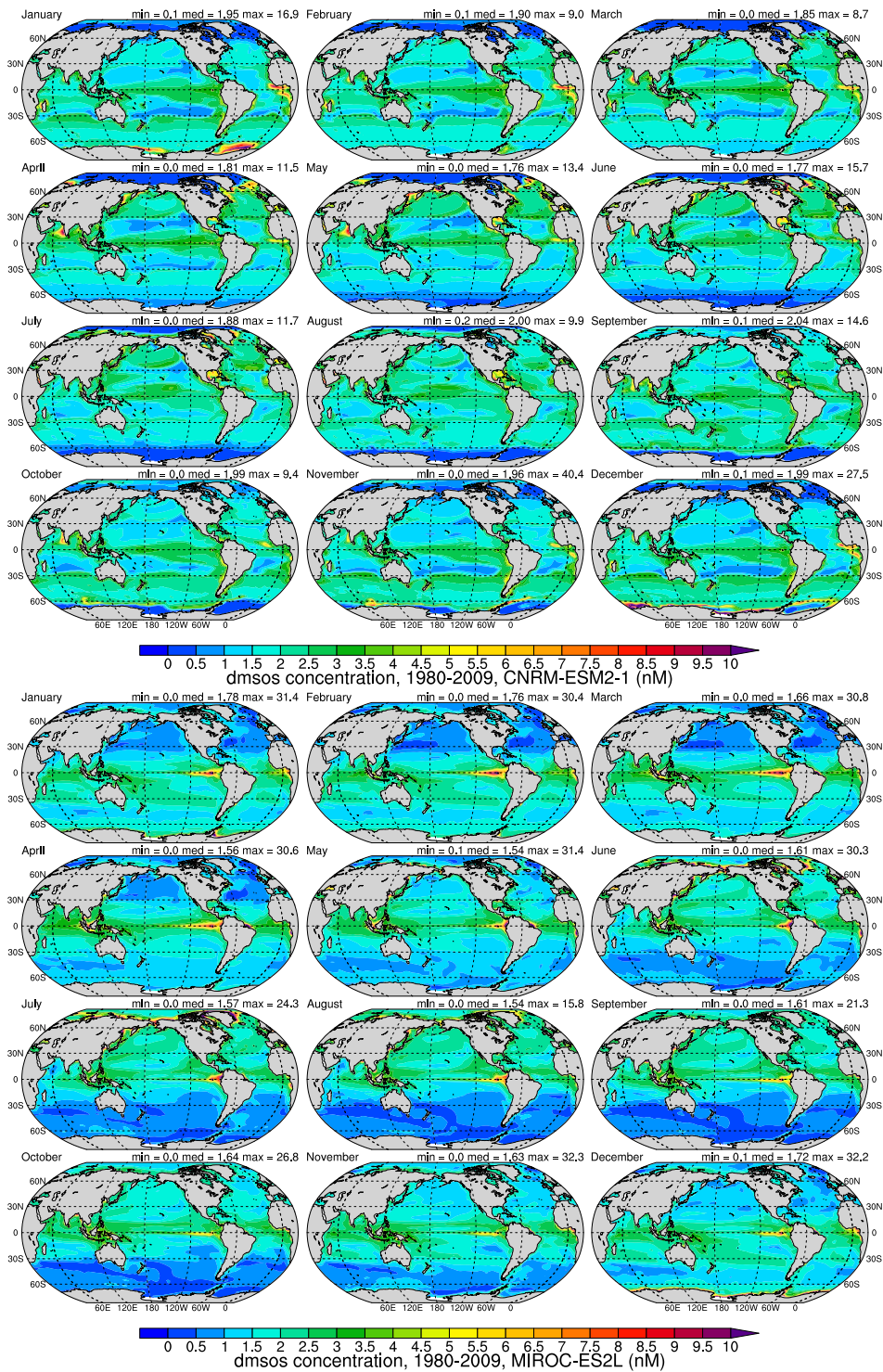


Figure S2. Surface ocean DMS concentration (nM). (top) Monthly mean (1980–2009) of CNRM-ESM2-1, (bottom) monthly mean (1980–2009) of MIROC-ES2L.

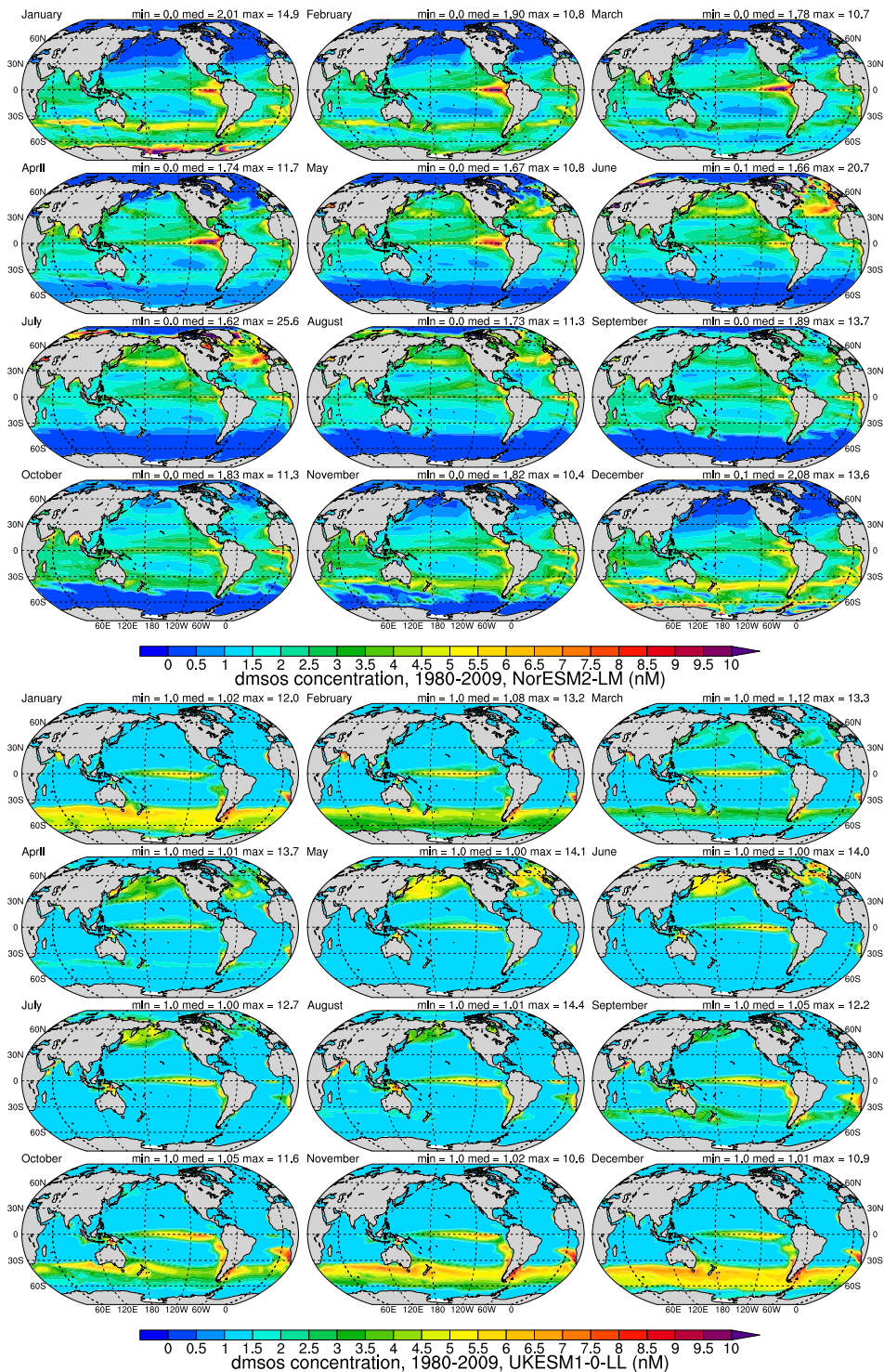


Figure S3. Surface ocean DMS concentration (nM). (top) Monthly mean (1980–2009) of NorESM2-LM, (bottom) monthly mean (1980–2009) of UKESM1-0-LL.

Table S1. Spatial monthly statistics of surface ocean DMS concentration between the models (as in Fig. 1) and L11: correlation coefficients, biases (expressed in percentage of L11) and RMSE (nM) (see Fig. 4 for a display of these statistics).

Model	Metrics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CNRM-ESM2-1	Corr. coef.	0.32	0.06	-0.07	0.38	0.48	0.40	0.41	0.24	0.13	0.21	0.24	0.40
	Bias	-41.8	-22.1	-9.02	4.36	-7.65	-7.17	-4.54	-4.57	12.2	-3.03	-17.5	-34.3
	RMSE	2.93	2.11	1.25	1.00	1.60	1.56	1.23	1.43	1.47	1.12	1.53	2.88
MIROC-ES2L	Corr. coef.	0.26	0.23	0.15	0.28	0.21	0.28	0.38	0.43	0.35	0.35	0.16	0.30
	Bias	-48.0	-29.1	-15.6	-3.66	-12.2	-10.7	-12.9	-21.2	-11.6	-19.1	-26.8	-40.6
	RMSE	3.12	2.10	1.33	1.18	1.93	1.80	1.50	1.46	1.42	1.19	1.68	3.11
NorESM2-LM	Corr. coef.	0.59	0.20	0.11	0.35	0.29	0.55	0.62	0.58	0.46	0.44	0.22	0.38
	Bias	-36.1	-19.8	-10.9	-1.50	-10.1	-3.77	-5.49	-13.0	-1.60	-9.11	-15.5	-27.3
	RMSE	2.49	2.12	1.44	1.25	1.94	1.57	1.32	1.29	1.33	1.20	1.73	2.83
UKESM1-0-LL	Corr. coef.	0.42	0.08	0.03	0.34	0.50	0.55	0.39	0.17	0.07	-0.02	-0.01	0.25
	Bias	-39.3	-23.8	-22.0	-17.3	-25.2	-27.8	-30.8	-30.2	-9.2	-6.0	-10.1	-30.6
	RMSE	2.83	2.36	1.45	1.15	1.69	1.53	1.45	1.77	1.77	1.80	2.28	3.18
MMM	Corr. coef.	0.60	0.20	0.09	0.47	0.50	0.59	0.60	0.51	0.37	0.35	0.20	0.48
	Bias(%)	-41.3	-23.6	-14.1	-3.92	-13.1	-11.3	-12.4	-16.6	-1.96	-8.99	-17.3	-33.1
	RMSE	2.68	2.02	1.15	0.84	1.60	1.37	1.09	1.29	1.29	1.03	1.54	2.82

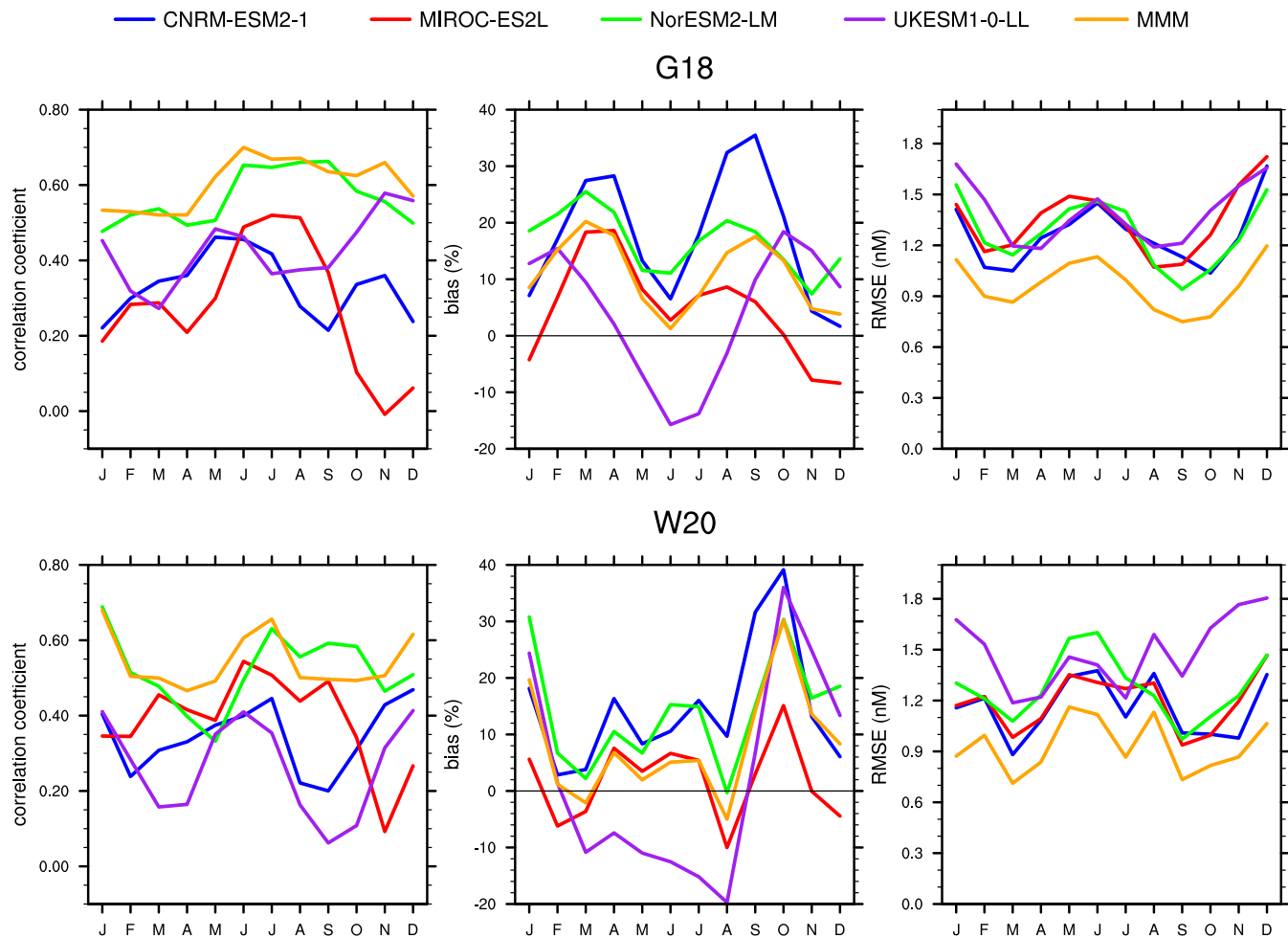


Figure S4. Monthly spatial metrics between the four models and MMM as compared to G18 (top row) and W20 (bottom row): pattern correlation (left column), bias (in % of the reference, middle column) and RMSE (nM, right column). Note axes are identical in both rows, but are different from those of Fig.4.

3.1.2 Seasonal variation analysis

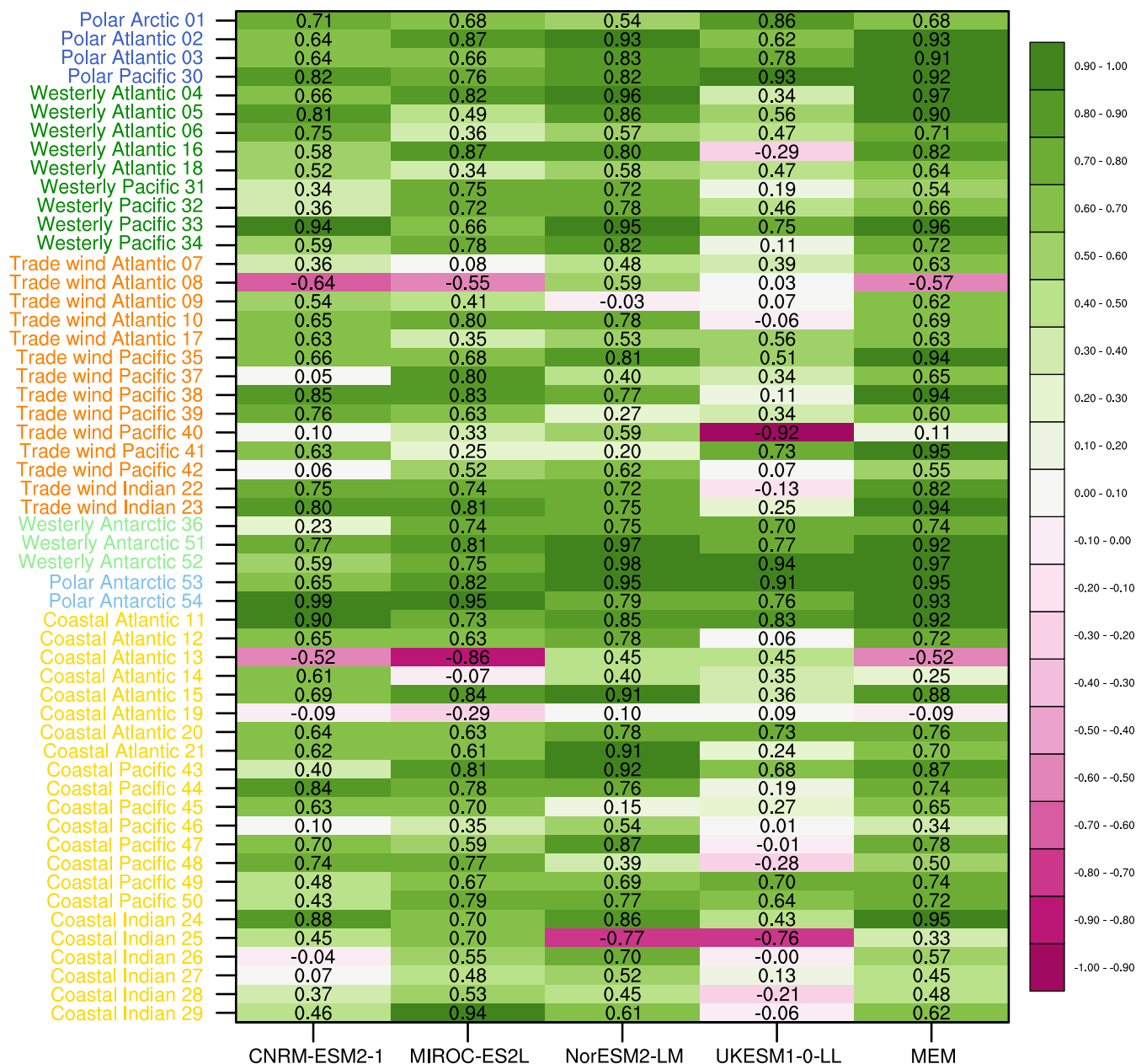


Table S2. Correlation coefficients of the linear regressions between the monthly time series of the models and W20. Time series and regions, with their numbering and color code, are those of Fig. 5. Purple colours for negative correlations, green colours for positive correlations.

3.2 Marine DMS emissions

3.2.2 Annual mean emission

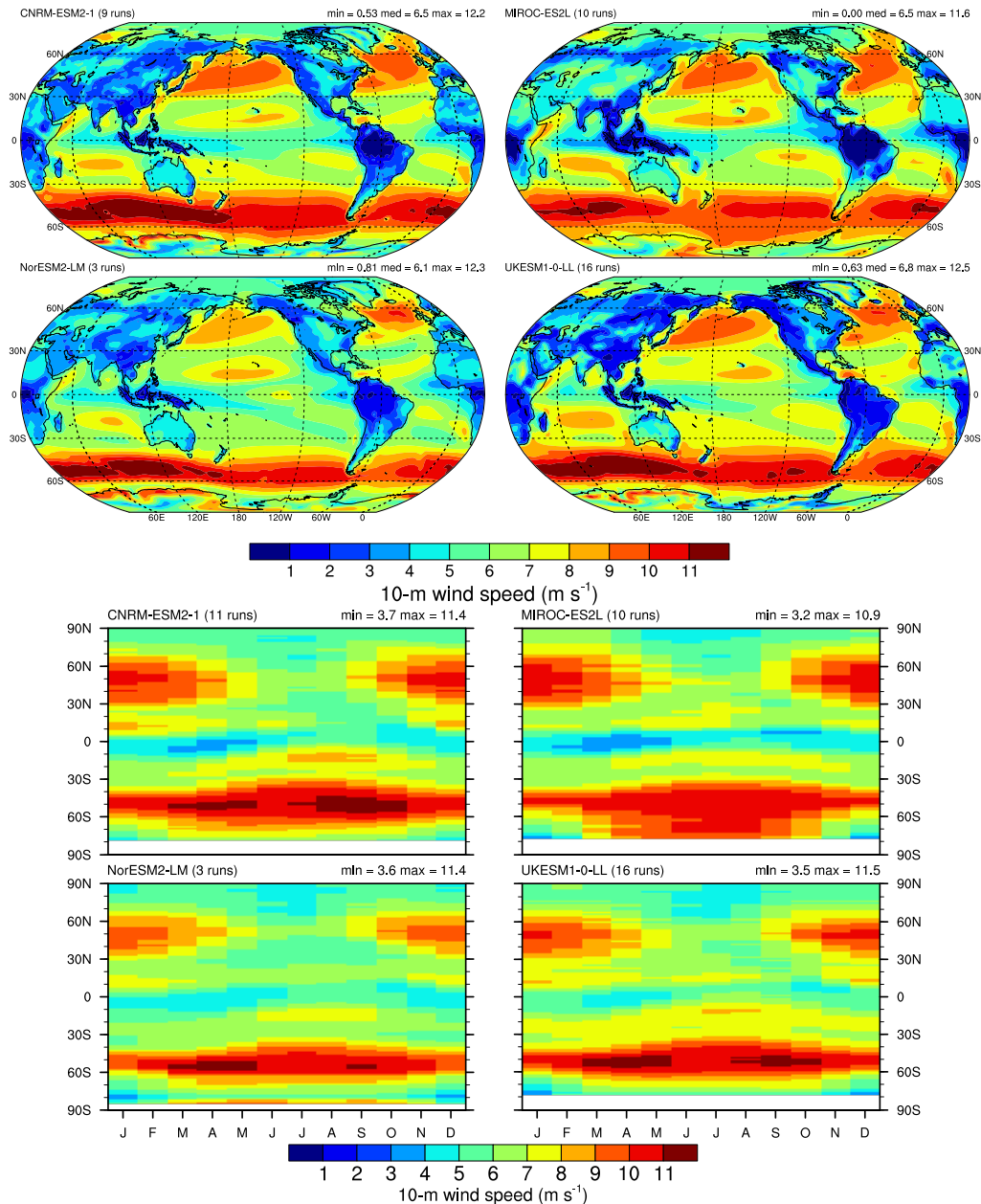


Figure S5. Mean (1980–2009) surface wind speed (m s^{-1}). Upper four panels: annual means. Lower four panels: monthly zonal means computed on the oceans only.

4 Historical and future evolution

20 4.1 Global and regional trends of DMS concentration and flux

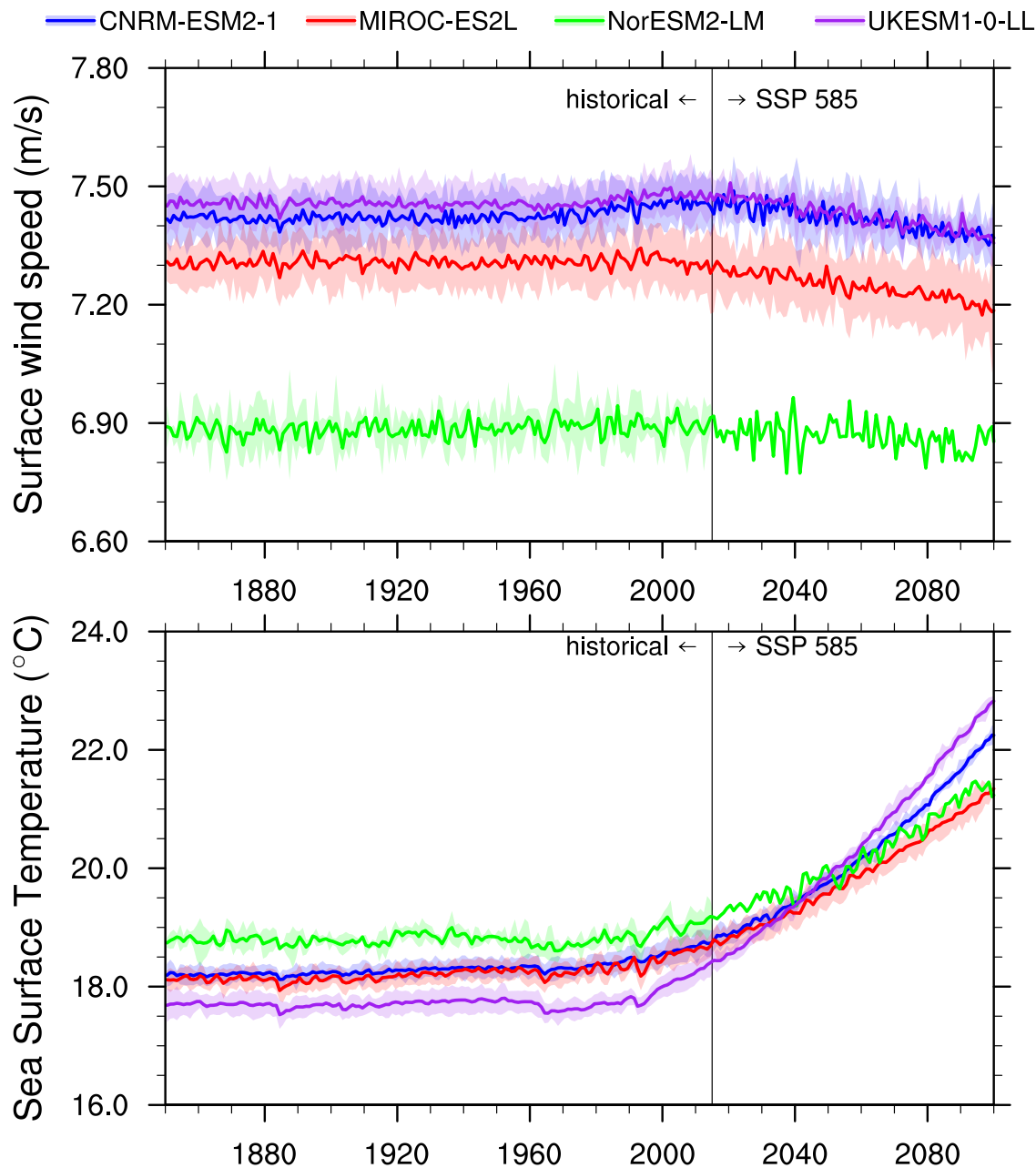


Figure S6. Time series of annual mean surface wind speed over the oceans (m s^{-1} , top panel) and of annual mean sea surface temperature ($^{\circ}\text{C}$, bottom panel) as computed in the historical and ssp585 simulations.

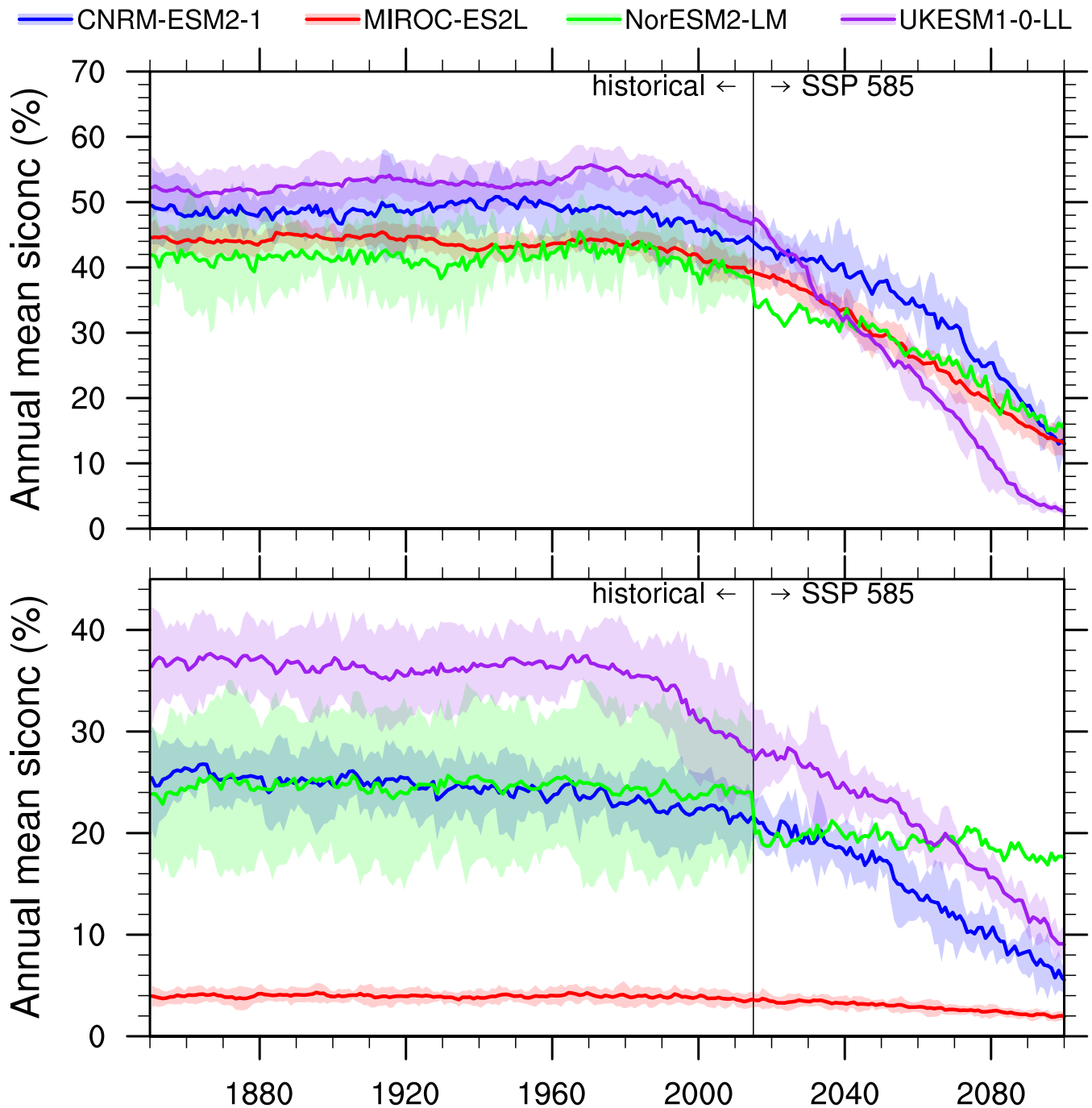


Figure S7. Time series of annual mean sea-ice concentration (%; CMIP6 siconc variable) in the polar N (top panel) and polar S (bottom panel), as computed in the historical and ssp585 simulations.

4.2 Role of marine biology

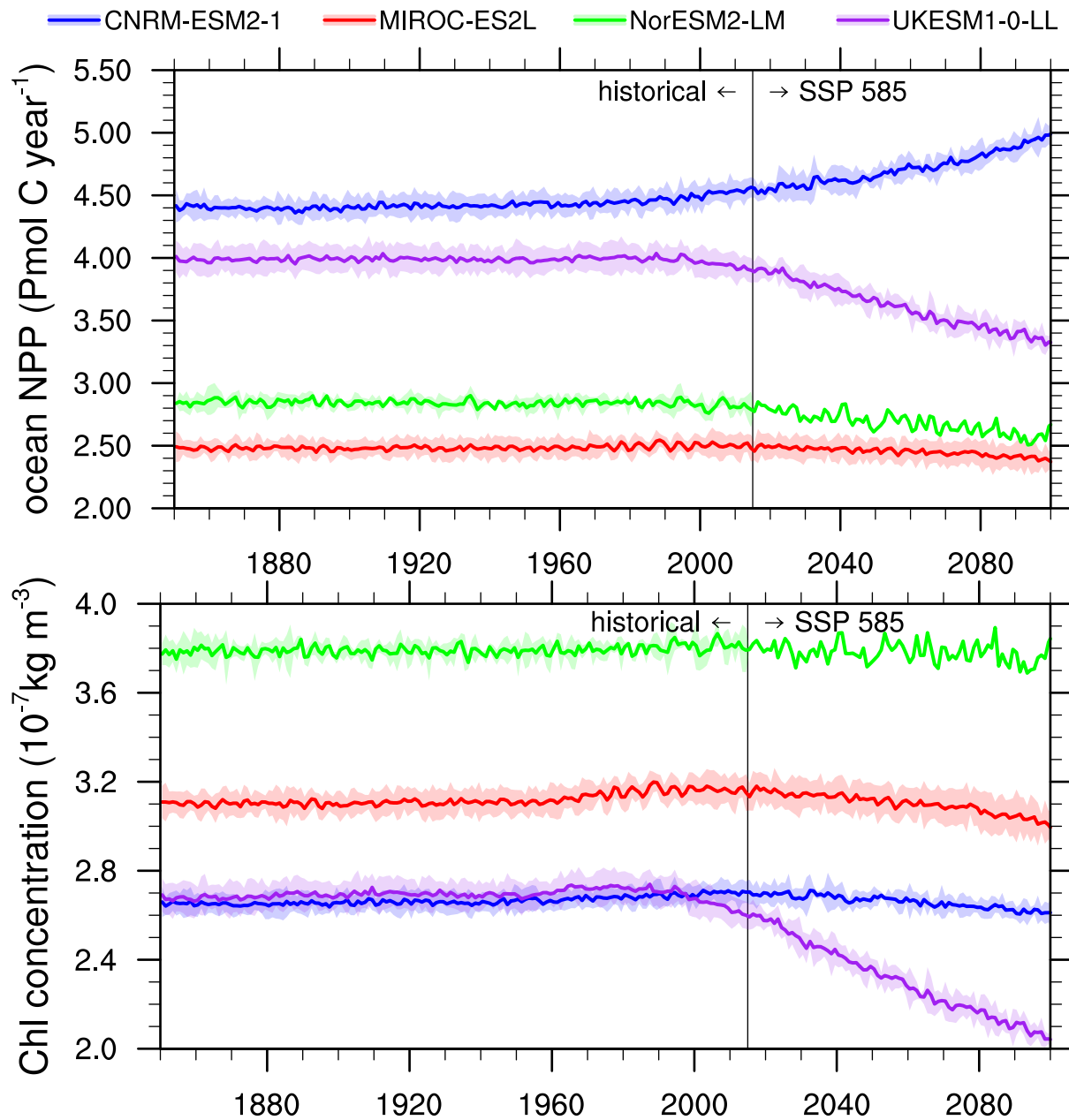


Figure S8. Time series of total annual NPP (Pmol year⁻¹, top panel) and mean annual Chl (bottom panel), as computed in the historical and ssp585 simulations.