



*Supplement of*

**Potential impact of shipping on air pollution in the Mediterranean region  
– a multimodel evaluation: comparison of photooxidants NO<sub>2</sub> and O<sub>3</sub>**

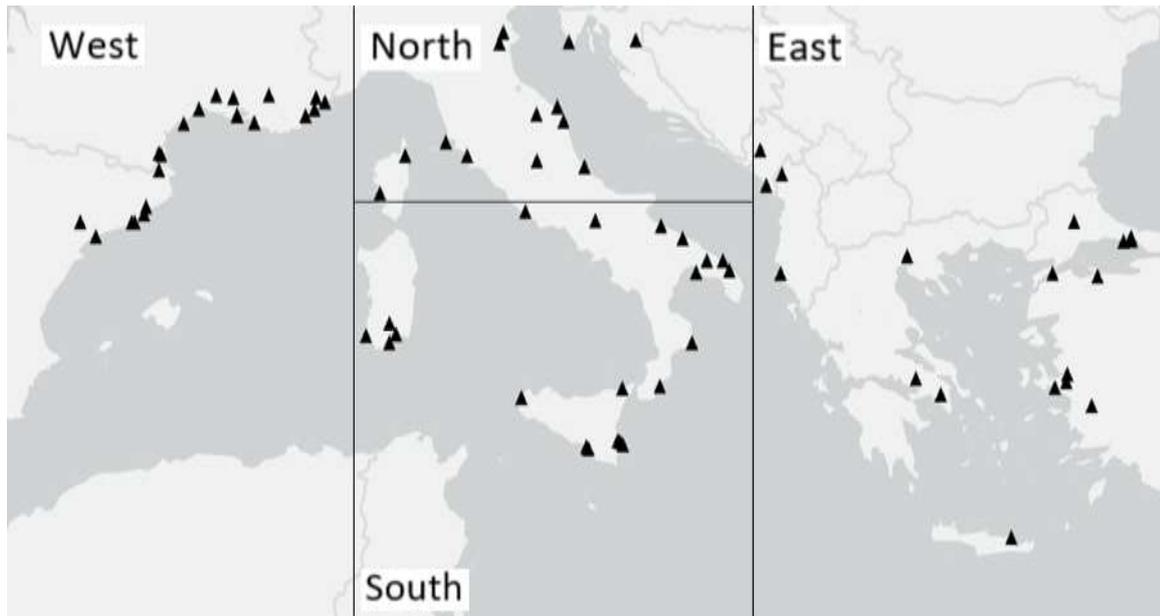
**Lea Fink et al.**

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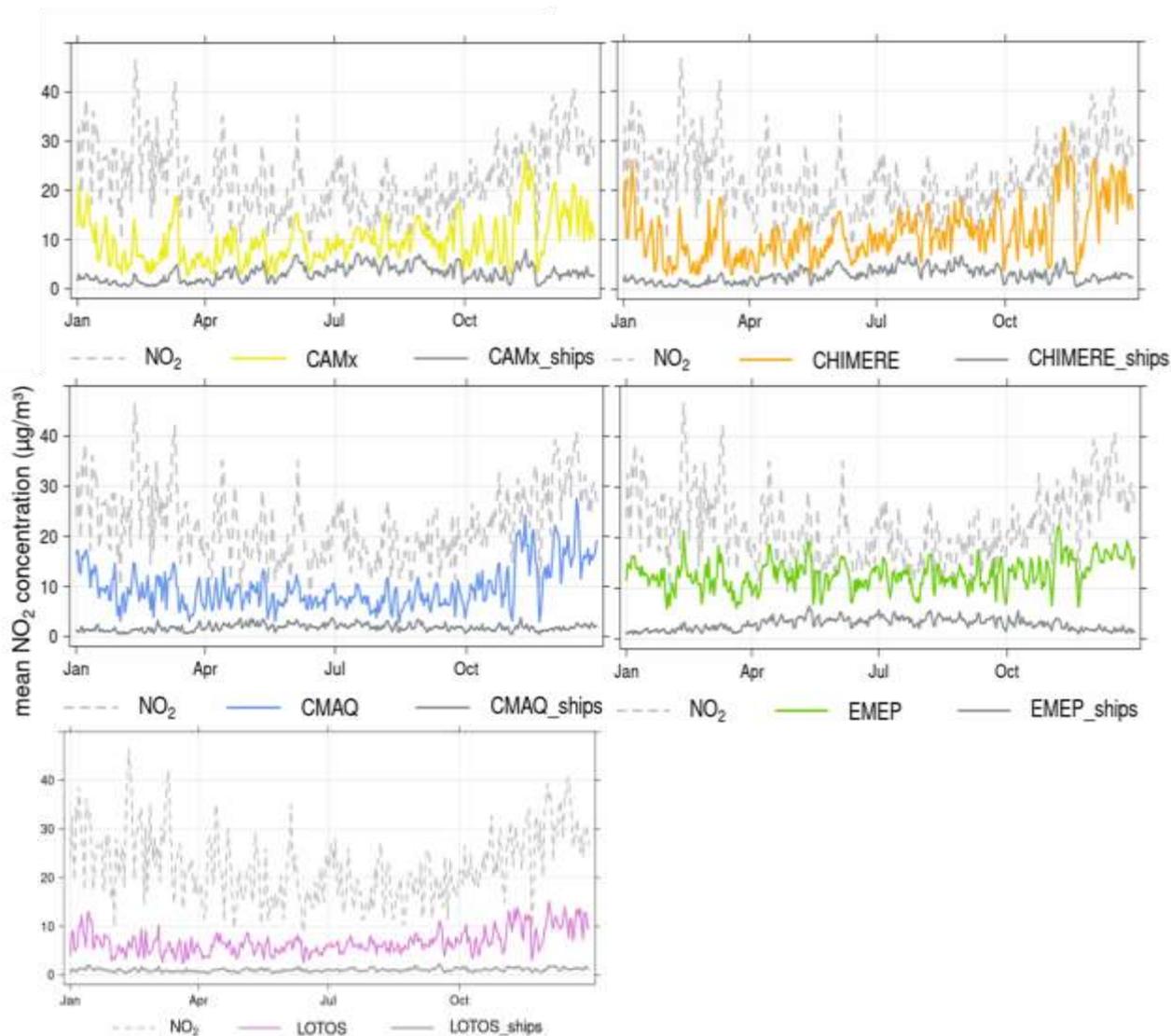
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**Supplement S1: Extent of computational domains**

<b>Model</b>	<b>Longitudes</b>	<b>Latitudes</b>
CAMx	-1.1323 to 30.0677	33.8102 to 45.8102
CHIMERE	-1.52724 to 30.07276	33.3787 to 45.8787
CMAQ	-1.0 to 31.1	32.8 to 46.7
EMEP	-0.95 to 31.15	32.85 to 46.75
LOTOS-EUROS	-0.95 to 29.95	32.85 to 44.95



**Figure S2:** Timeseries display mean values of all stations in the respective region and the mean value of each model in this region in the grid cells of the stations.



**Figure S3: Time series with daily mean values of NO<sub>2</sub> for 2015 in panel “west”. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx: R = 0.23, CHIMERE: R = 0.25, CMAQ: R = 0.2, EMEP: R = 0.23, LOTOS-EUROS: R = 0.26.**

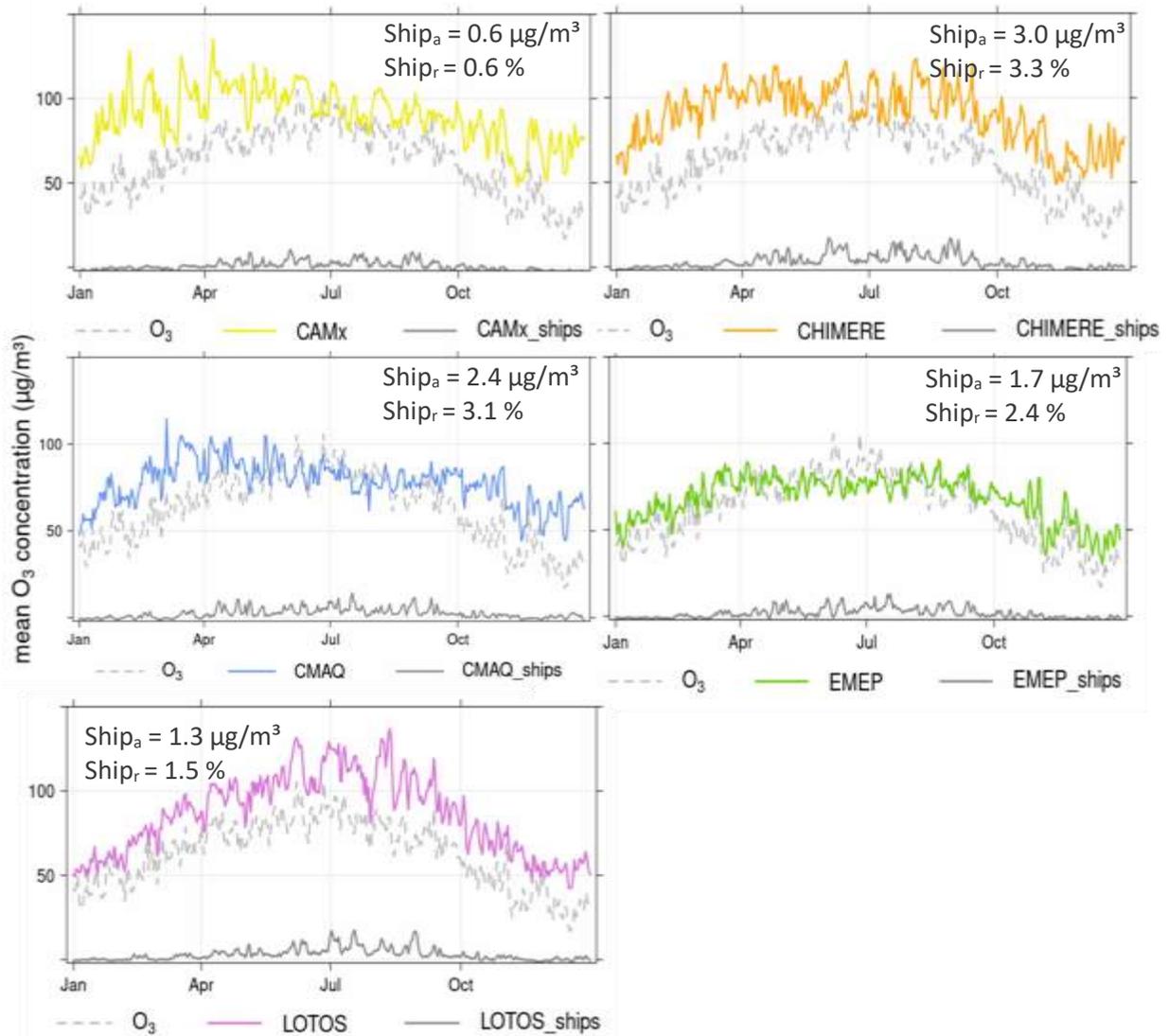


Figure S4: Time series with daily mean values of  $O_3$  for 2015 in panel "west". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx  $R = 0.57$ , CHIMERE  $R = 0.60$ , CMAQ:  $R = 0.58$ , EMEP:  $R = 0.23$ , LOTOS-EUROS:  $R = 0.65$ .

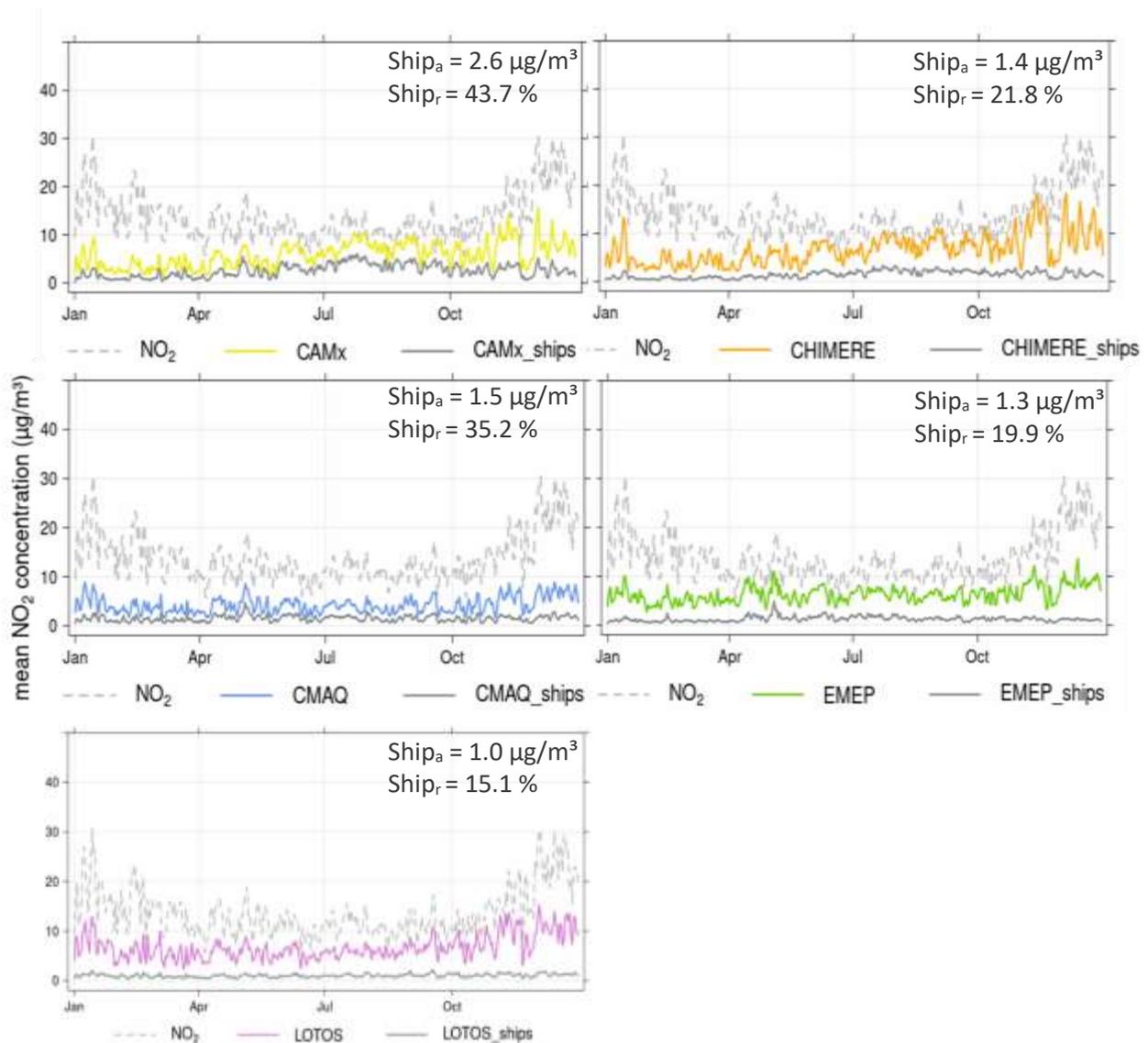
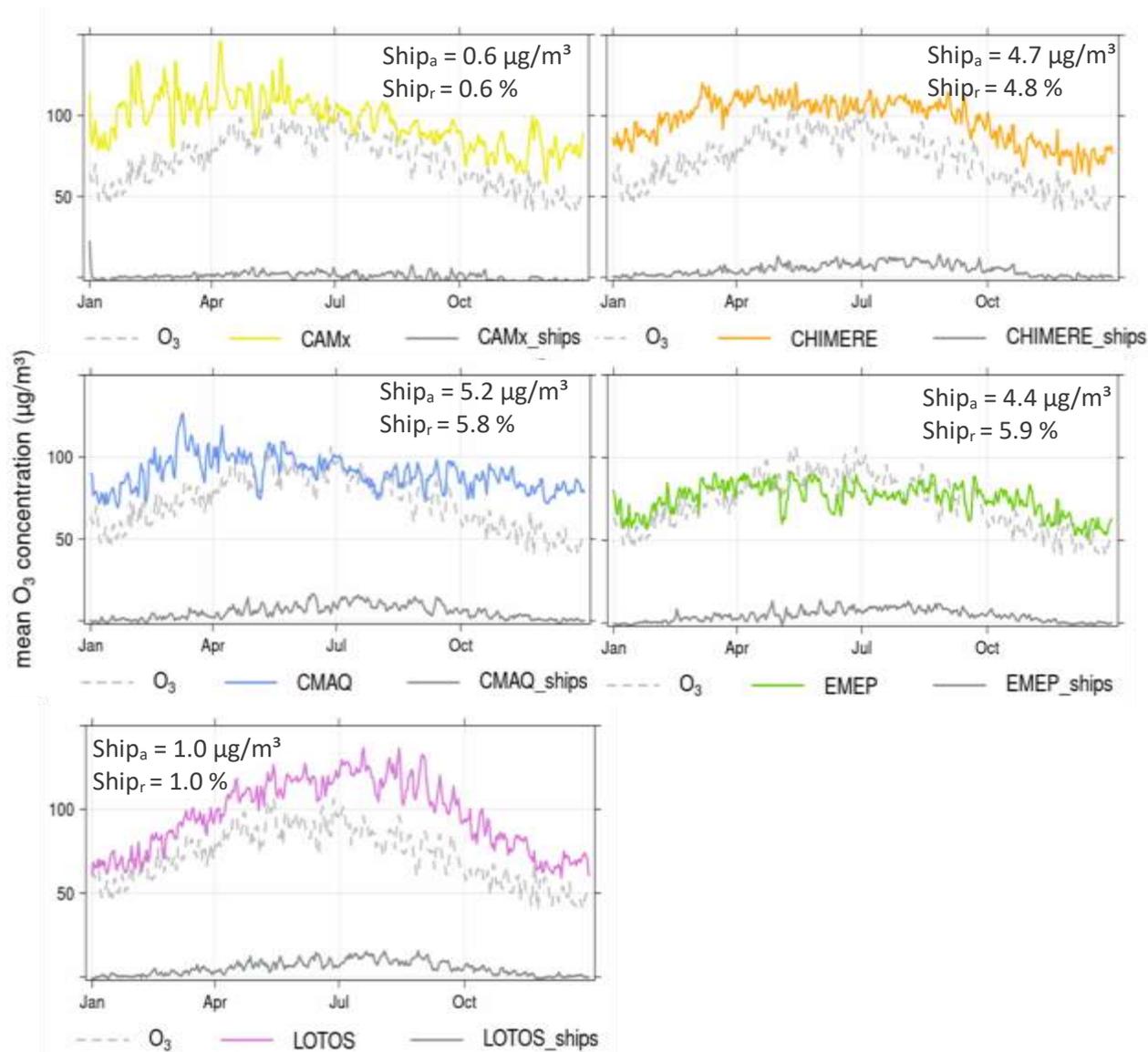


Figure S5: Time series with daily mean values of NO<sub>2</sub> for 2015 in panel "south". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx: R = 0.20, CHIMERE: R = 0.26, CMAQ: R = 0.15, EMEP: R = 0.24, LOTOS-EUROS: R = 0.22.



**Figure S6:** Time series with daily mean values of  $O_3$  for 2015 in panel “south”. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx:  $R = 0.47$ , CHIMERE:  $R = 0.56$ , CMAQ:  $R = 0.44$ , EMEP:  $R = 0.52$ , LOTOS-EUROS:  $R = 0.53$ .

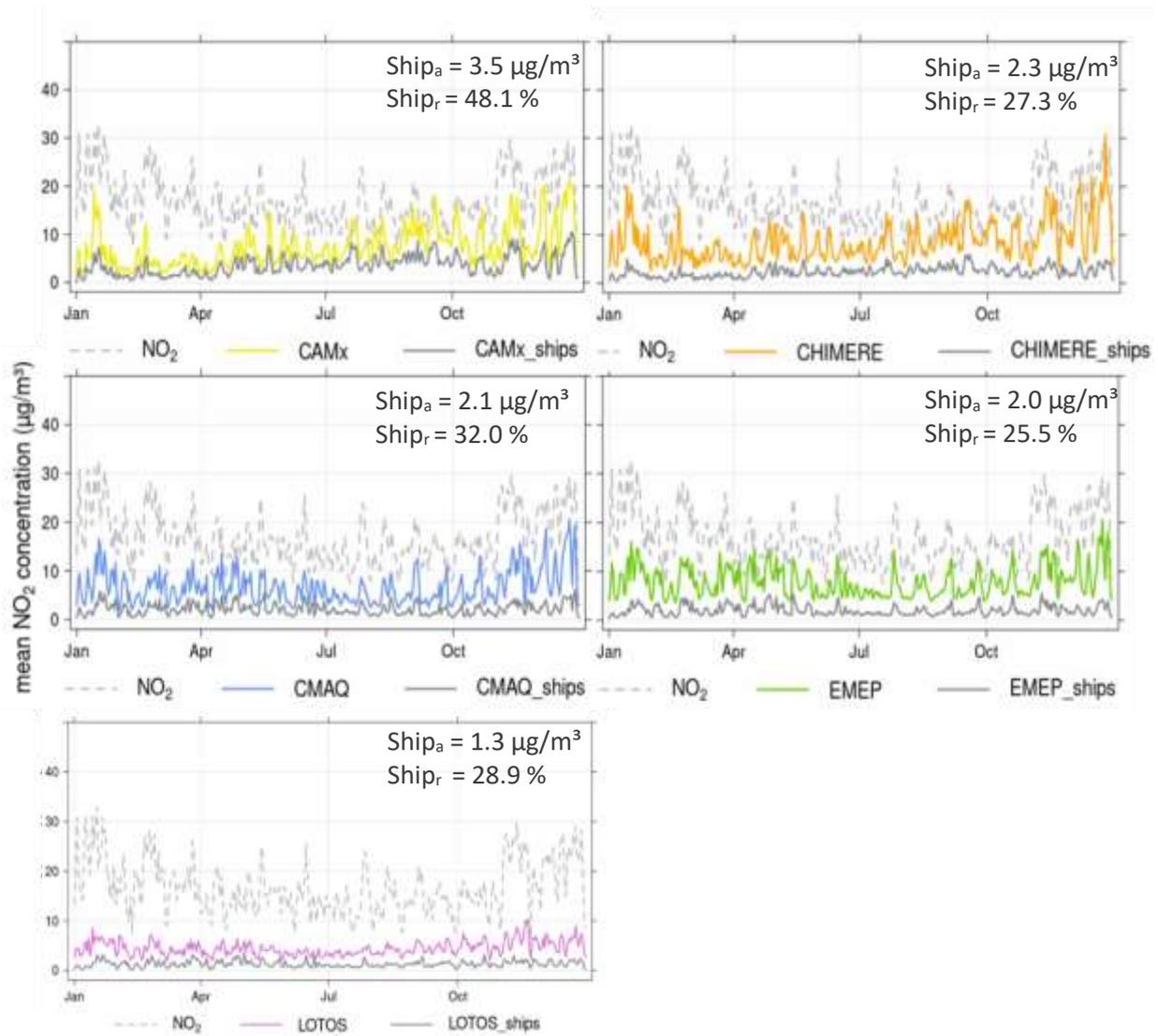
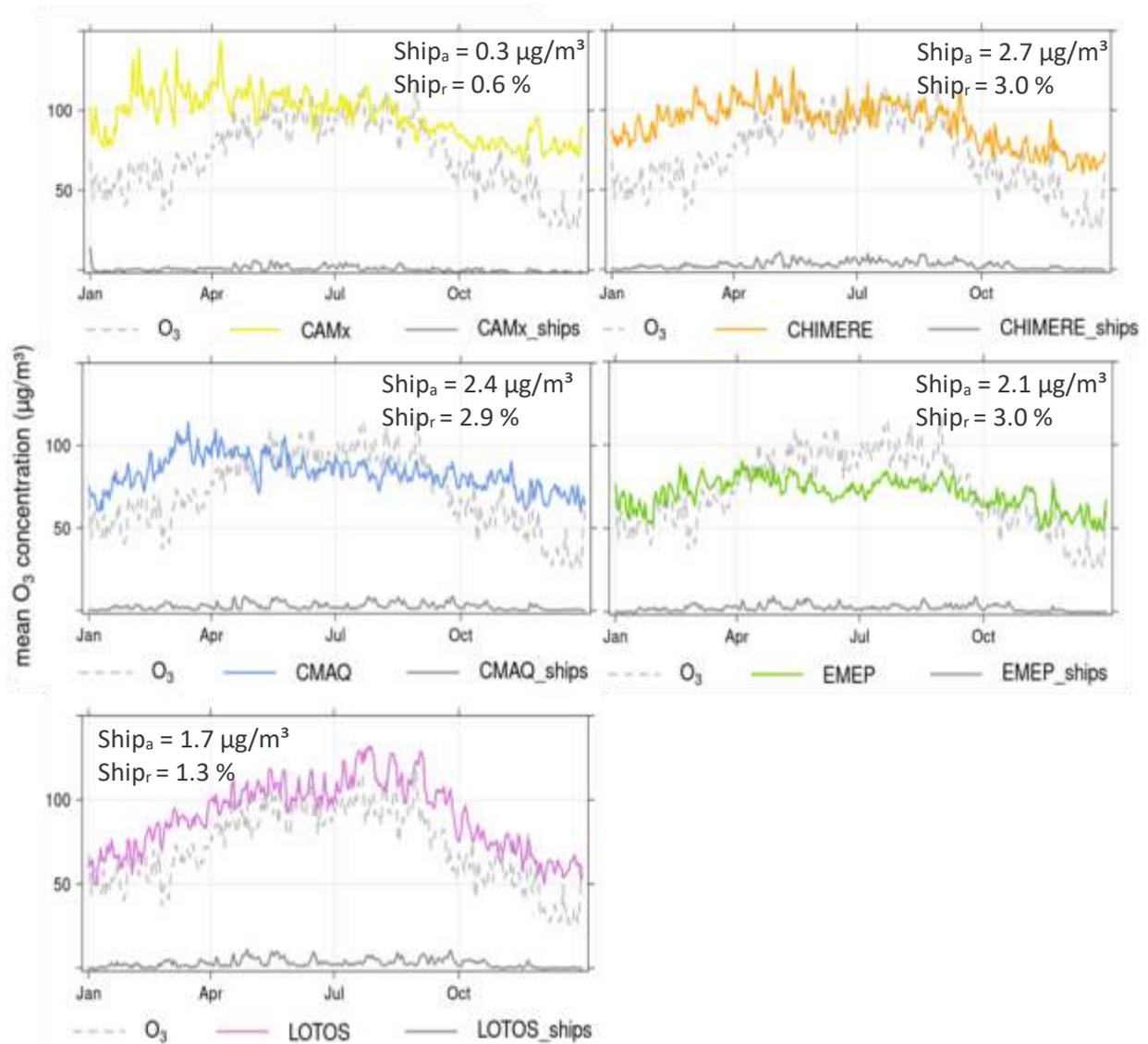


Figure S7: Time series with daily mean values of NO<sub>2</sub> for 2015 in panel "east". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx: R = 0.16, CHIMERE: R = 0.22, CMAQ: R = 0.22, EMEP: R = 0.27, LOTOS-EUROS: R = 0.23.



**Figure S8:** Time series with daily mean values of  $O_3$  for 2015 in panel "east". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx:  $R = 0.35$ , CHIMERE:  $R = 0.46$ , CMAQ:  $R = 0.37$ , EMEP:  $R = 0.47$ , LOTOS-EUROS:  $R = 0.53$ .

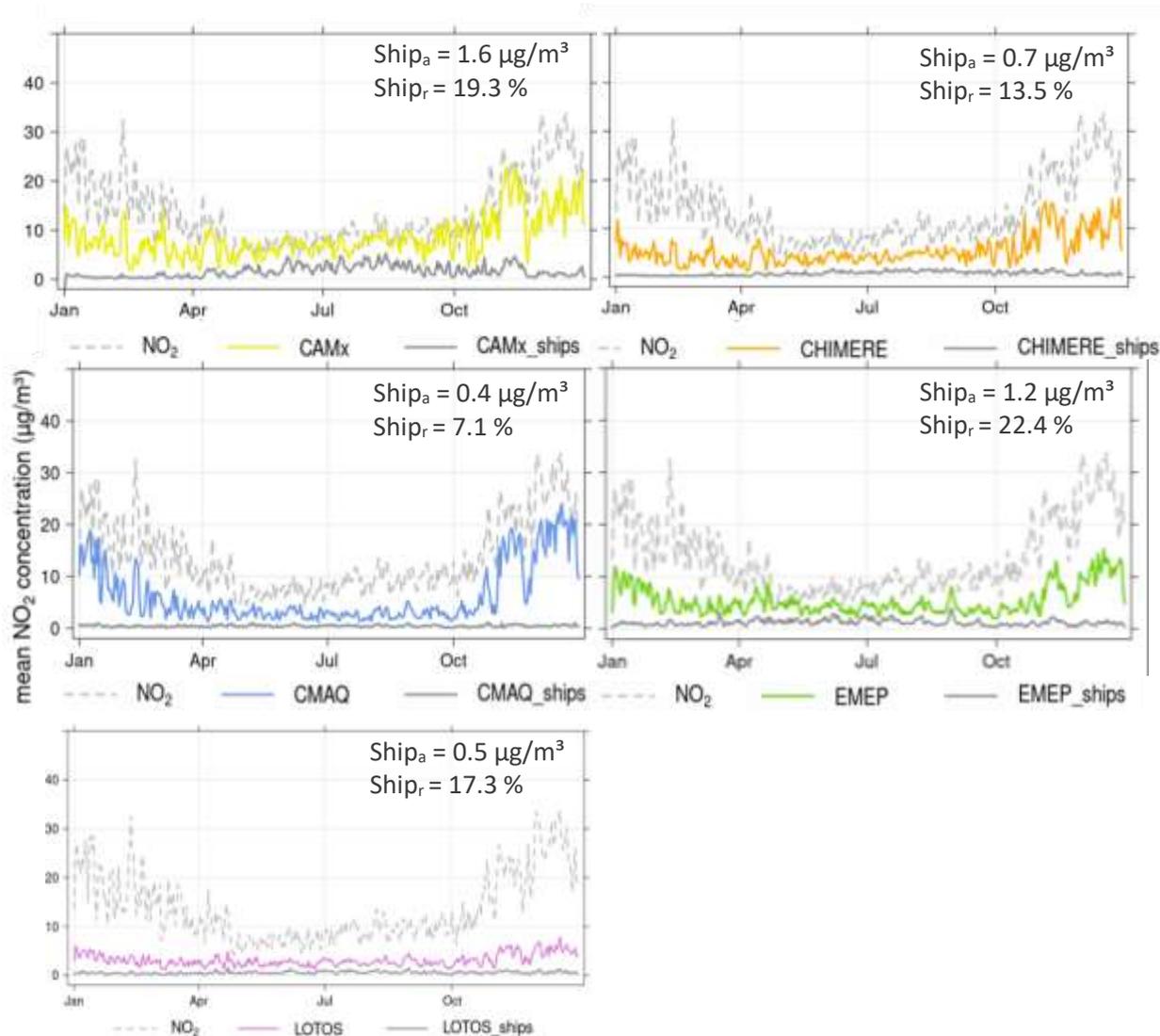
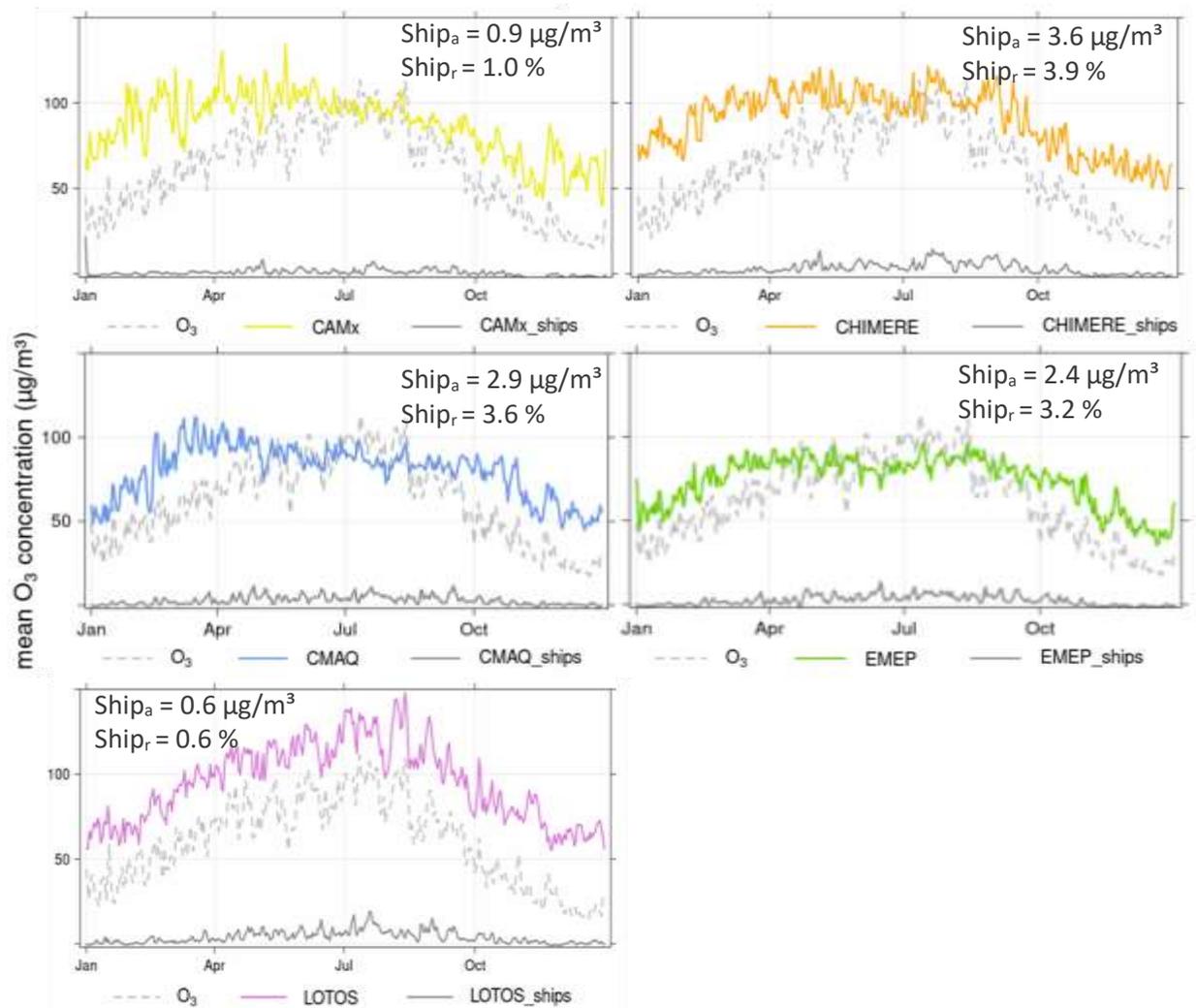
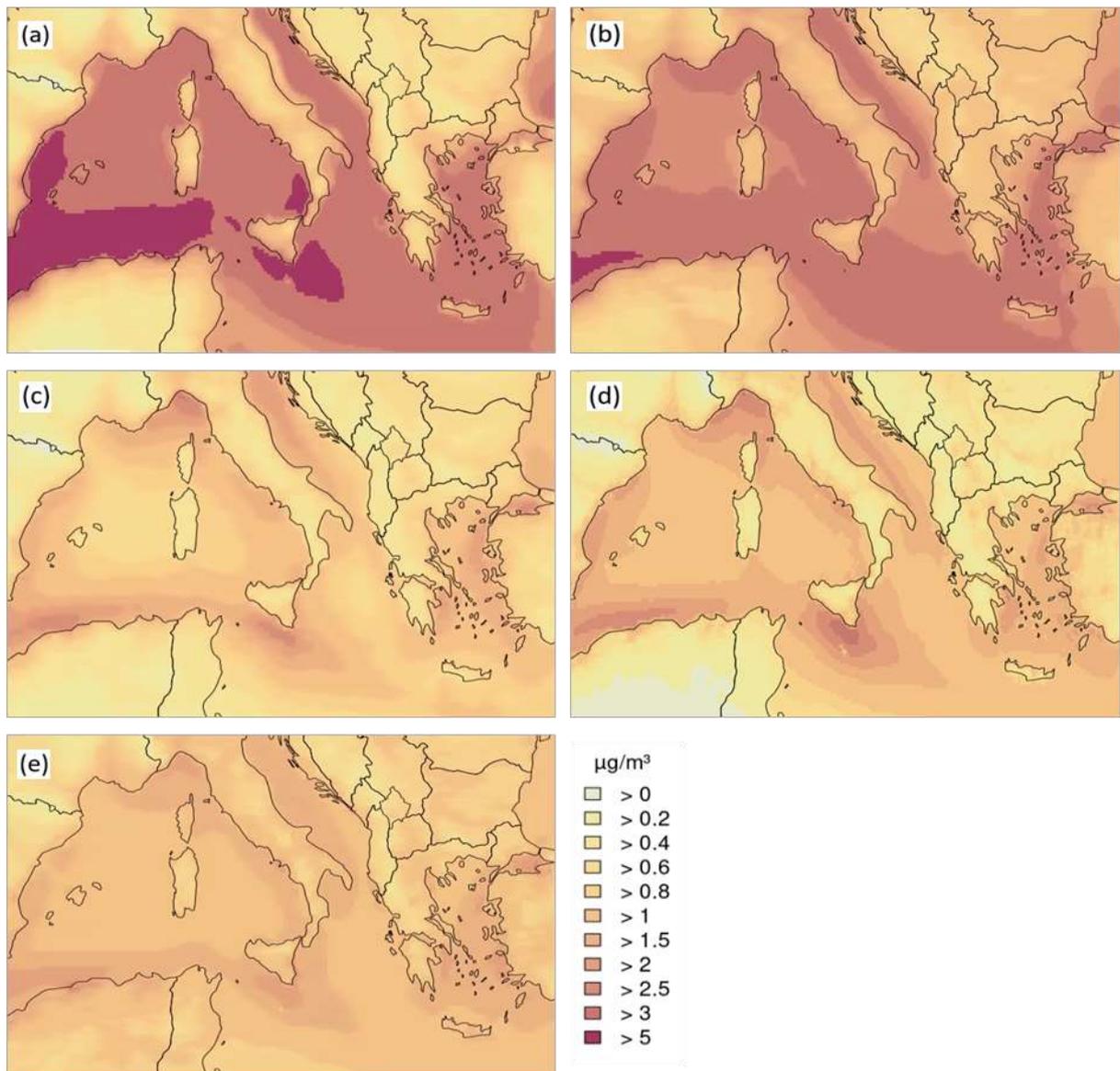


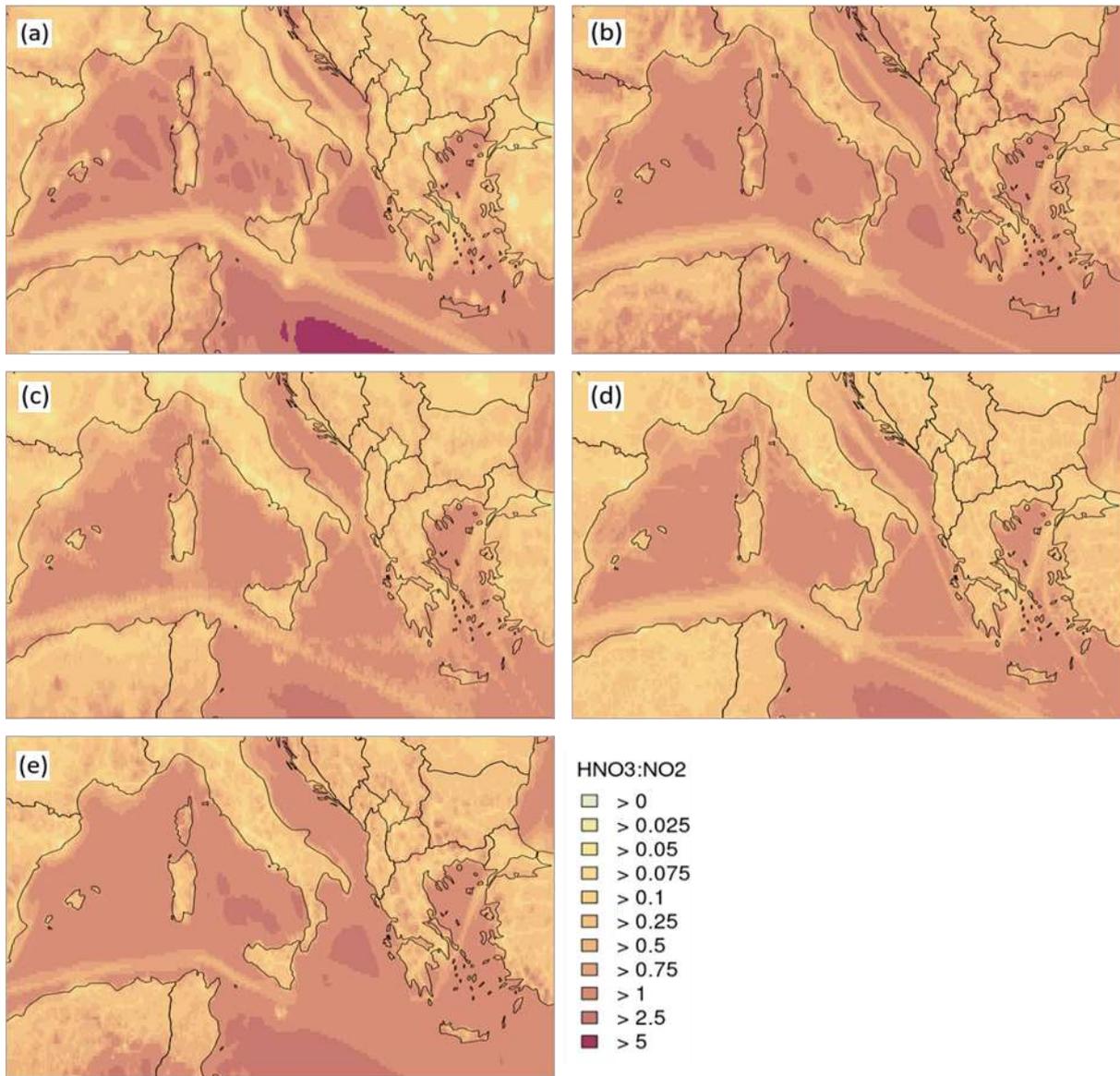
Figure S9: Time series with daily mean values of NO<sub>2</sub> for 2015 in panel "north". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx: R = 0.3, CHIMERE: R = 0.27, CMAQ: R = 0.35, EMEP: R = 0.33, LOTOS-EUROS: R = 0.26.



**Figure S10: Time series with daily mean values of  $O_3$  for 2015 in panel "north". (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS. Dashed grey line = measured data, colored lines = modelled data, grey line = modelled ship contribution. Correlation between modelled and measured data for hourly total emission data for 2015: CAMx:  $R = 0.61$ , CHIMERE:  $R = 0.70$ , CMAQ:  $R = 0.60$ , EMEP:  $R = 0.65$ , LOTOS-EUROS:  $R = 0.66.64$**



**Figure S11: Annual mean concentration of  $\text{HNO}_3$  for emisbase run with all emission sources, based on averaged daily values. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS.**



**Figure S12: Annual mean ratio of  $\text{HNO}_3:\text{NO}_2$  for emisbase run with all emission sources, based on averaged daily values. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = EMEP, (e) = LOTOS-EUROS.**

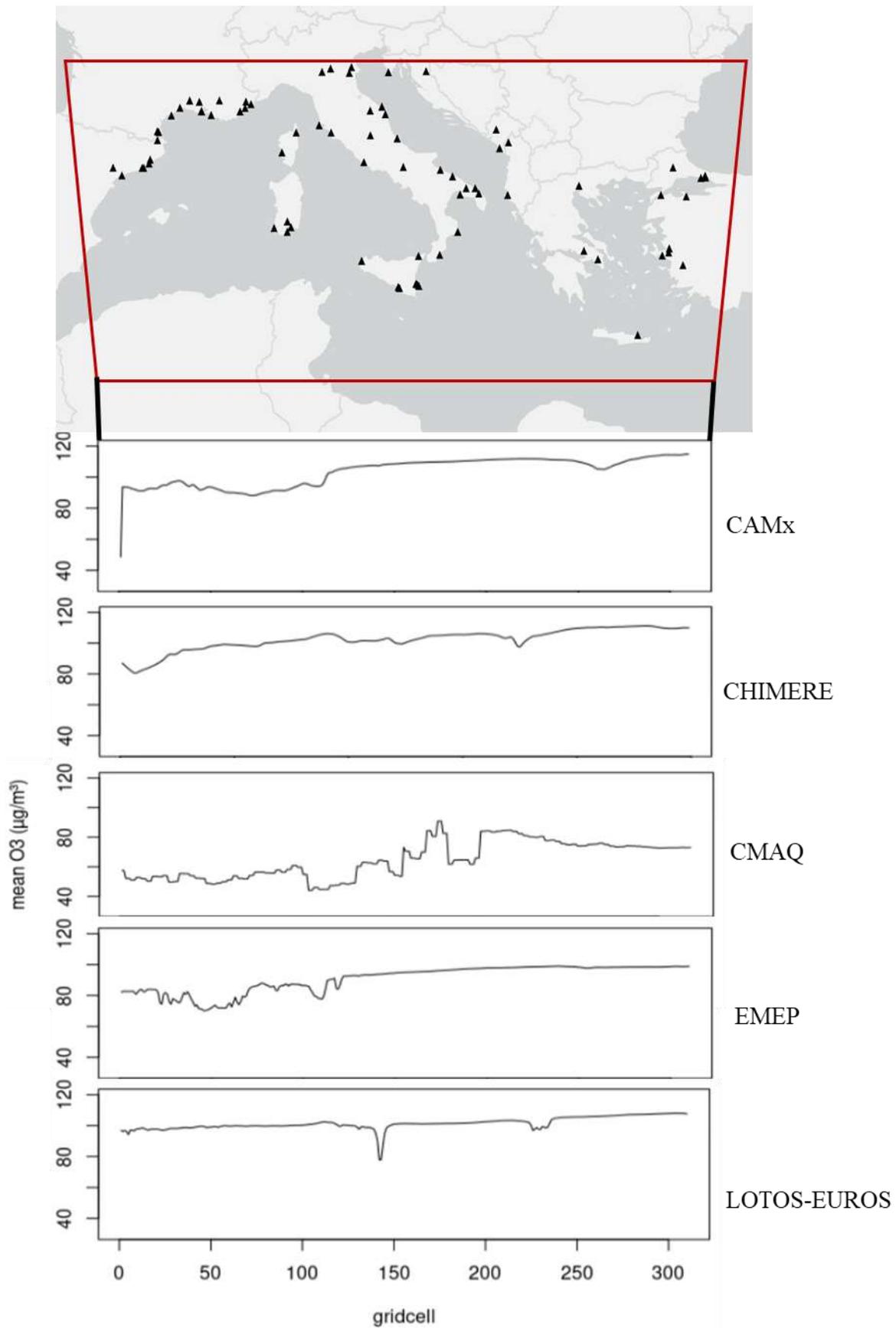


Figure S13: Boundary conditions of the southern part of the SC12 domain.

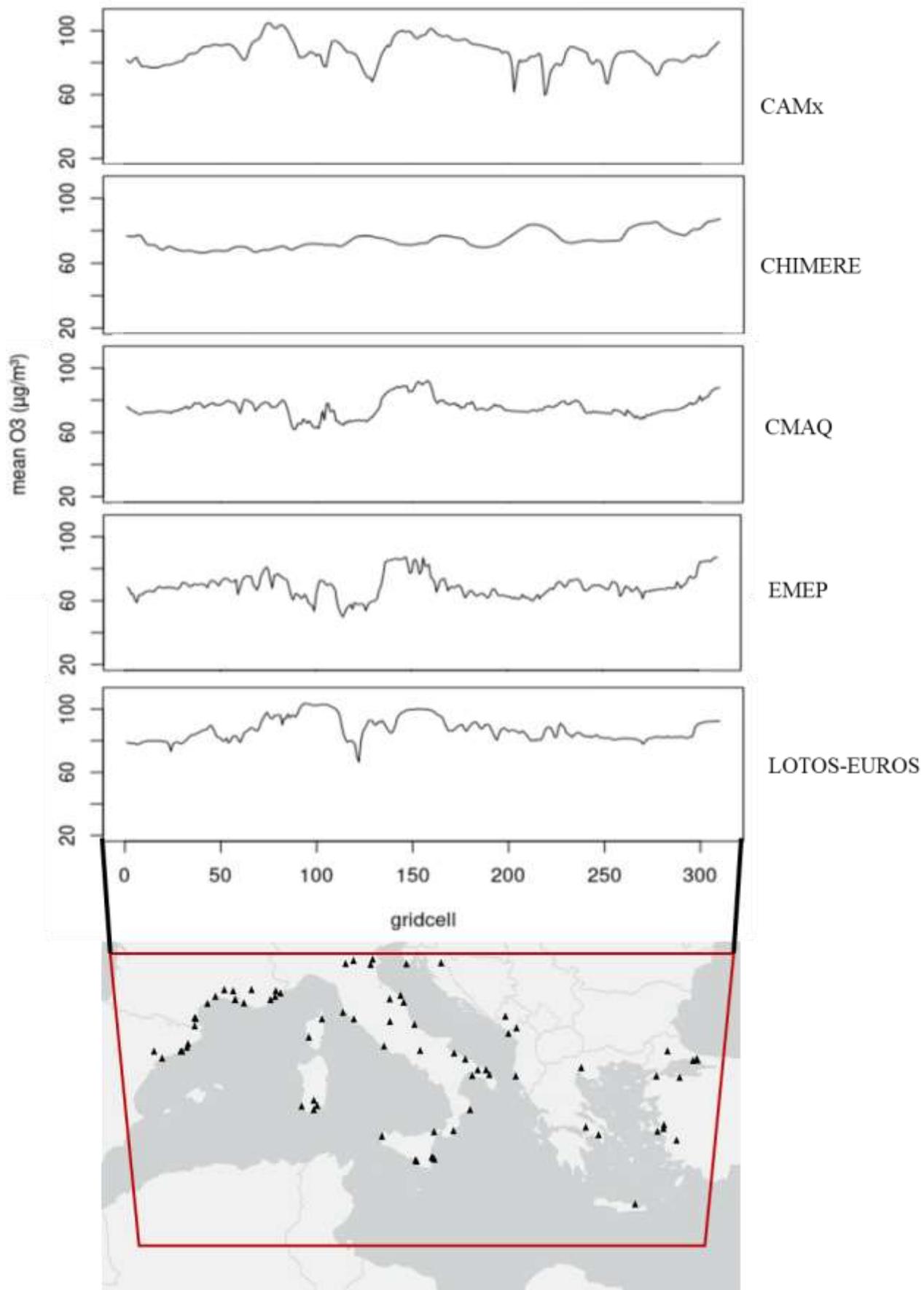


Figure S14: Boundary conditions of the northern part of the SC12 domain.

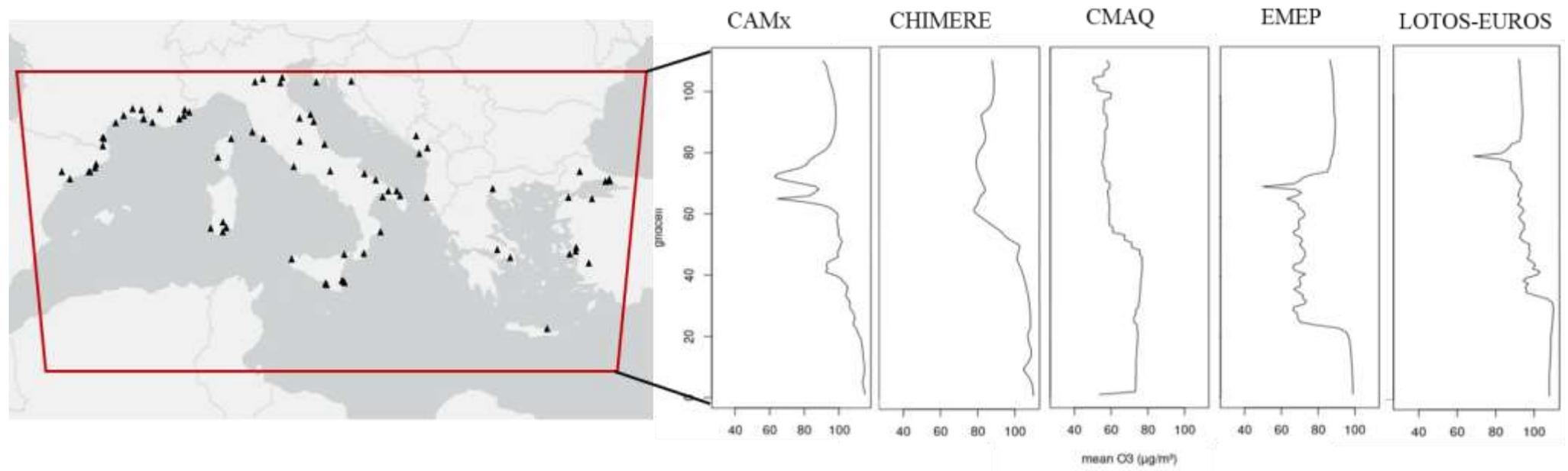


Figure S15: Boundary conditions of the eastern part of the SC12 domain.

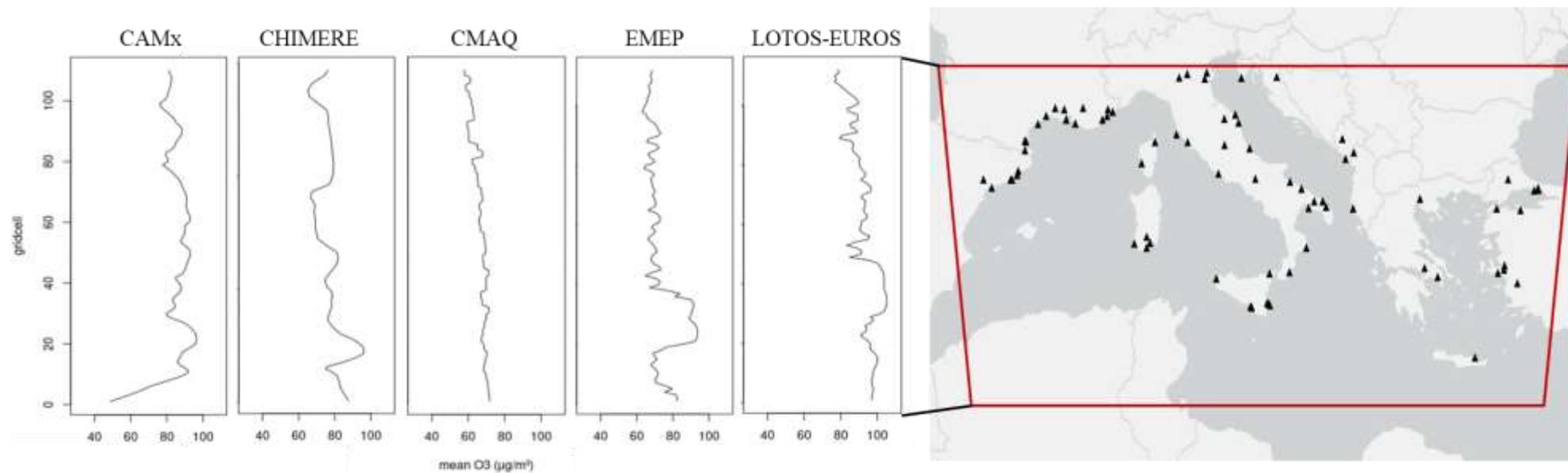


Figure S16: Boundary conditions of the eastern part of the SC12 domain.

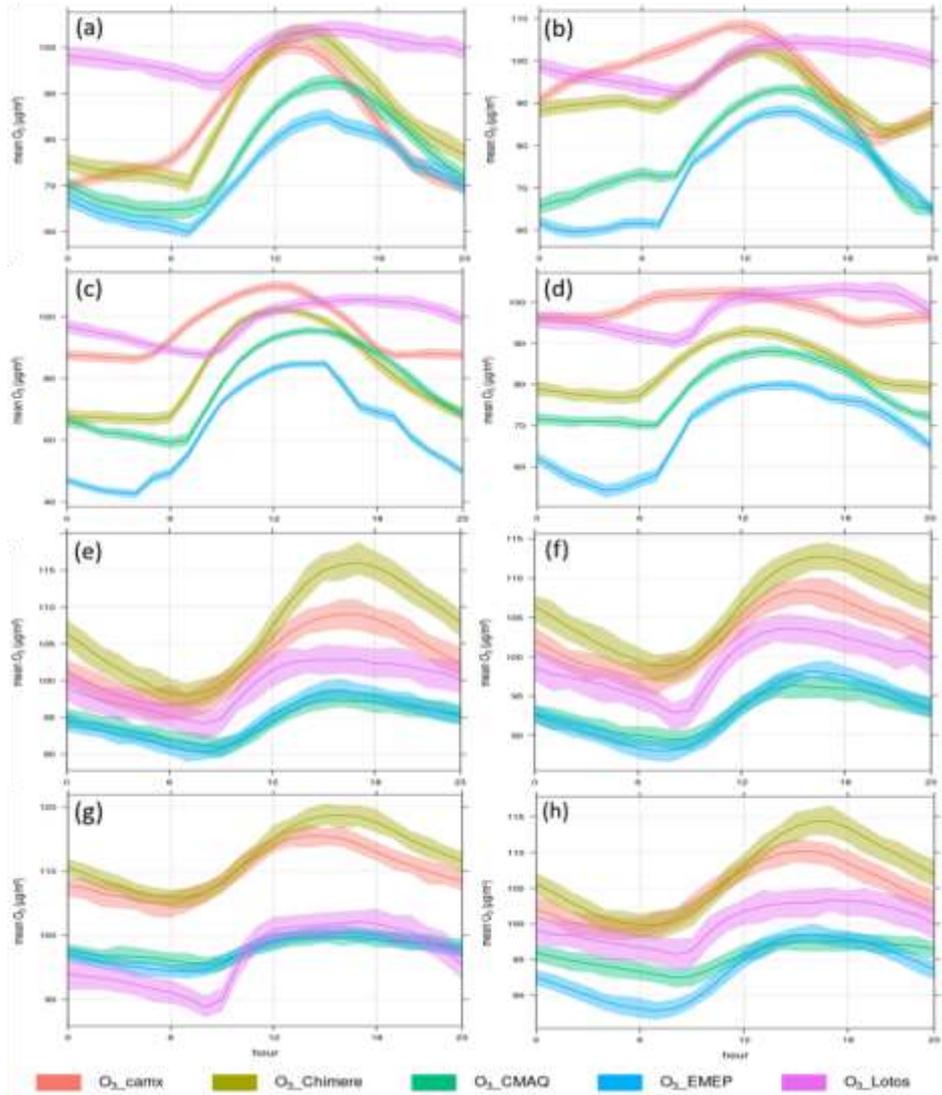


Figure S17: Diurnal cycle of O<sub>3</sub> in grid cells over land: (a) = Location 1, (b) = Location 2, (c) = Location 3, (d) = Location 4. Diurnal cycle of O<sub>3</sub> in grid cells over water: (e) = Location 5, (f) = Location 6, (g) = Location 7, (h) = Location 8. The map displays the location of the respective chosen grid cell.

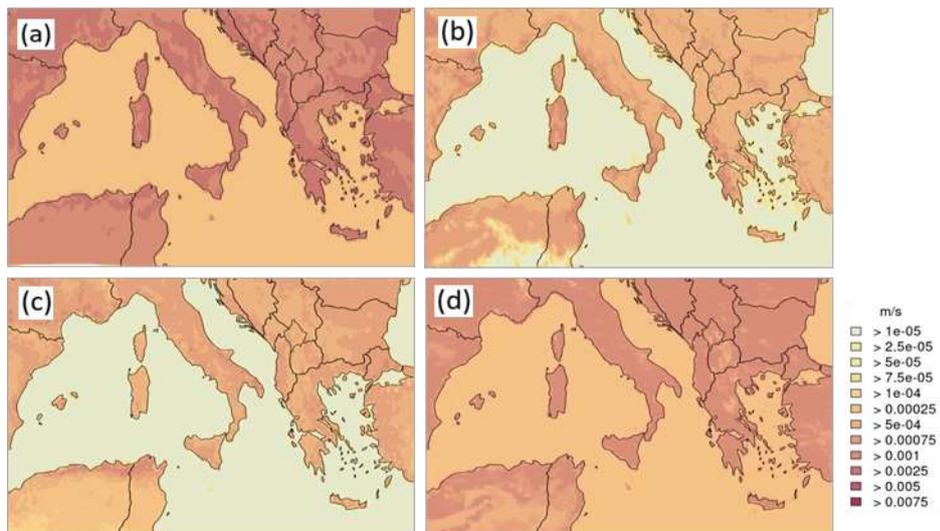


Figure S18: annual mean NO<sub>2</sub> deposition velocities based on hourly data. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = LOTOS-EUROS.

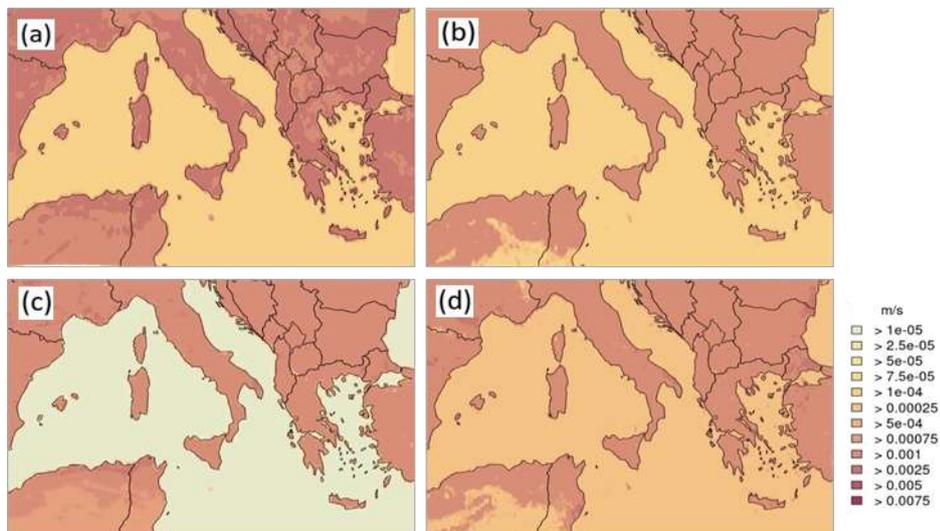


Figure S19: annual mean O<sub>3</sub> deposition velocities based on hourly data. (a) = CAMx, (b) = CHIMERE, (c) = CMAQ, (d) = LOTOS-EUROS.

Table S20: annual total of biogenic emissions (in g).

	CAMx	CHIMERE	CMAQ	EMEP	LOTOS-EUROS
ISOP	2.08E+08	3.05E+12	2.19E+12	1.835E+12	2.3753E+12
TERP	5.67E+07	0.00E+00	1.14E+12	1.696E+12	1.2652E+12
PAR	1.10E+06		1.27E+11		
XYL	4.40E+03		0.00E+00		
OLE	1.36E+05		2.32E+11		
MEOH	1.08E+05		5.71E+11		
CH4	2.41E+04		2.39E+08		
NH3	0.00E+00		0.00E+00		
NO	3.60E+06	7.17E+10	7.25E+11	1.06E+11	2.5184E+11
ALD2	5.99E+04		8.05E+10		
ETOH	6.00E+04		7.96E+10		
FORM	2.22E+04		1.37E+10		
ALDX	2.06E+04		0.00E+00		
TOL	2.71E+03		0.00E+00		
IOLE	2.77E+04		1.78E+10		
CO	4.46E+05		3.13E+11		
ETHA	1.49E+03		3.69E+10		
ETH	9.65E+04		6.46E+10		
AACD			1.16E+10		
FACD			4.39E+10		
HCN			4.84E+09		
ISPD			1.22E+11		
N2O			0.00E+00		
SESQ			9.50E+10		
TRS			0.00E+00		
CH3BR			1.41E+08		
CH3CL			6.03E+08		
CH3I			5.40E+09		
HONO	0.00E+00				
NO2	0.00E+00				
TRP	5.66E+07				
POA	0.00E+00				
SO2	0.00E+00				
PEC	0.00E+00				
PSO4	1.34E+12				
NA	6.93E+09	2.88E+09			
PCL	9.64E+09				
ISP	2.08E+08				
CPRM (DUST)	5.33E+11	9.90E+11			
FPRM (SEASALT)	1.79E+11	9.28E+11			
DMS				1.85E+11	
APINEN	4.64E+11	4.71E+10			
BPINEN	2.06E+11	2.93E+11			
OCIMEN	1.29E+11	1.67E+11			
H2SO4		7.61E+11			
Limonene		1.43E+11			
<b>total sum</b>	<b>2.07E+12</b>	<b>5.04E+12</b>	<b>5.87E+12</b>	<b>3.64E+12</b>	<b>3.89E+12</b>