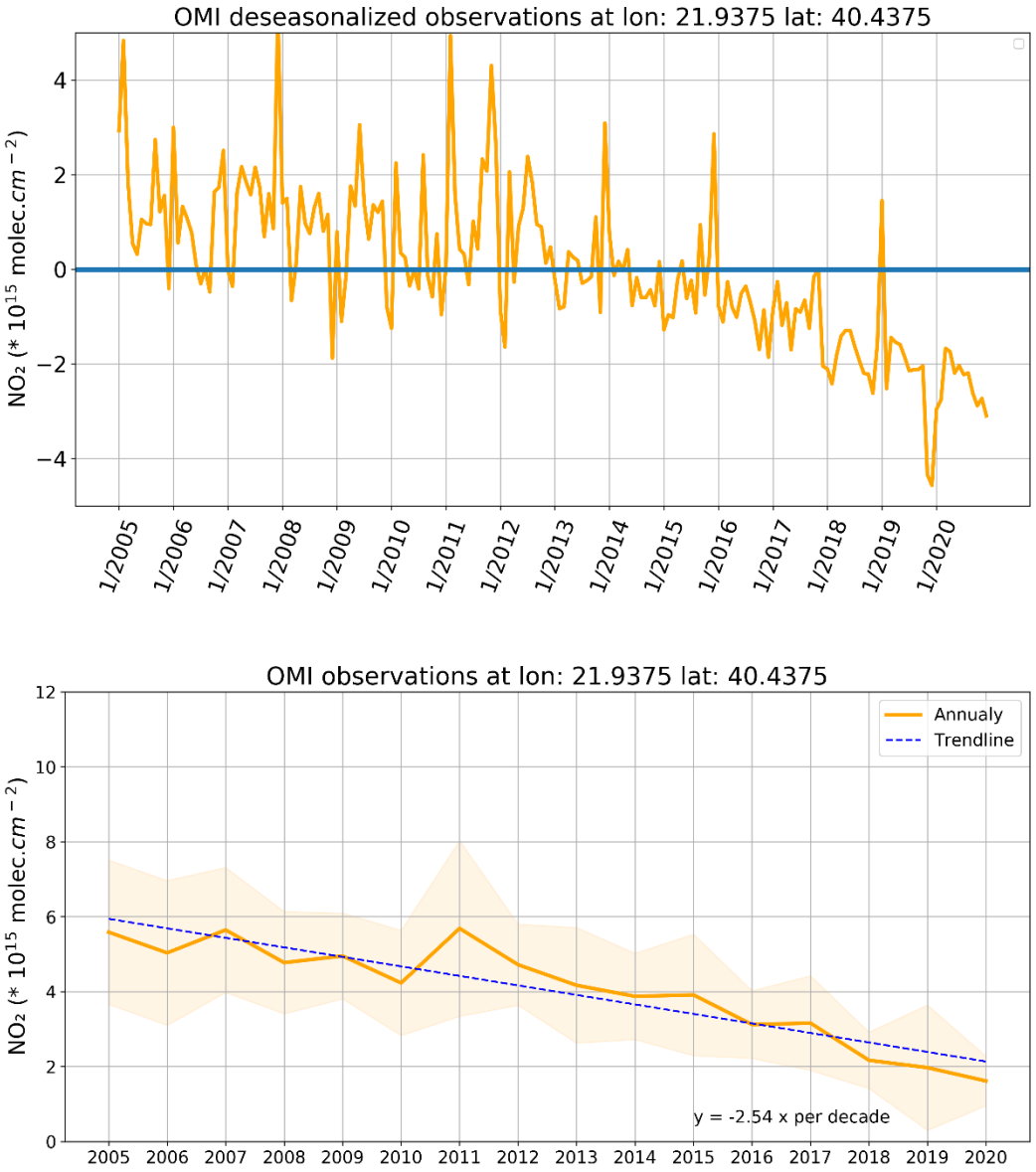

Figure S1 Top: Time series of deseasonalized mothly NO_2 columns from OMI/AURA for the period between 2005 and 2020 at the pixel where Ag. Dimitrios is located. **Bottom:** Time series of mean annual NO_2 columns from OMI/AURA at the same location. The shaded area denotes the standard deviation of the mean values and the trend is shown in blue.

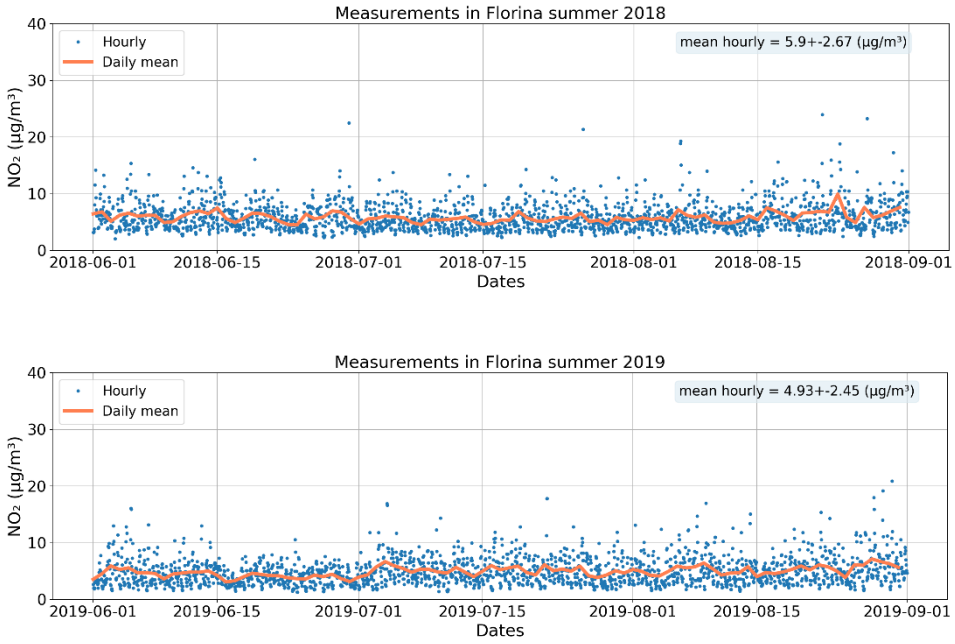

Figure S2. Timeseries of NO_2 hourly measurements (blue dots) in the station of Florina and the daily mean NO_2 (orange line) for the summer of 2018 (top) and 2019 (bottom).

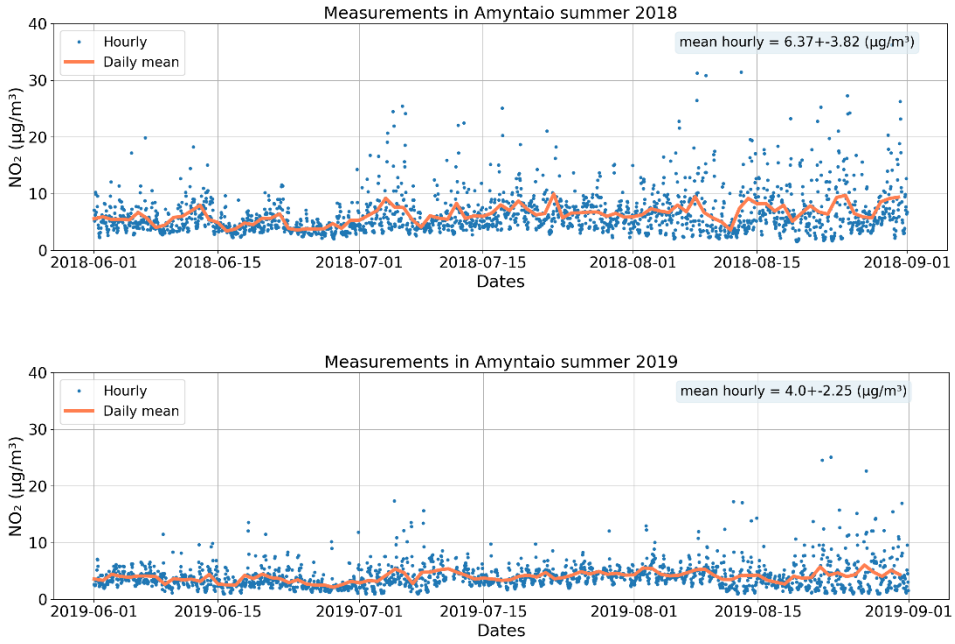

Figure S3. Timeseries of NO_2 hourly measurements (blue dots) in the station of Amyntaio and the daily mean NO_2 (orange line) for the summer of 2018 (top) and 2019 (bottom).

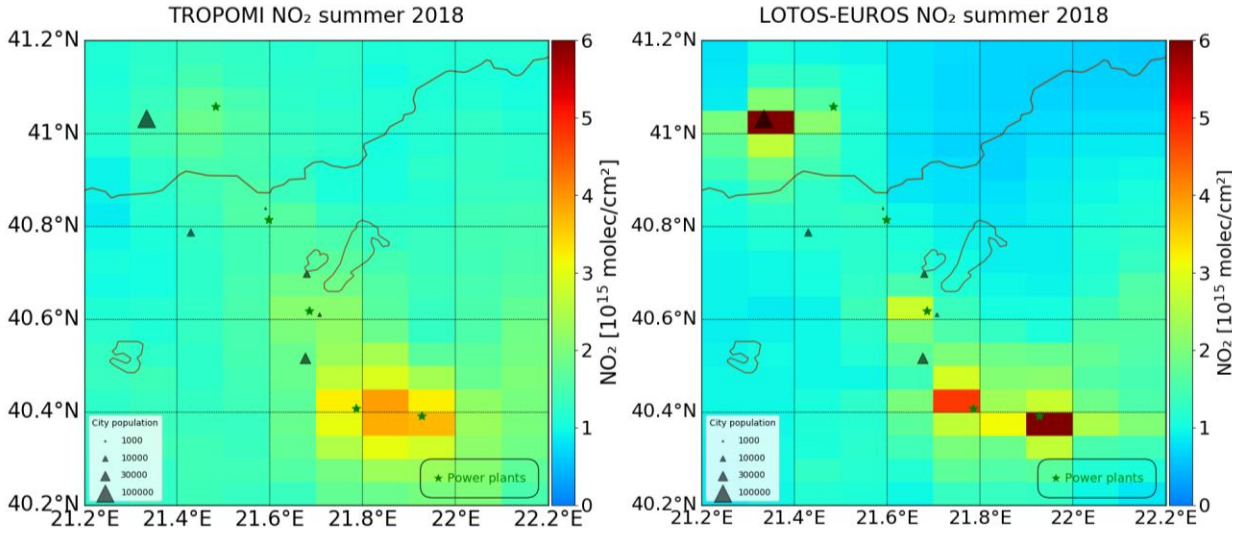

Figure S4 Seasonal averaged NO_2 tropospheric columns in summer 2018 (a) from S5P/TROPOMI**; (b) and** LOTOS-EUROS CTM after the AK of the satellite product are applied.

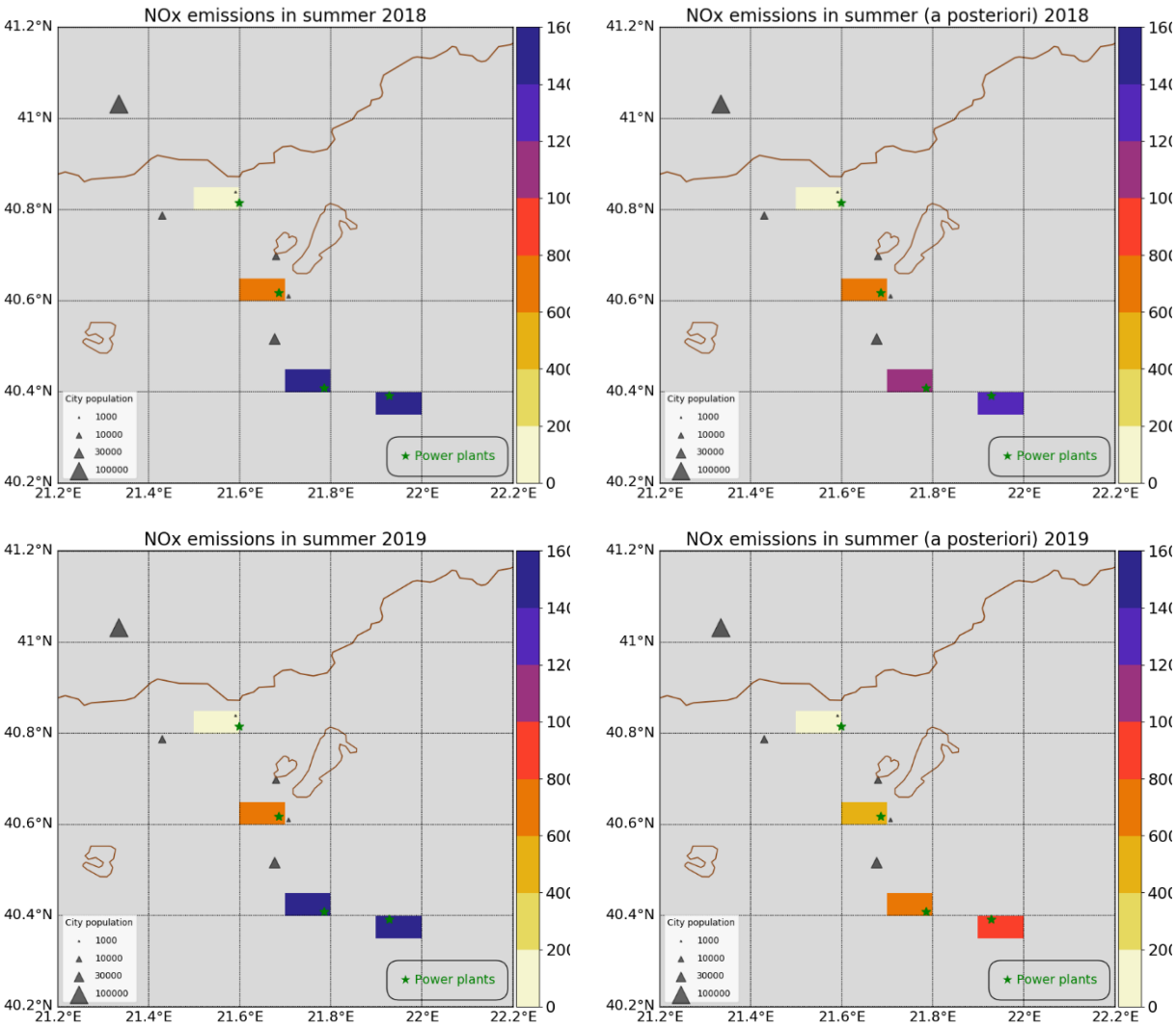

Figure S5 (a) Aggregated NO_x *a priori* emissions over the four grid pixels in Northwest Greece used for the base run in summer 2018 (top) and summer 2019 (bottom); **(b) same** for the NO_x *a posteriori* emissions assimilated using S5P/TROPOMI observations

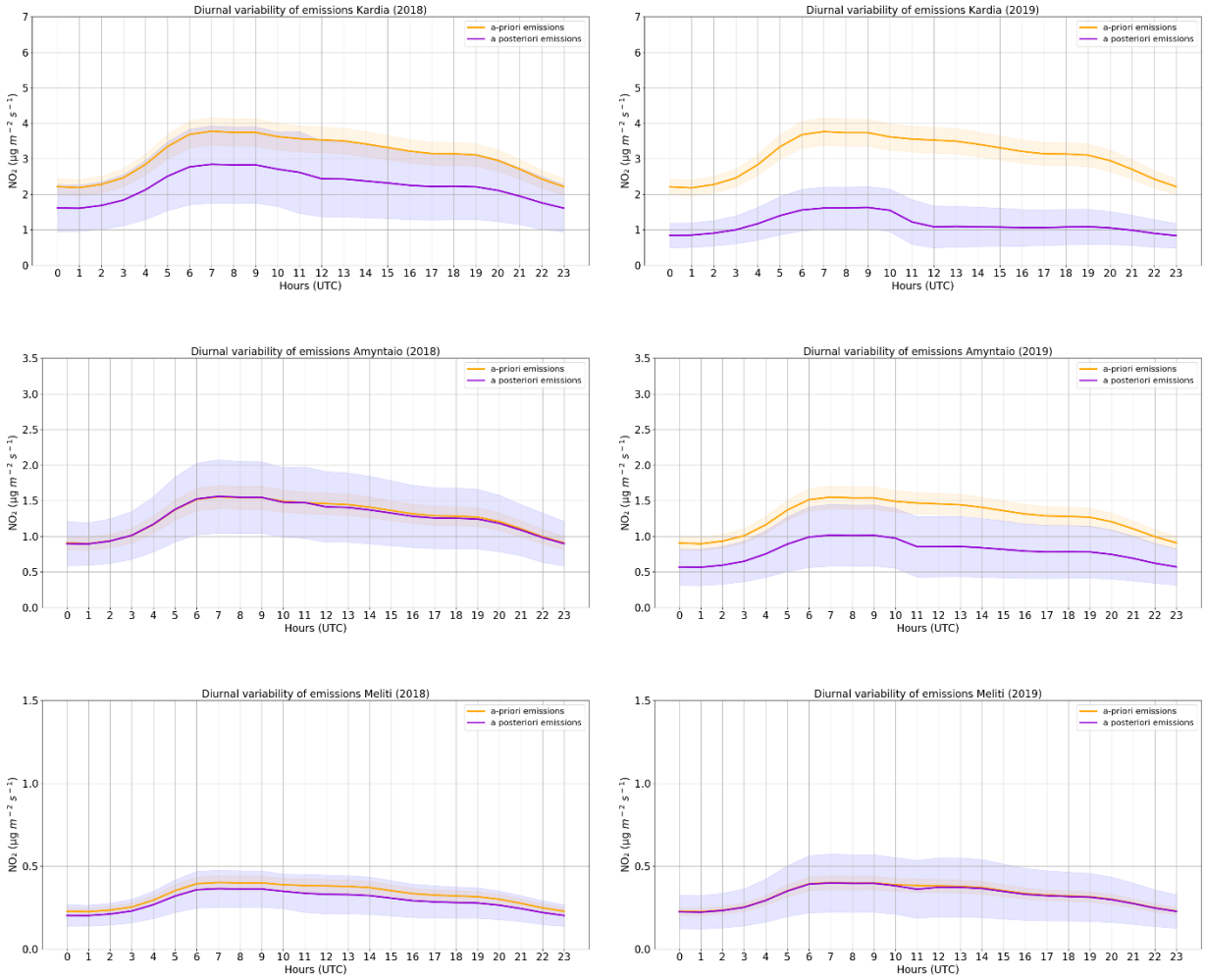

Figure S6 (a) Diurnal variability of NO_x *a priori* and *a posteriori* emissions derived from TROPOMI assimilation over the power plants of Kardia (top), Amyntaio (middle) and Meliti (bottom) are located in summer 2018; **(b)** the same for summer 2019. The shaded areas refer to the standard deviation of the averaged values.

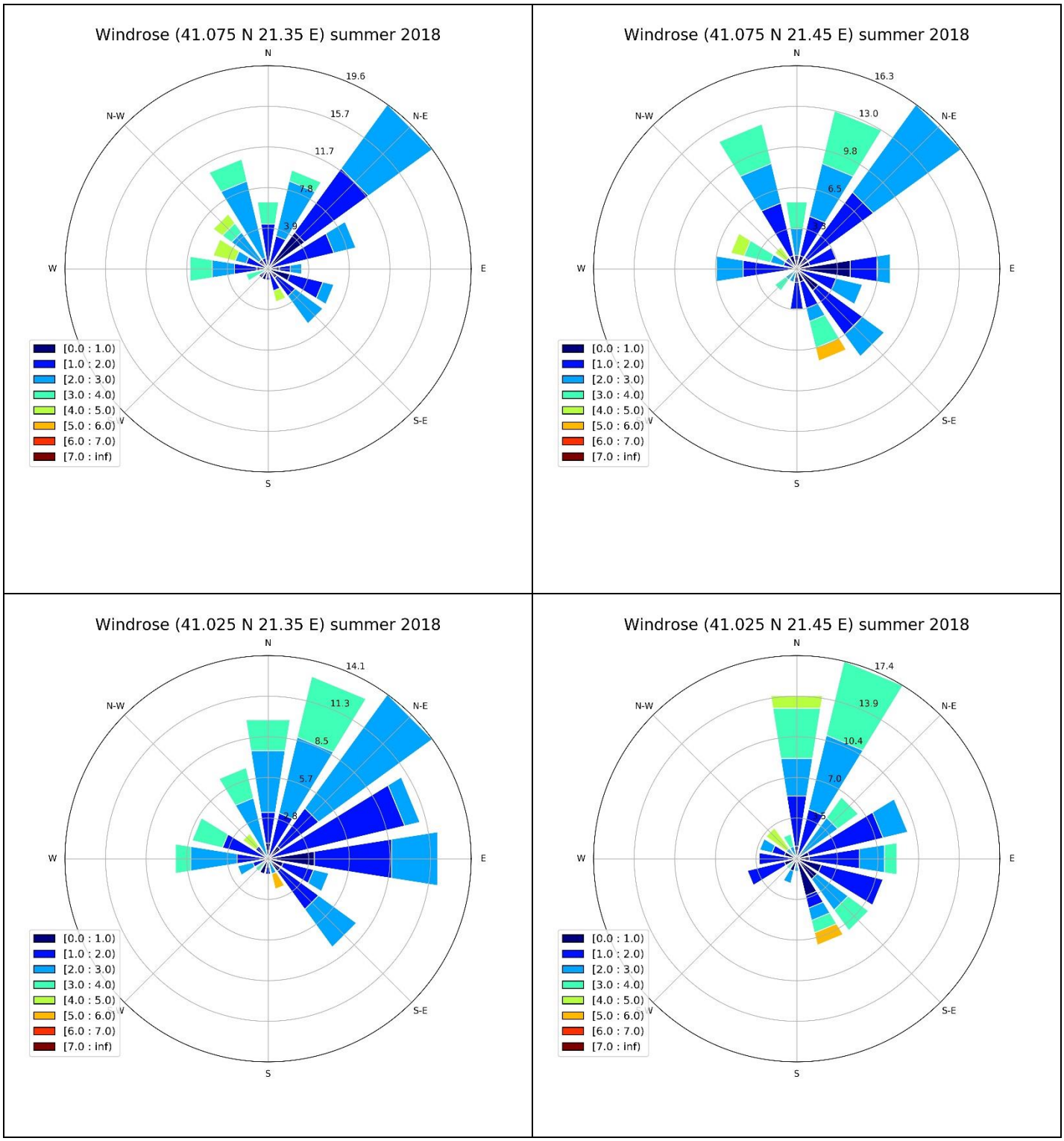

Figure S7 Windroses for the pixels around around the power plant and city of Bitola in summer 2018.

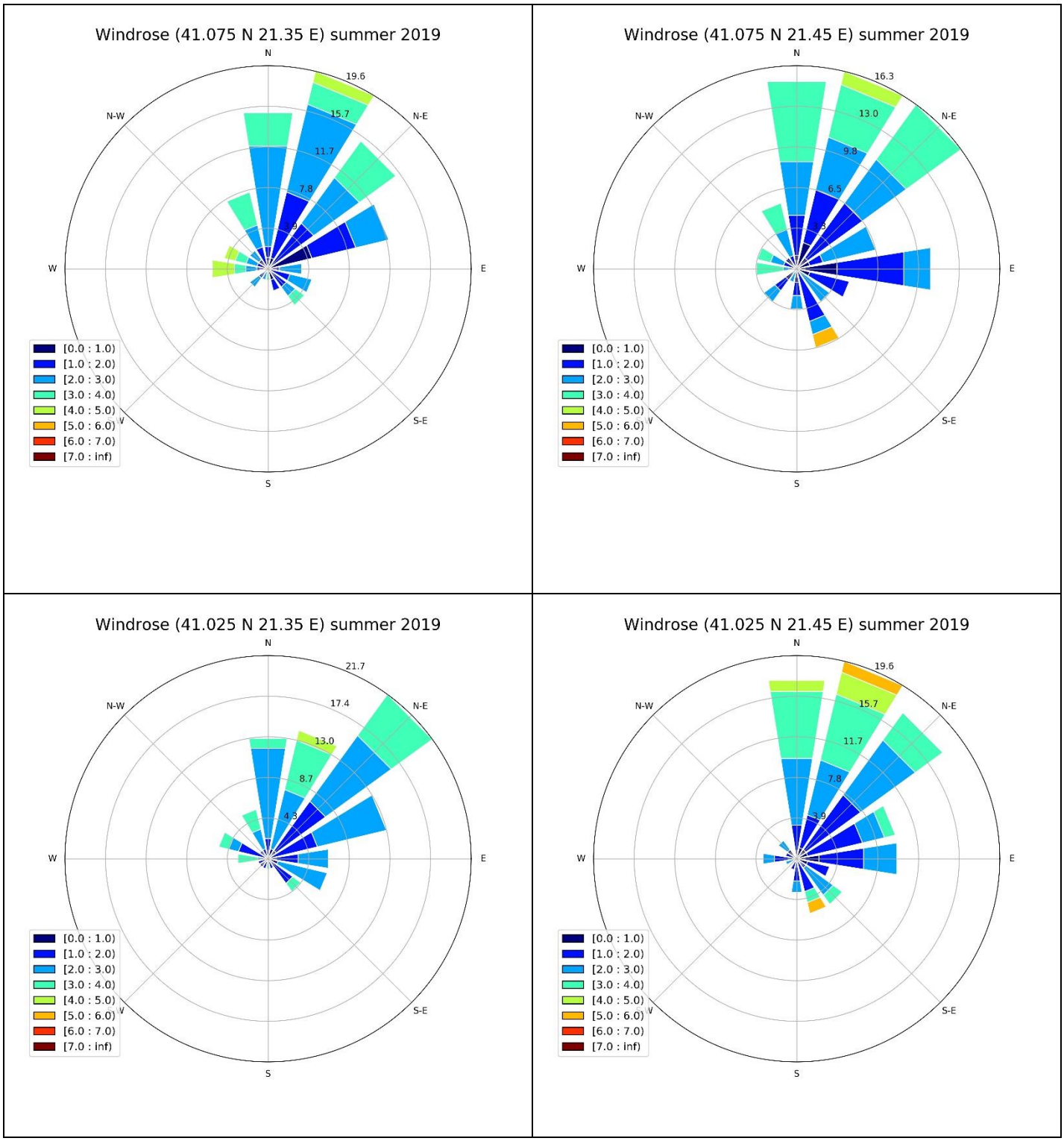

Figure S8 Windroses for the pixels around around the power plant and city of Bitola in summer 2019.

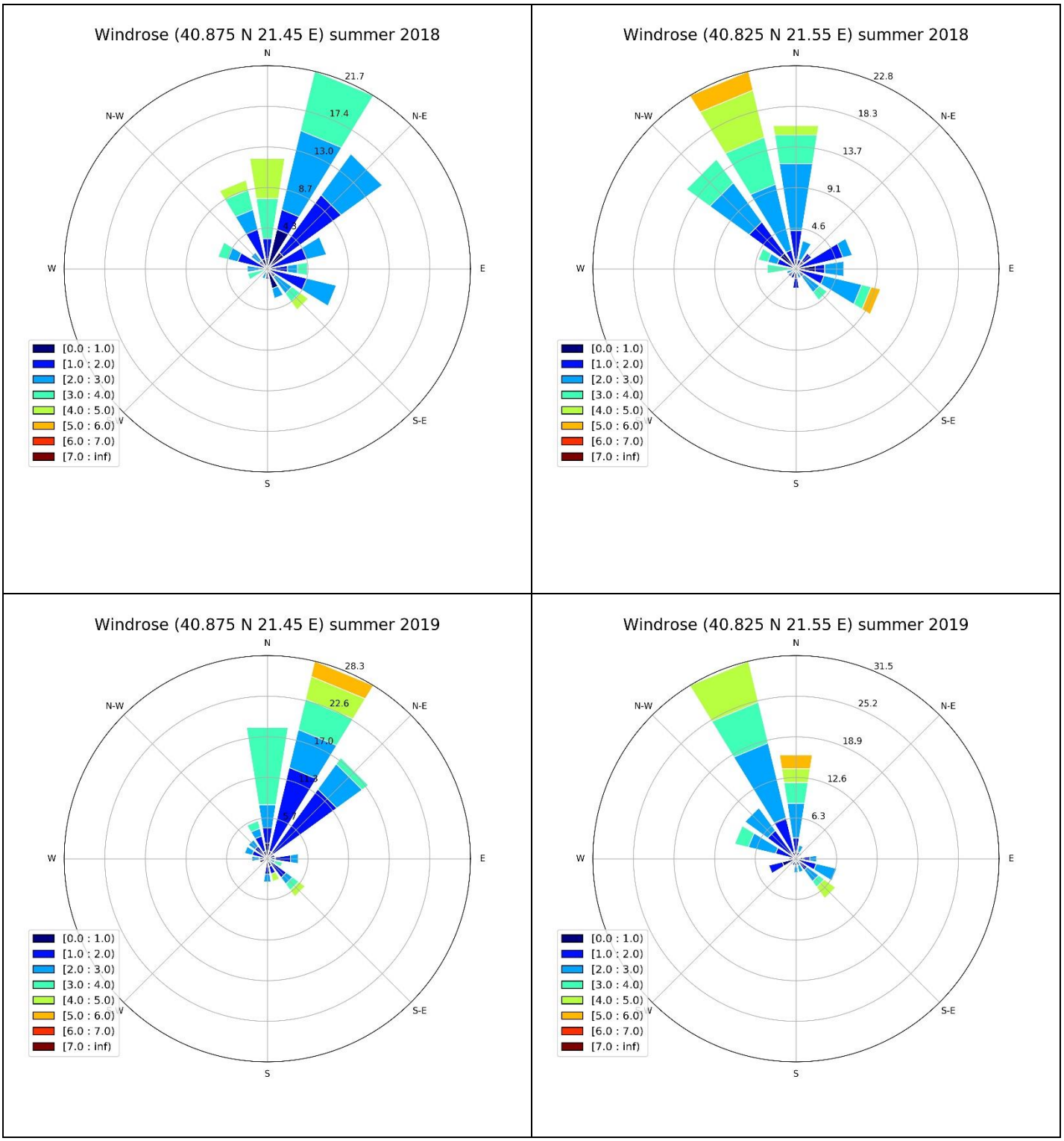

Figure S9 Windroses for the pixels around the power plant and city of Meliti in summer 2018 (top) and 2019 (bottom).

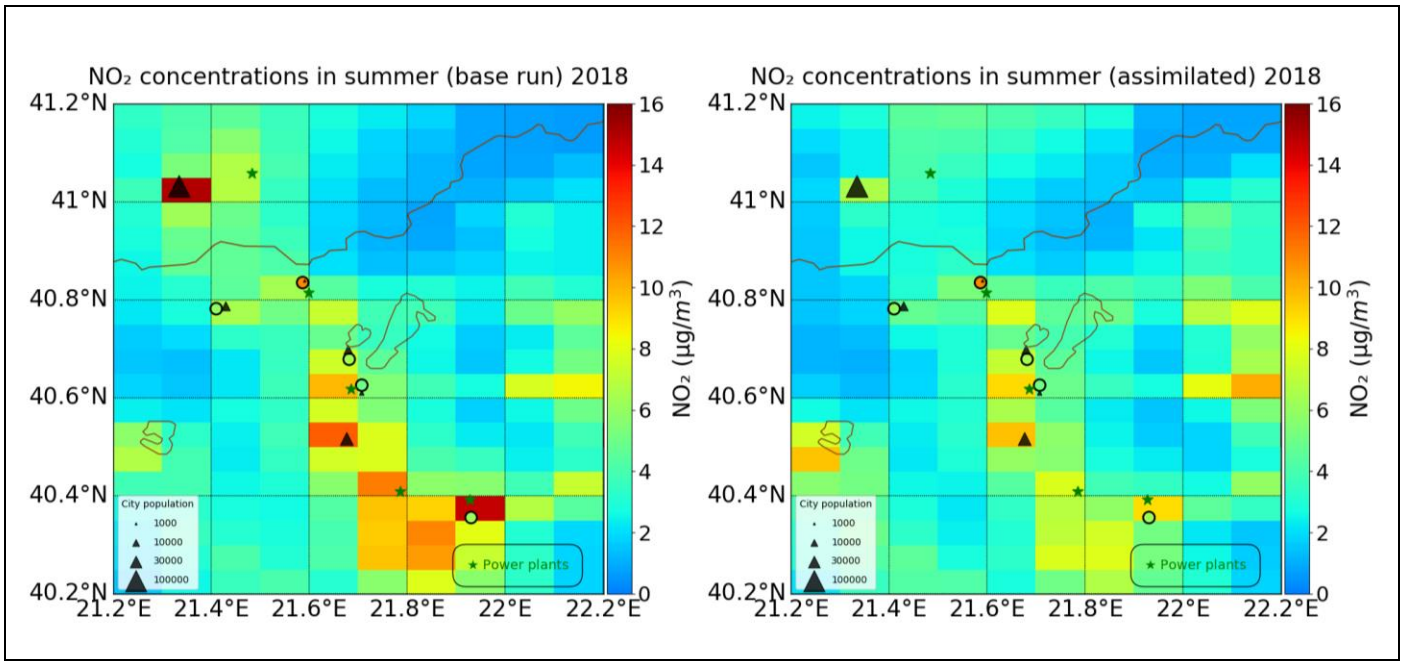

Figure S10 LOTOS-EUROS surface simulations compared with in situ measurements (coloured circles). (a) base run for summer 2018 (b) assimilated run for summer 2018. The color of the circles indicates the average summer-time level of the in situ measurements.

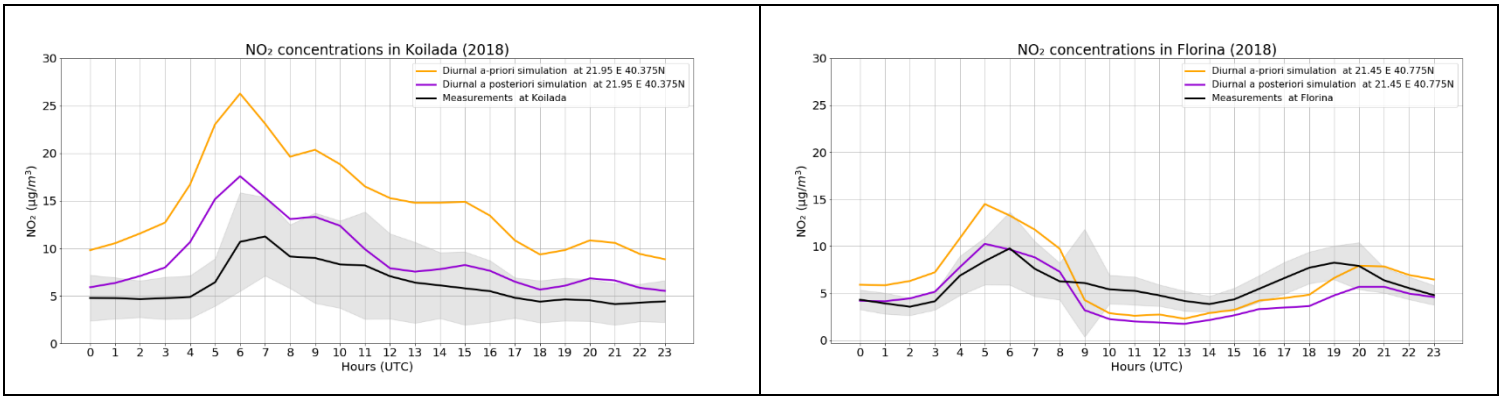

Figure S 11 (a) Diurnal variability of NO_2 surface concentrations as simulated by the model using the *a priori* emissions (orange lines), the *a posteriori* emissions form S5P/TROPOMI assimilation (purple lines) and in situ measurements (black lines) of the station Koilada (left) and Florina (right) for summer 2018.

Table S1. Statistics of the comparison of LOTOS-EUROS surface simulations with the *a priori* emissions (base run) and the simulations with the *a posteriori* emissions (assimilated) with in situ surface measurements in summer 2018. P.P. refers to power plant.

Air Quality stations	Emission sources	Seasonal mean (μg/m3) ±std			Bias (μg/m3)	
		Measurements	Base run	Assimilated	Base run	Assimilated
Koilada	P.S. Ag. Dimitrios	6.22±3.93	14.68±10.70	9.05±6.98	8.46	**2.83**
Filotas	Town of Filotas/ P.P. Amyntaio	5.05±3.74	5.46±4.65	4.93±4.43	0.40	**-0.13**
Amyntaio	Town of Amyntaio/ P.S. Amyntaio	6.37±3.82	7.50±7.35	7.22±7.55	1.13	**0.85**
Meliti	Town of Meliti/P.P. Meliti/ P.P. Bitola	10.93±11.05	6.38±5.53	5.30±4.94	-4.54	-5.63
Florina	Town of Florina	5.90±2.67	6.49±6.13	4.74±4.81	0.59	-1.15