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Supplement of

Acidification, deoxygenation, and nutrient and biomass declines in a warming Mediterranean Sea

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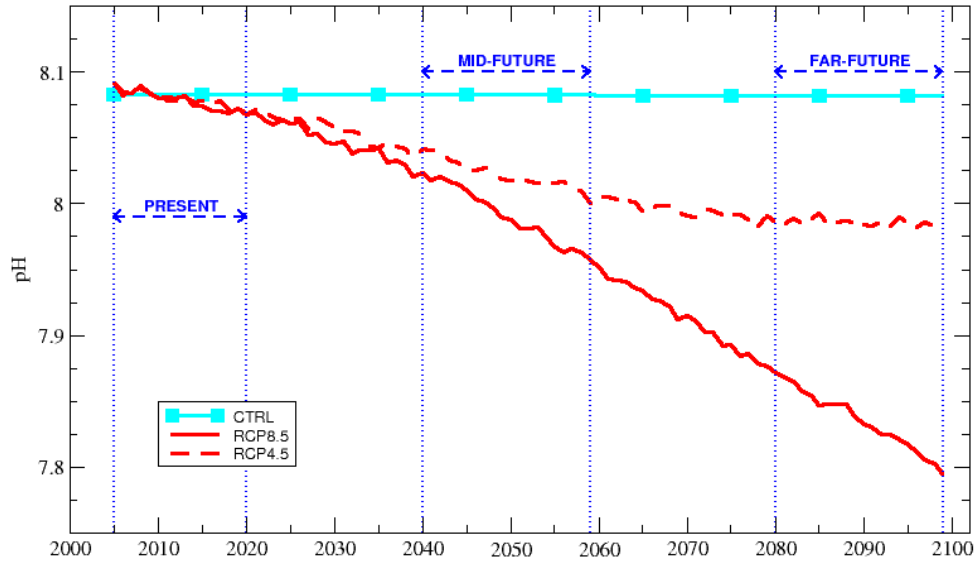

Fig. S1 Time series of annual pH in the Ionian Sea in the first 50 m according to the CONTROL (CTRL, cyan line with squares), RCP8.5 (red line) and RCP4.5 (red dashed line).

TEMPERATURE

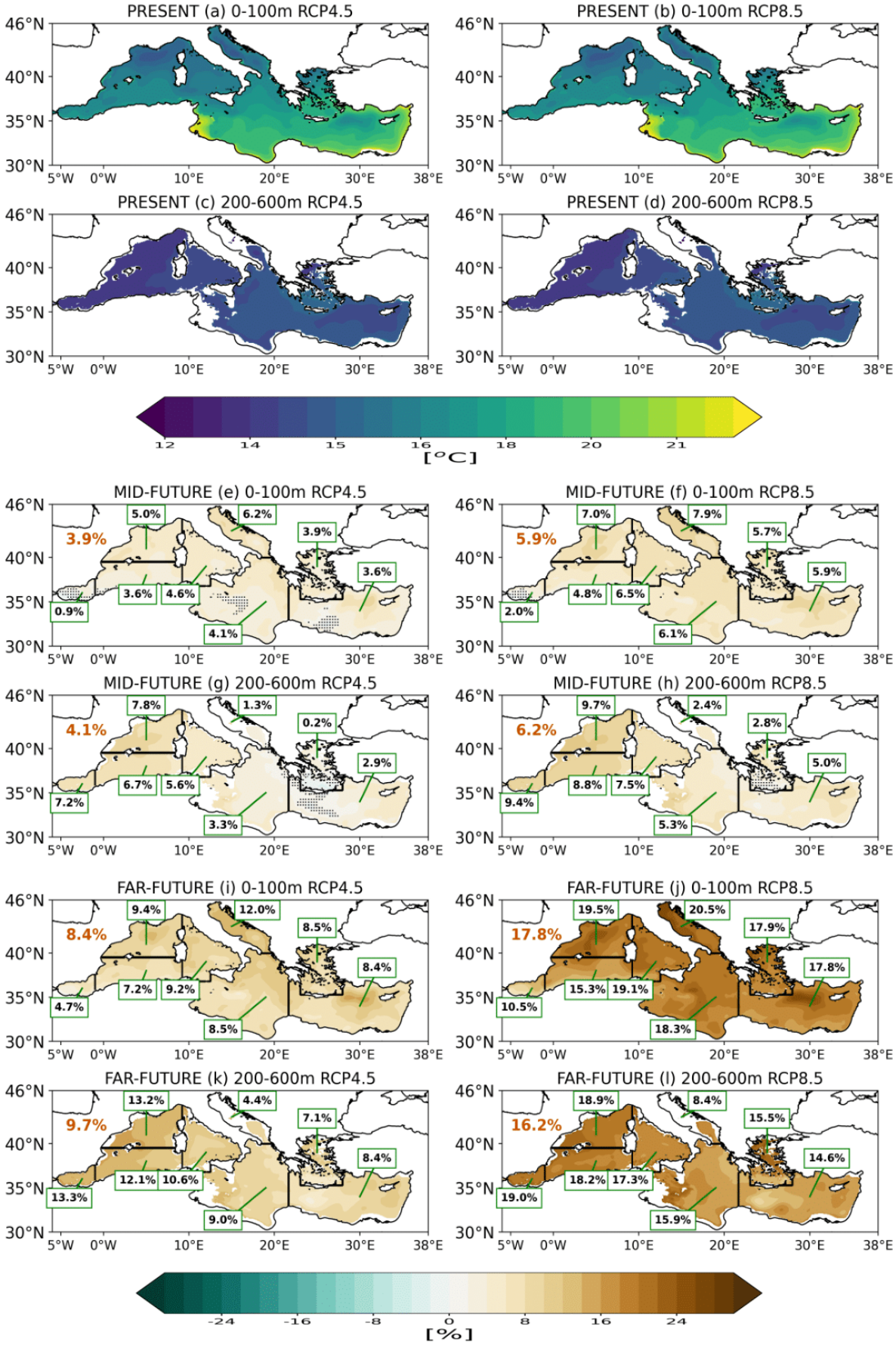

Fig.S2 - Mean Temperature (in ºC) in the 0-100 m and 200-600 m layers in the PRESENT (2005-2020, a,b,c and d), and relative climate change signal (with respect to the PRESENT, in %) in the MID-FUTURE (2040-2059, e,f,g and h) and FAR-FUTURE (2080-2099, i,j,k and l) in the RCP4.5 (left column) and RCP8.5 (right column) scenarios. The Mediterranean average relative climate change signal in each period (with respect to the PRESENT) is displayed by the top-left colored value (blue or dark orange when negative or positive, respectively). Values in the green boxes are the average relative climate change signal for particular periods and sub-basins shown in Fig. 1. Domain grid points where the relative climate change signals are not statistically significant according to a Mann-Whitney test with $p<0.05$ are marked by a dot.

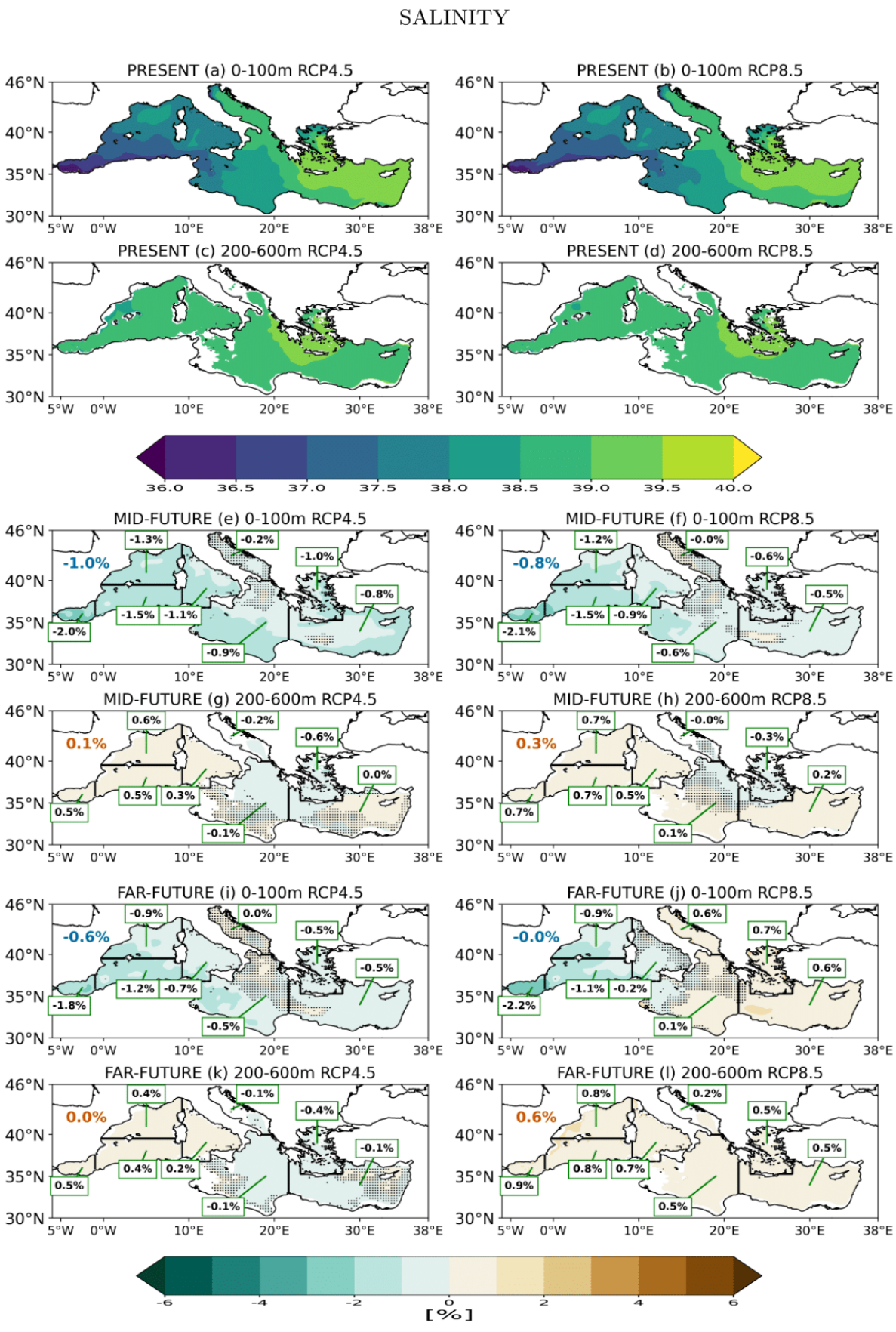

Fig. S3 as Fig.S2 but for Salinity.

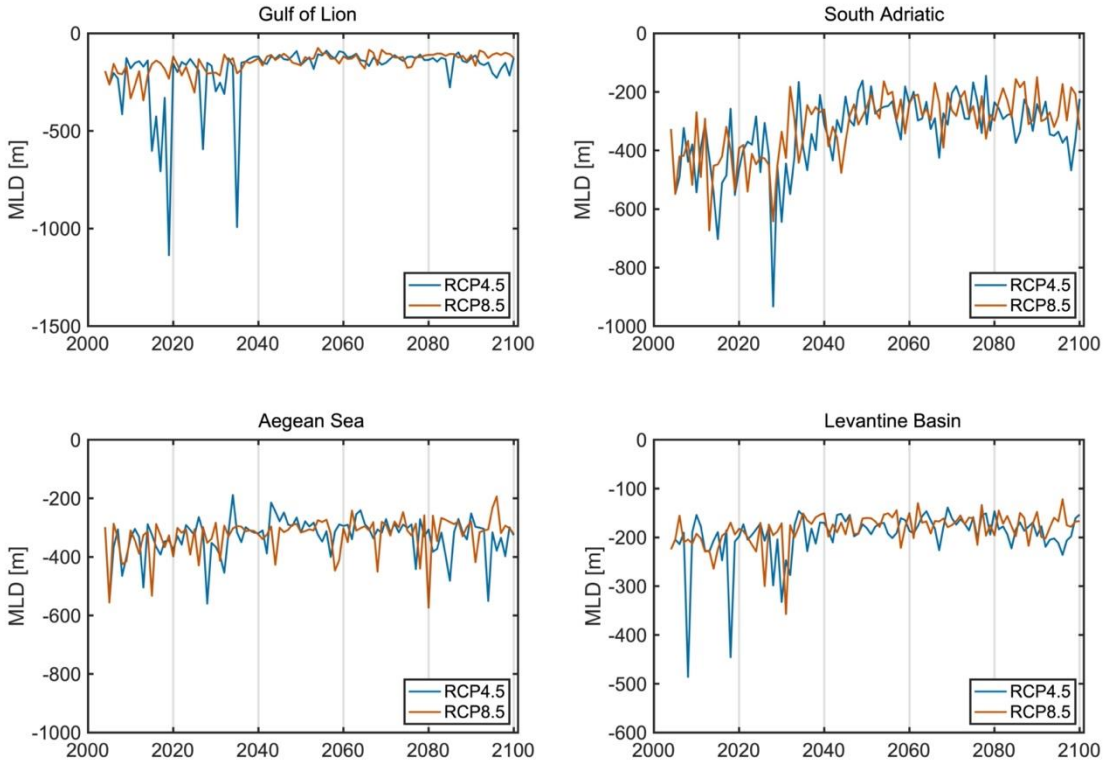

Fig. S4 - Time series of the yearly maximum value of mixed layer depth (in m) observed in the Gulf of Lion, Southern Adriatic, Aegean Sea and Levantine basin in the period 2005-2099 under emission scenario RCP4.5 (blue line) and RCP8.5 (dark orange line). The mixed layer depth has been computed using the criteria based on a density difference with the surface lower than 0.01 kg m^{-3}.

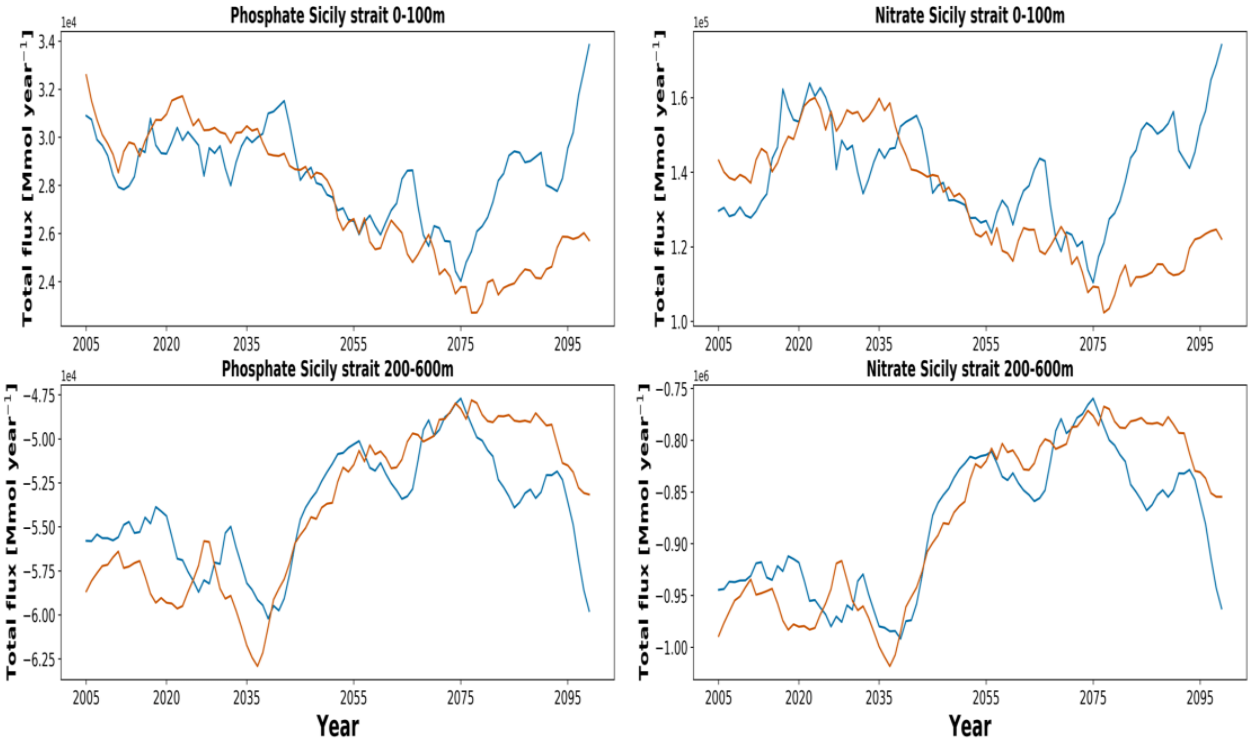

Fig.S5 Time series of the yearly total transport (in Mmol year^{-1}) of Phosphate (left panels) and Nitrate (right panels) through the Strait of Sicily in the period 2005-2099, in the first 100 m (upper panels) and between 200-600 m (bottom panels) under emission scenario RCP4.5 (blue line) and RCP8.5 (dark orange line). The yearly time series have been smoothed using a 10-years running mean.

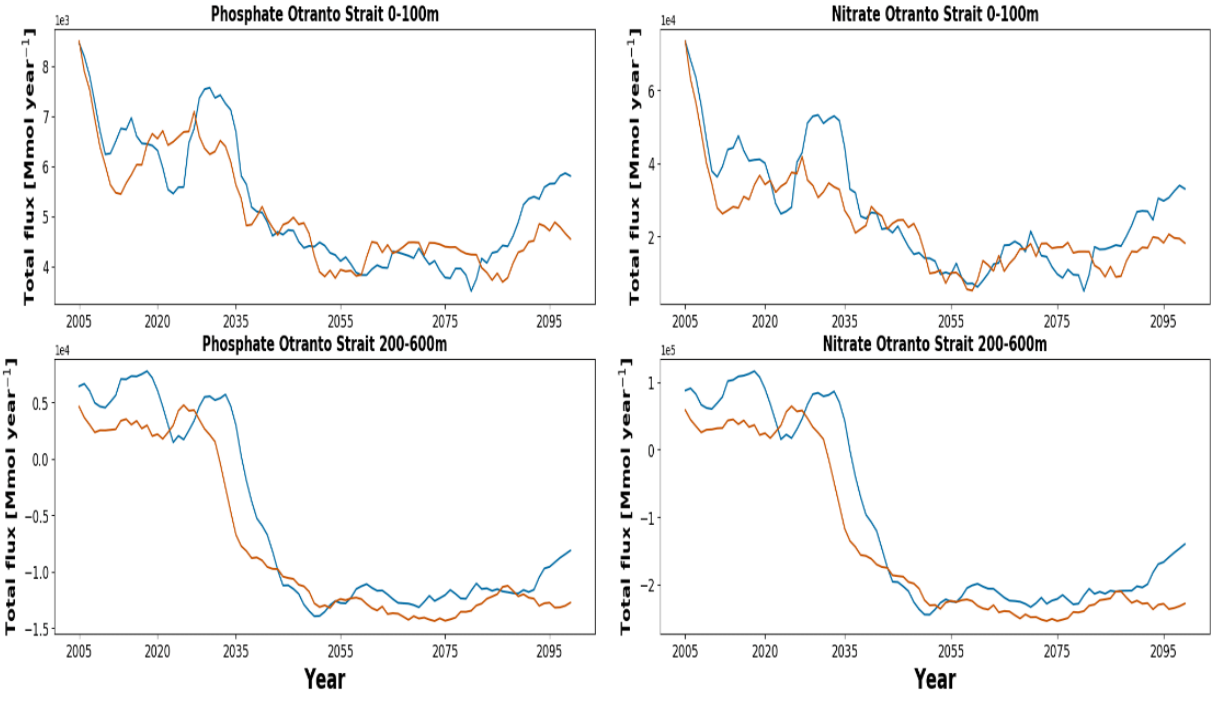

Fig.S6 Time series of the yearly total transport (in Mmol year^{-1}) of Phosphate (left panels) and Nitrate (right panels) through the Otranto strait in the period 2005-2099, in the first 100 m (upper panels) and between 200-600 m (bottom panels) under RCP4.5 (blue line) and RCP8.5 (dark orange line). The yearly time series have been smoothed using a 10-years running average.

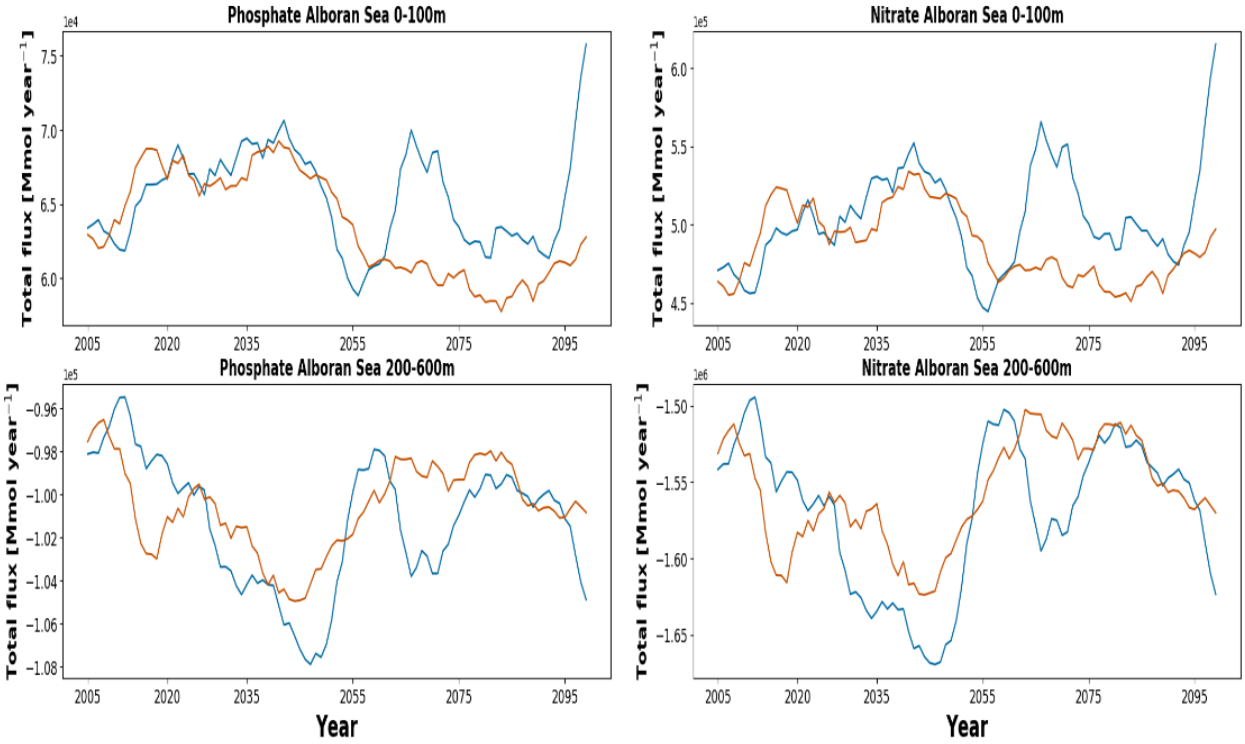

Fig.S7 Time series of the yearly total transport (in Mmol year^{-1}) of Phosphate (left panels) and Nitrate (right panels) in the Alboran Sea (longitudinal section at 5ºW) in the period 2005-2099, in the first 100 m (upper panels) and between 200-600 m (bottom panels) under RCP4.5 (blue line) and RCP8.5 (dark orange line). The yearly time series have been smoothed using a 10-years running average.

DO

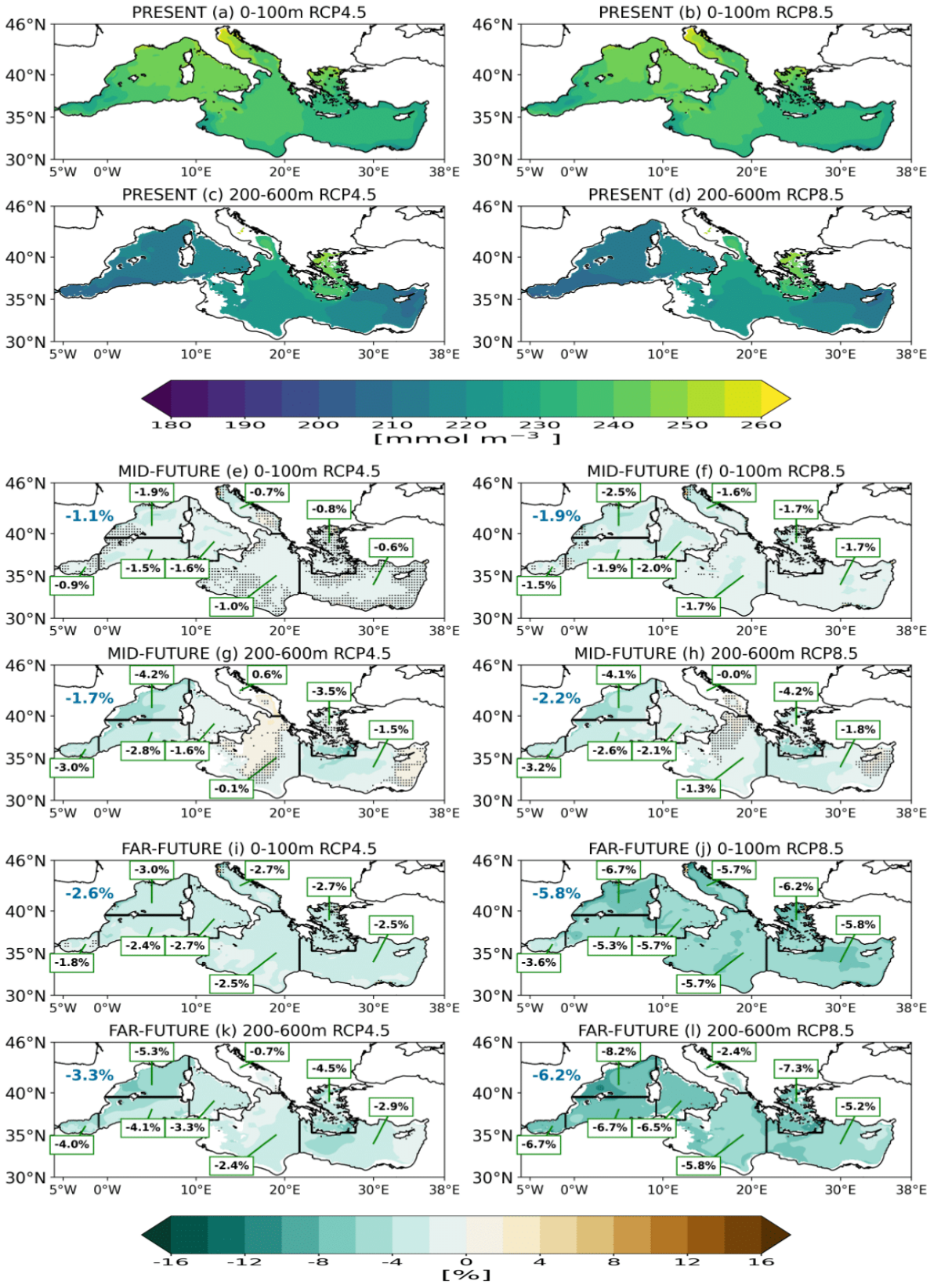

Fig.S8 -as Fig.S3 but for Dissolved oxygen (in mmol m^{-3}).

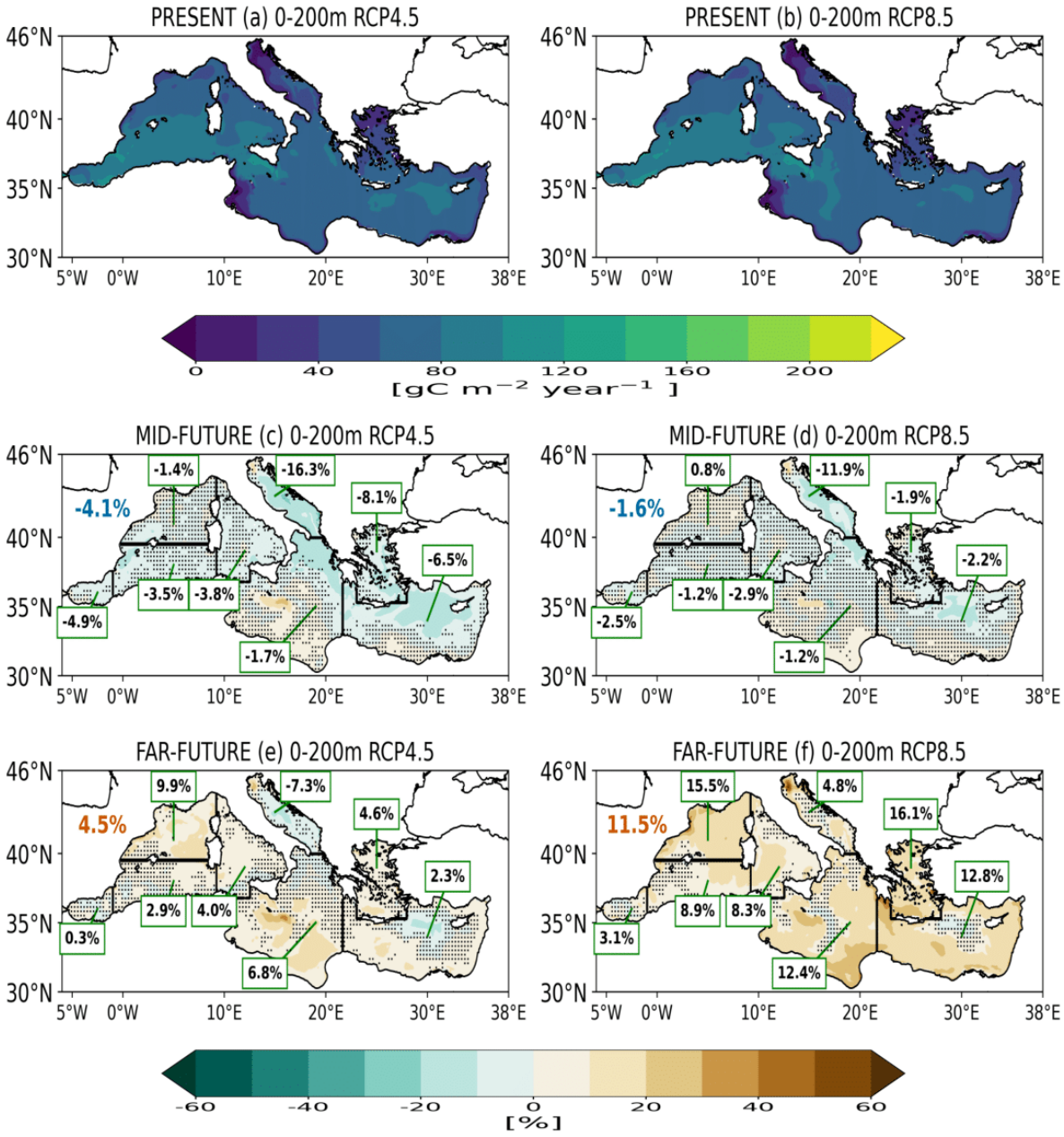

Fig. S9- as Fig.S8 but for the Integrated phytoplankton respiration (in gC m^{-2} $year^{-1}$) in the first 200 m.

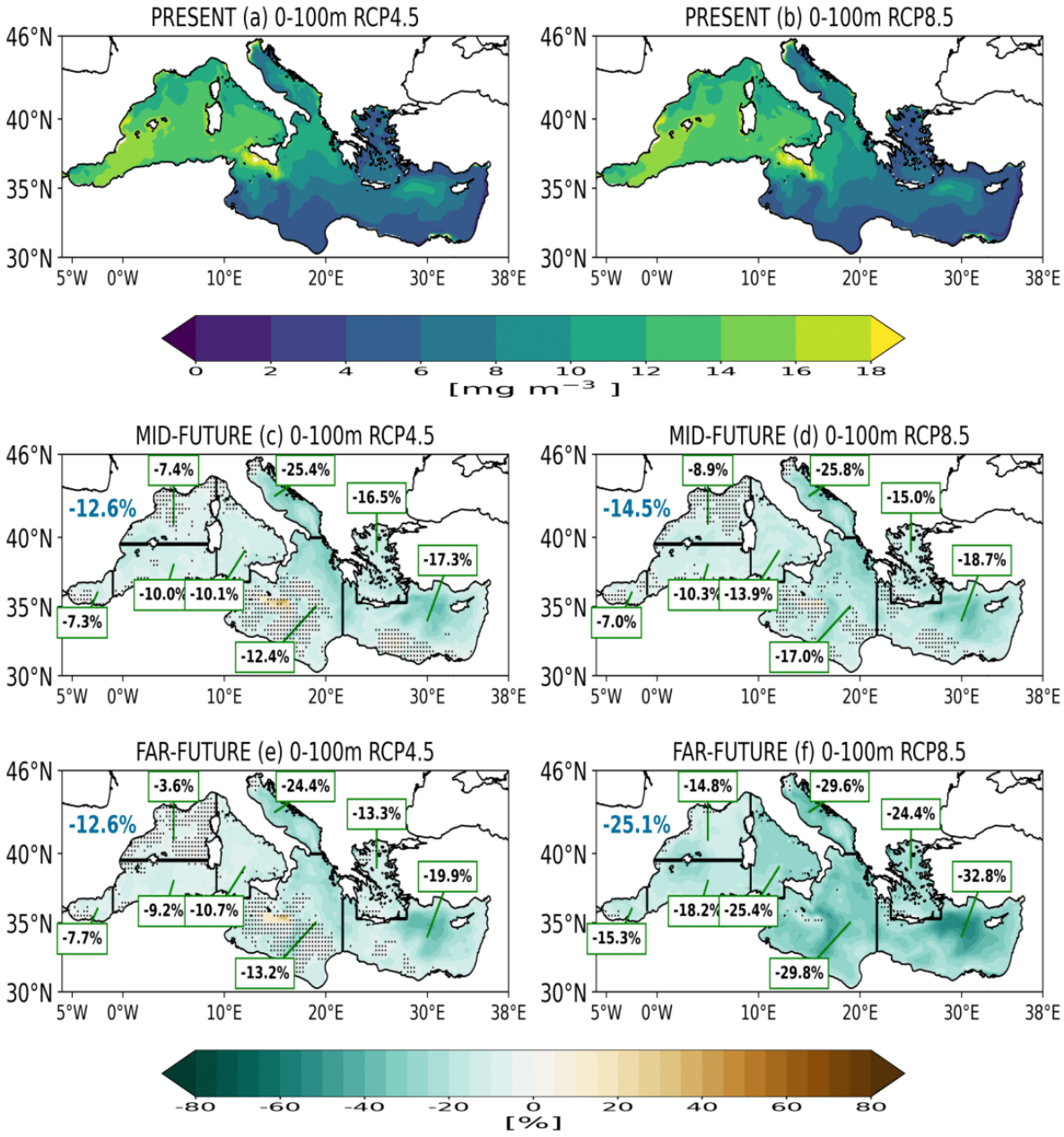

Fig. S10 - as Fig. S8 but for Phytoplankton carbon biomass (in mg m^{-3}) in the first 100 m.

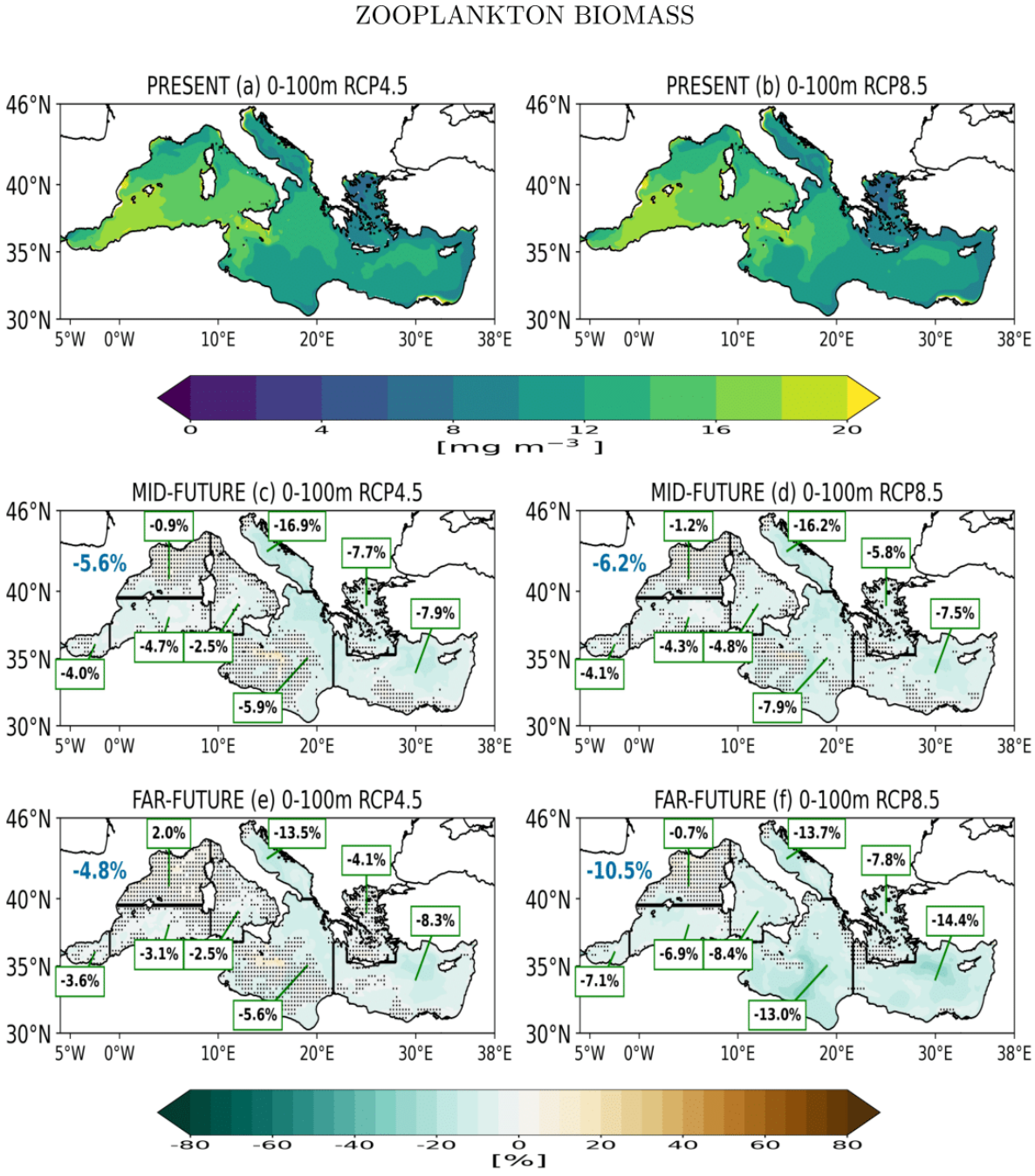

Fig.S11 - as Fig.S10 but for Zooplankton carbon biomass (in mg m^{-3}).

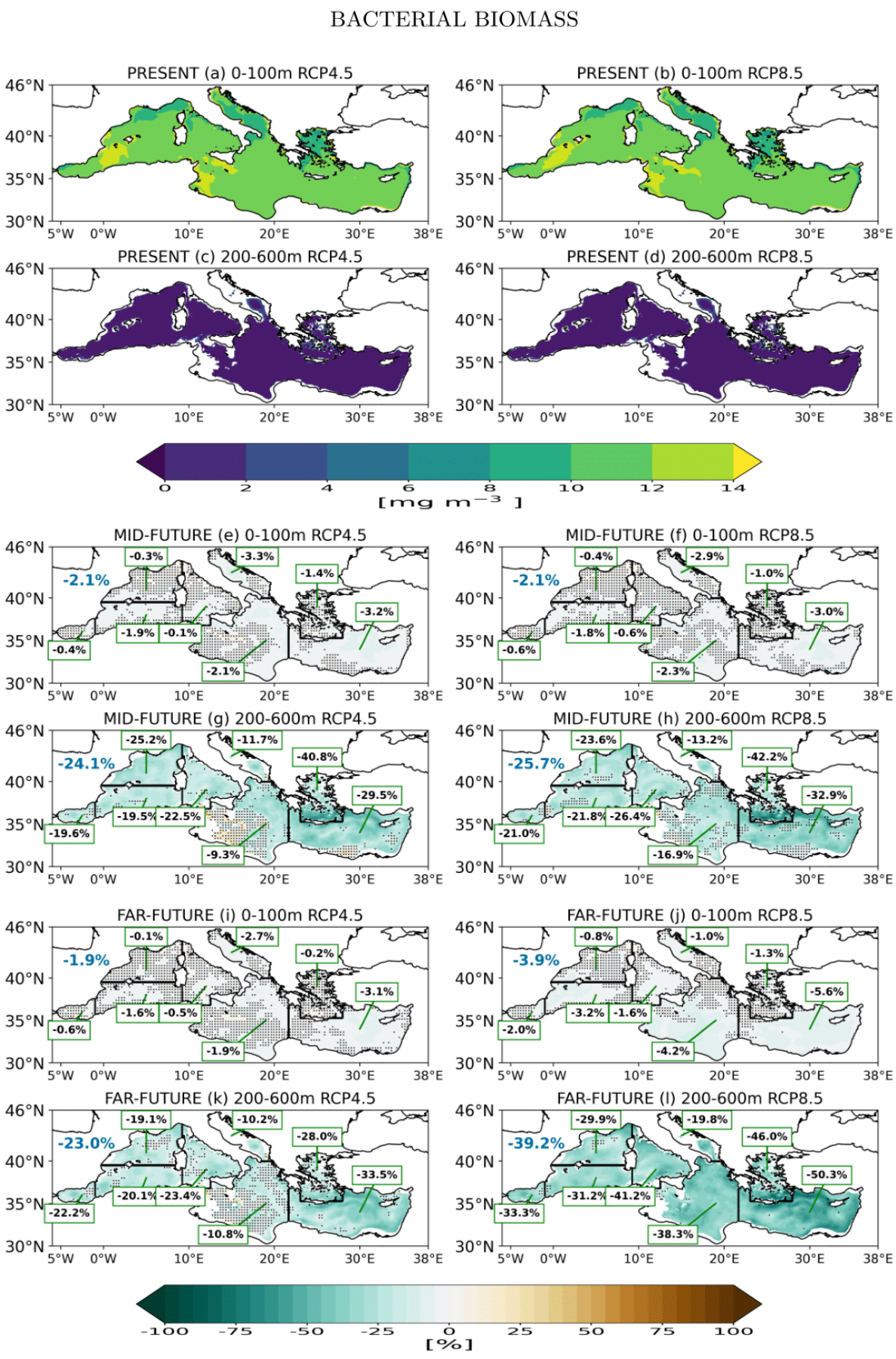

Fig. S12 - as Fig. S8 but for Bacterial carbon biomass (in mg m^{-3}).

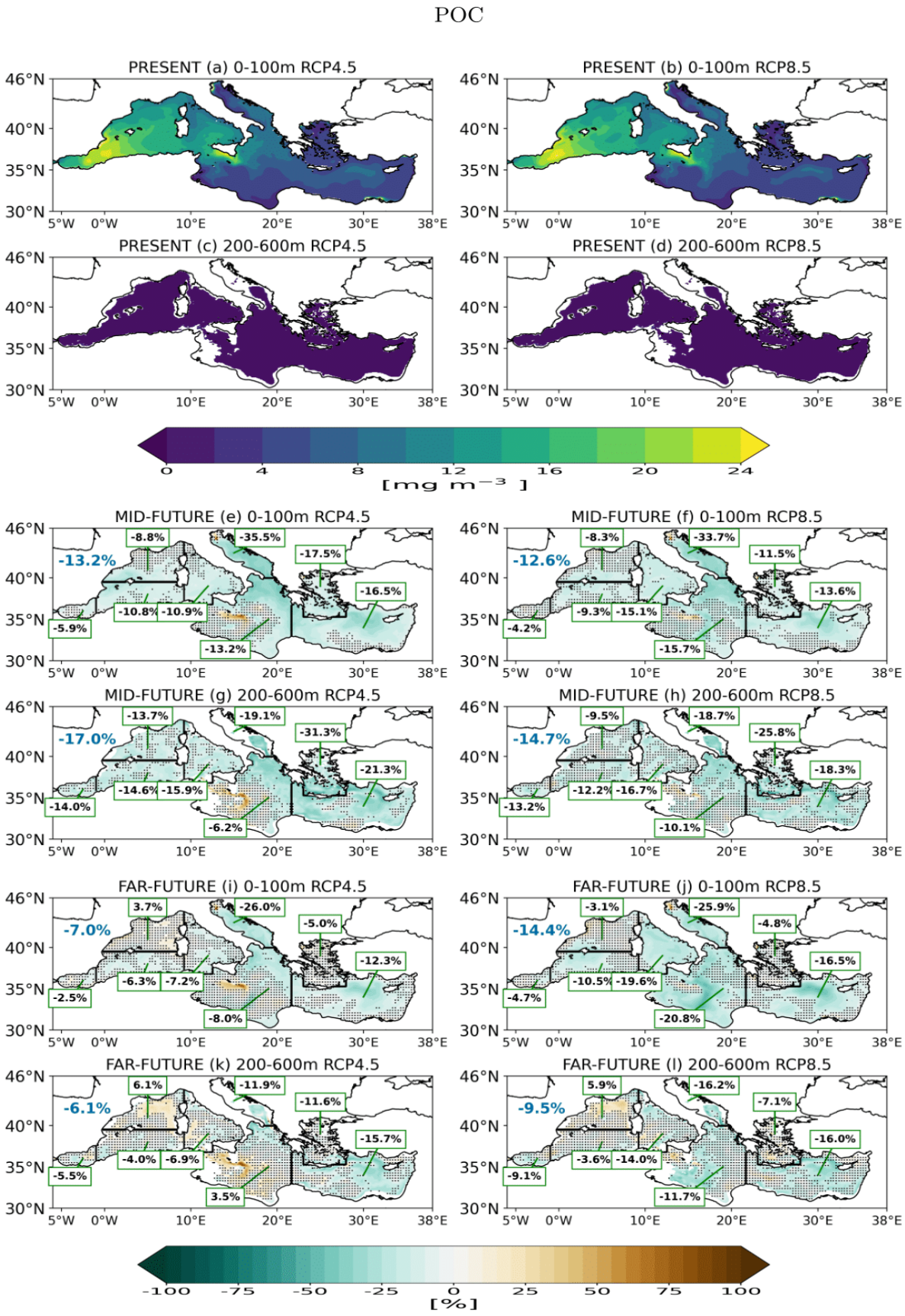

Fig. S13 - as Fig. S12 but for Particulate Organic Matter (in mg m^{-3}).

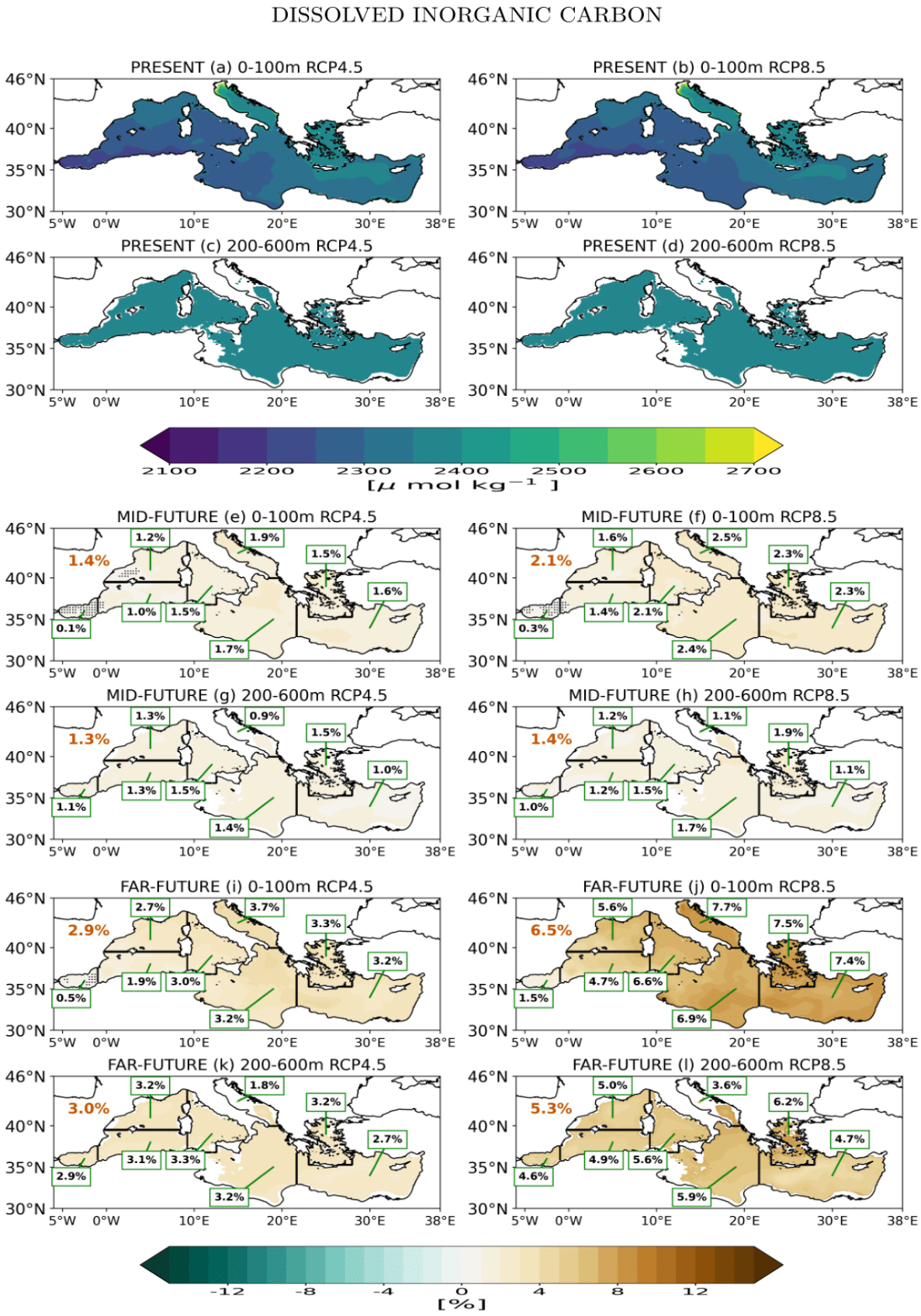

Fig. S14 as Fig.S13 but for Dissolved inorganic carbon (in µmol kg^{-1}).

		RCP4.5			RCP8.5		
		PRESENT	**MID-FUTURE**	**FAR-FUTURE**	**PRESENT**	**MID-FUTURE**	**FAR-FUTURE**
Seawater Temperature (°C)							
WMED	0-100	16.3±0.3	**16.8±0.3**	**17.5±0.2**	16.4±0.3	**17.2±0.4**	**19.0±0.3**
	200-600	13.9±0.1	**14.9±0.1**	**15.6±0.1**	14.0±0.1	**15.2±0.1**	**16.6±0.2**
EMED	0-100	18.2±0.2	**18.9±0.3**	**19.8±0.2**	18.4± 0.2	**19.5±0.5**	**21.7±0.4**
	200-600	14.5±0.1	**15.0±0.1**	**15.8±0.0**	14.6±0.1	**15.3±0.1**	**16.8±0.2**
Seawater Salinity (-)							
WMED	0-100	37.4±0.1	**36.9±0.1**	**37.0±0.1**	37.4±0.1	**36.9±0.1**	**37.0±0.1**
	200-600	38.6±0.0	**38.8±0.0**	**38.7±0.0**	38.6±0.0	38.9±0.0	**39.0±0.0**
EMED	0-100	38.6±0.1	**38.3±0.1**	**38.5±0.1**	38.6±0.1	**38.4±0.1**	**38.8±0.1**
	200-600	38.9±0.0	38.9±0.0	**38.9±0.0**	38.9±0.0	**39.0±0.0**	**39.1±0.1**
PO_4 (mmol m^{-3})							
WMED	0-100	0.14±0.01	**0.13±0.00**	0.14±0.01	0.14±0.00	**0.13±0.00**	**0.13±0.00**
	200-600	0.29±0.00	**0.30±0.01**	**0.28±0.00**	0.30±0.00	**0.29±0.01**	**0.29±0.00**
EMED	0-100	0.03±0.00	**0.03±0.00**	**0.03±0.00**	0.03±0.00	**0.03±0.00**	**0.02±0.00**
	200-600	0.18±0.00	**0.18±0.00**	**0.17±0.00**	0.17±0.00	0.17±0.00	0.17±0.00
NO_3 (mmol m^{-3})							
WMED	0-100	1.0±0.1	1.0±0.1	1.0±0.1	1.0±0.1	**0.9±0.0**	**0.9±0.0**
	200-600	4.6±0.0	**4.7±0.1**	**4.5±0.0**	4.7±0.0	**4.7±0.1**	**4.6±0.0**
EMED	0-100	0.2±0.0	**0.1±0.0**	**0.1±0.0**	0.2±0.0	**0.1±0.0**	**0.1±0.0**
	200-600	3.1±0.0	**3.0±0.0**	**3.0±0.0**	3.0±0.0	3.0±0.0	3.0±0.0
Dissolved Oxygen (mmol m^{-3})							
WMED	0-100	237±1	**233±1**	**231±1**	235±1	**230±2**	**223±1**
	200-600	213±1	**207±1**	**204±1**	211±0	**205±0**	**196±2**
EMED	0-100	234±1	**232±1**	**228±1**	233±1	**229±2**	**219±1**
	200-600	219±1	**217±0**	**213±0**	220±1	**217±1**	**208±2**

Phytoplankton carbon biomass (mg m^{-3})							
WMED	0-100	12.9±0.5	**11.8±0.6**	**11.9±0.6**	12.7±0.6	**11.5±0.6**	**10.4±0.5**
EMED	0-100	7.5±0.5	**6.3±0.5**	**6.2±0.4**	7.0±0.4	**5.7±0.5**	**4.8±0.3**
Zooplankton carbon biomass (mg m^{-3})							
WMED	0-100	14.5±0.3	**14.0±0.4**	**14.2±0.4**	14.6±0.4	**14.0±0.4**	**13.7±0.5**
EMED	0-100	11.7±0.3	**10.9±0.3**	**10.9±0.3**	11.4±0.2	**10.5±0.4**	**9.8±0.4**
Integrated net primary production (gC m^{-2} $year^{-1}$)							
WMED	0-200	135±6	134±3	**144±4**	137±5	**139±3**	**156±8**
EMED	0-200	140±5	**136±3**	**149±4**	137±4	**139±3**	**162±6**
Dissolved Inorganic carbon (µmol kg^{-1})							
WMED	0-100	2276±7	**2297±4**	**2322±4**	2270±2	**2301±8**	**2375±12**
	200-600	2373±0	**2404±7**	**2447±4**	2375±1	**2404±11**	**2495±14**
EMED	0-100	2325±4	**2363±12**	**2400±4**	2318±3	**2372±14**	**2484±15**
	200-600	2382±2	**2410±6**	**2452±3**	2379±2	**2412±10**	**2505±15**
pH (-)							
WMED	0-100	8.07±0.00	**8.03±0.01**	**8.00±0.00**	8.07±0.01	**8.01±0.02**	**7.88±0.02**
	200-600	8.08±0.00	**8.05±0.00**	**8.00±0.00**	8.09±0.00	**8.04±0.01**	**7.92±0.02**
EMED	0-100	8.09±0.00	**8.03±0.01**	**7.99±0.00**	8.09±0.00	**8.00±0.02**	**7.84±0.02**
	200-600	8.1±0.00	**8.06±0.00**	**8.02±0.00**	8.10±0.01	**8.05±0.01**	**7.92±0.02**

Table SP1 "Unbiased scenario" values for seawater temperature, salinity, dissolved phosphate, nitrate and oxygen concentrations, Phytoplankton and Zooplankton carbon biomass at surface, vertically integrated net primary production, Dissolved Inorganic Carbon and pH in the PRESENT (2005-2020), MID-FUTURE (2040-2059) and FAR-FUTURE (2080-2099) time windows. Averages and temporal standard deviations are computed considering the timeseries of annual means for the Western (WMED) and Eastern (EMED) Mediterranean Sea for the layers 0-100 m and 200-600 m. Bold format indicates significant differences of the future averages from the values of the PRESENT period according to a Mann-Whitney test with $p<0.05$.