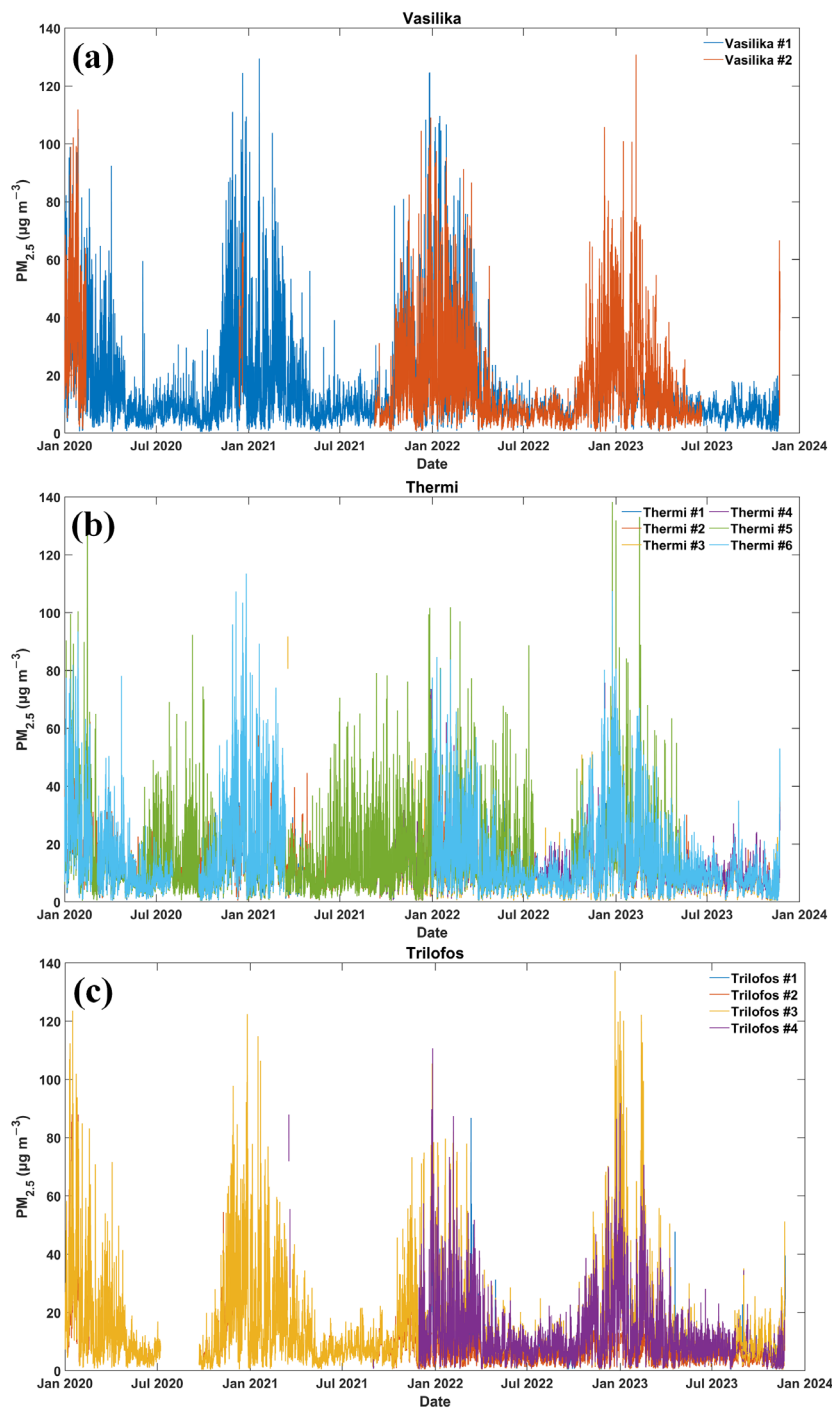
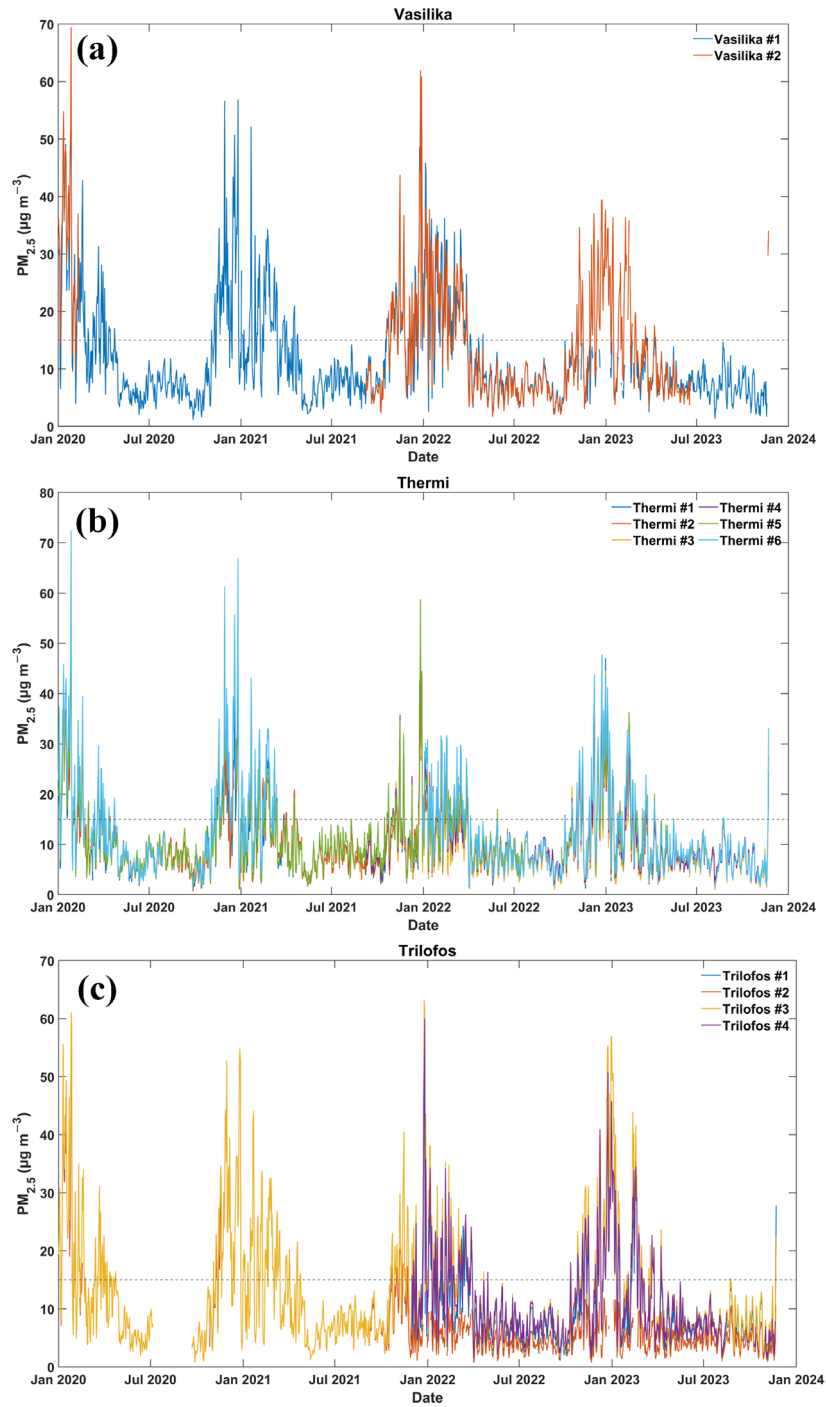


# Supplementary Materials: Forecasting the exceedances of PM<sub>2.5</sub> in an urban area

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**Figure S1.** Hourly timeseries of PM<sub>2.5</sub> concentration at the station in (a) Vasilika, (b) Thermi, and (c) Trilofos. .



**Figure S2.** Daily timeseries of PM<sub>2.5</sub> concentration at the station in (a) Vasilika, (b) Thermi, and (c) Trilofos.

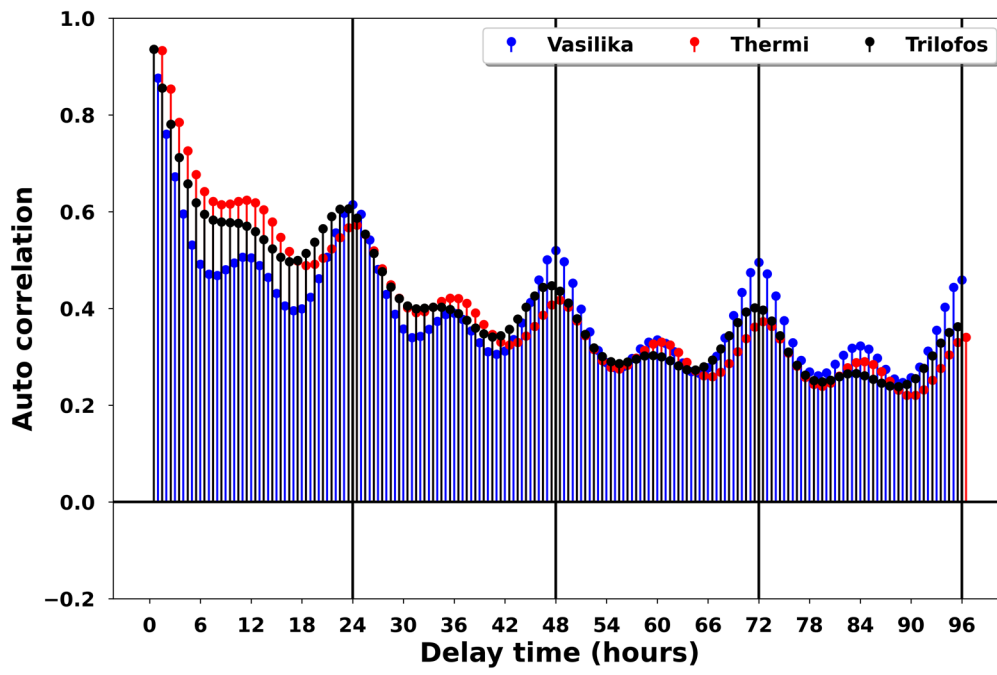


Figure S3. Autocorrelation coefficient of PM<sub>2.5</sub> observations on different delay times. .

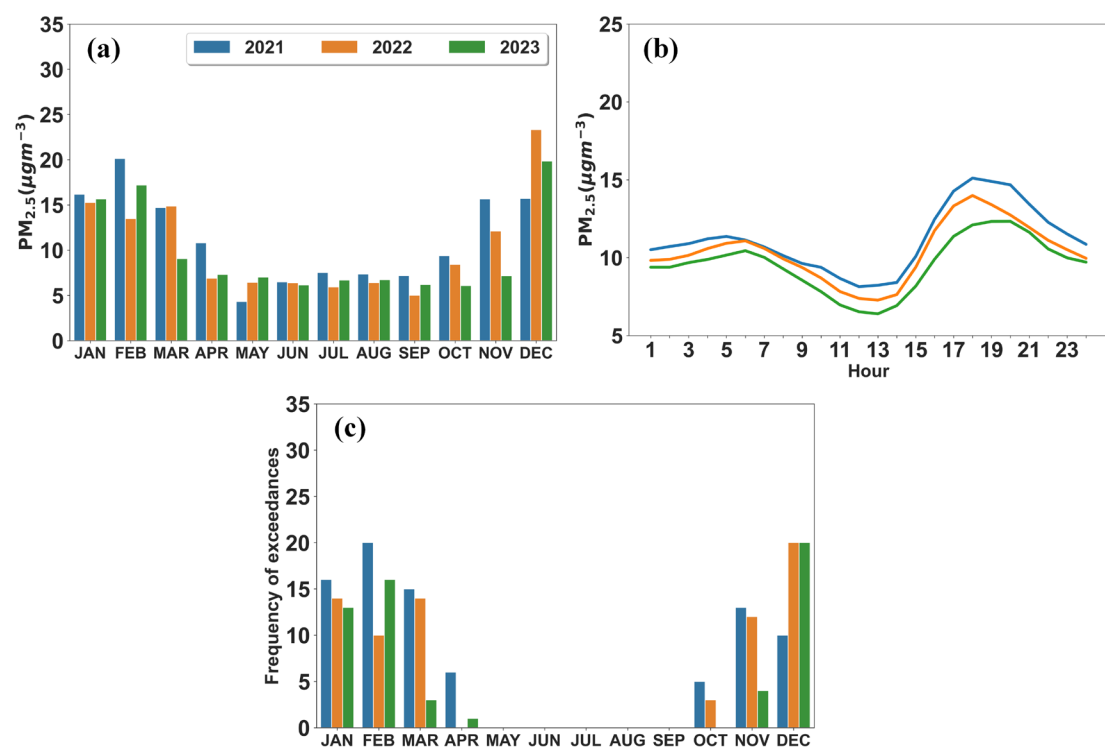


Figure S4. Same as Fig. 5 for Trilofos. .

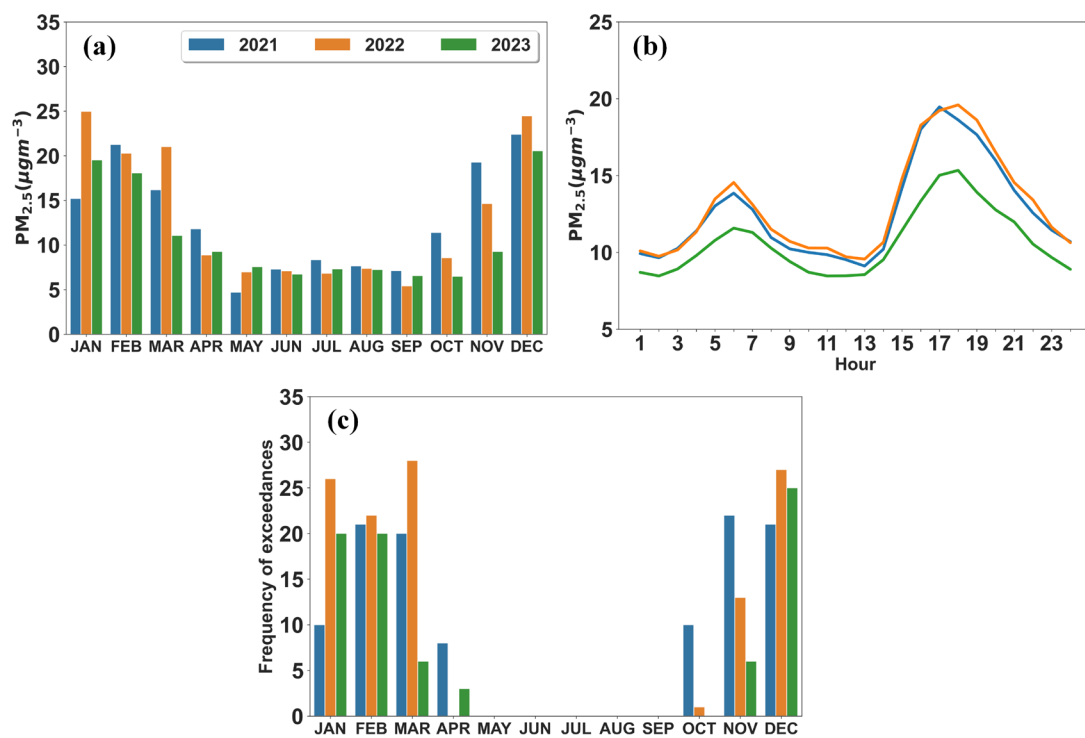


Figure S5. Same as Fig. 5 for Vasilika. .

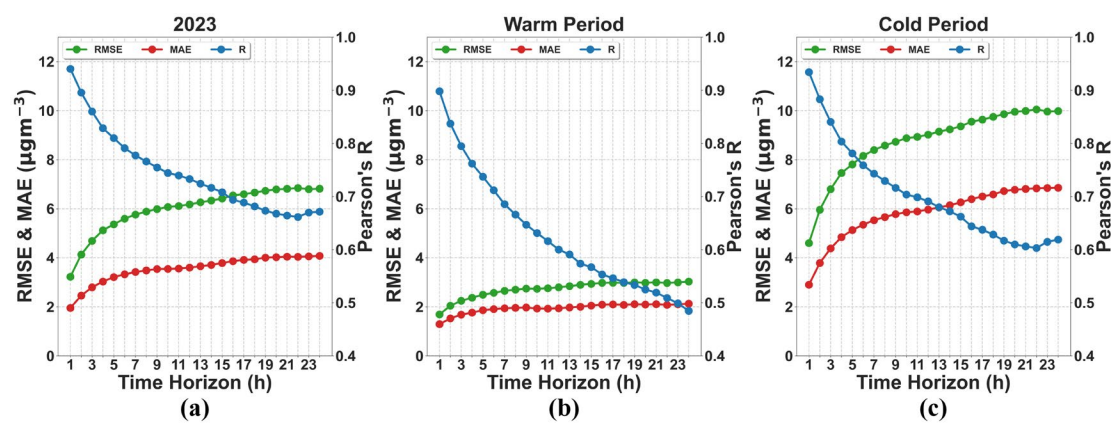


Figure S6. Same as Fig. 7 for Trilofos.

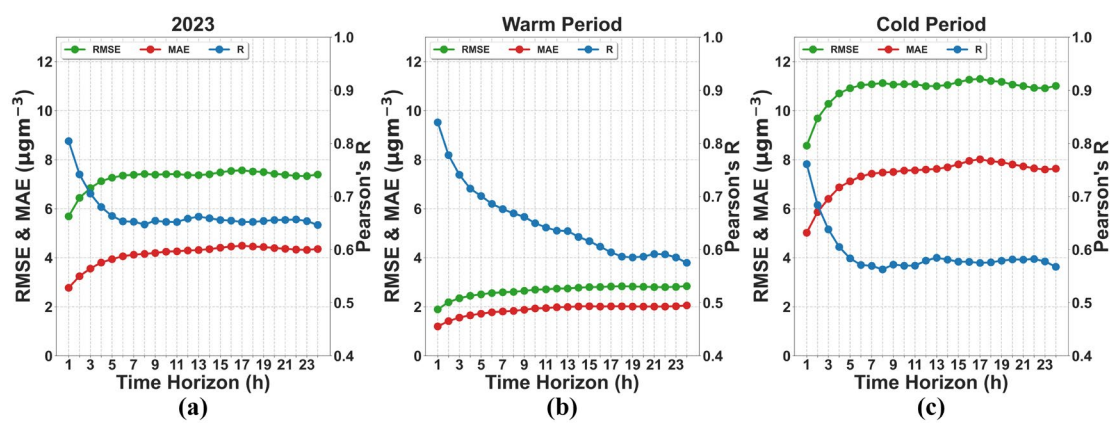


Figure S7. Same as Fig. 7 for Vasilika.

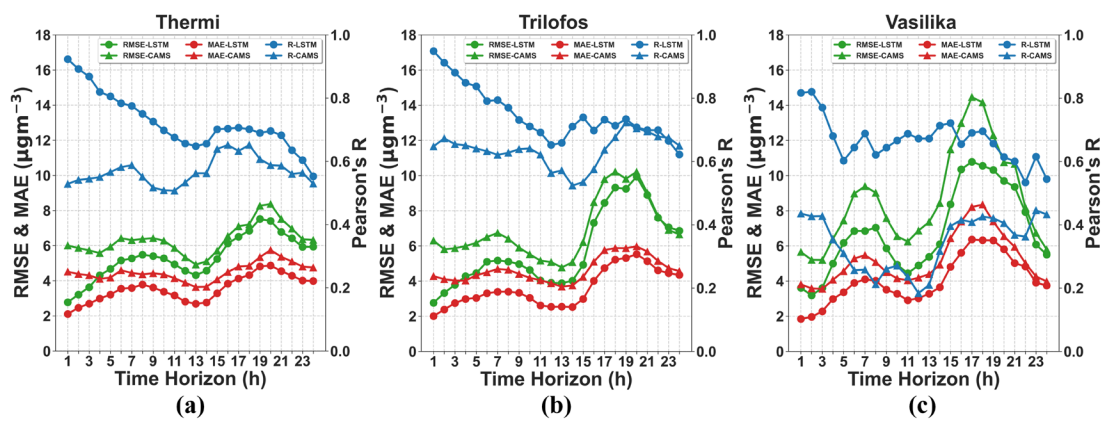
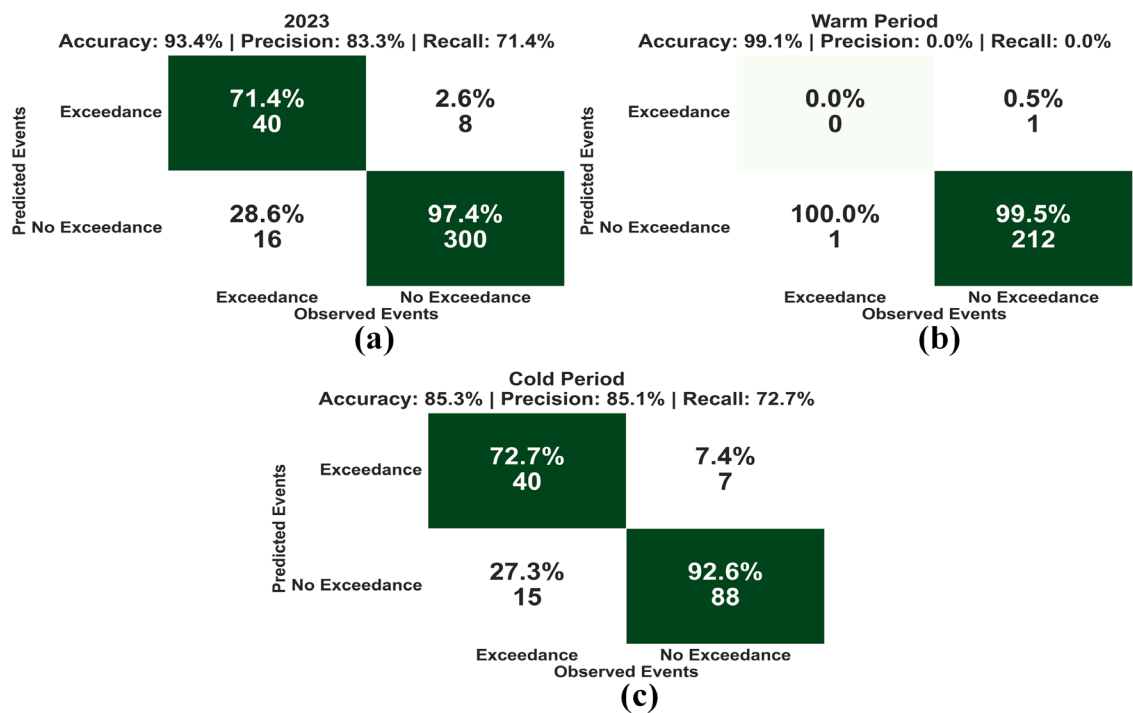
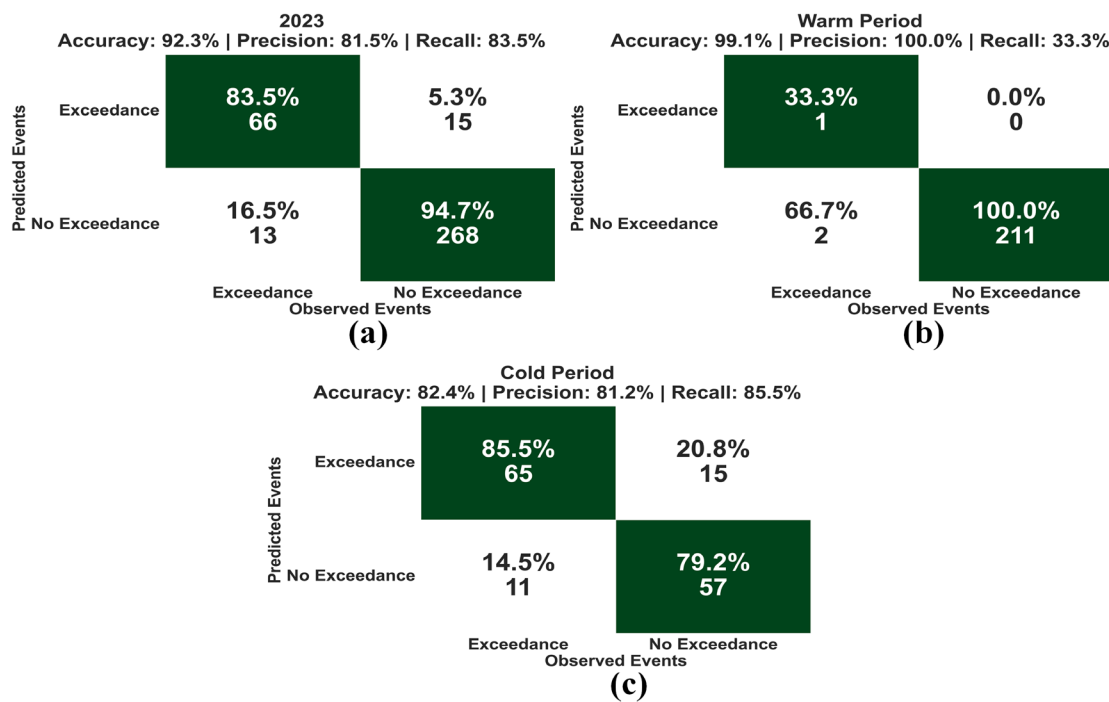


Figure S8. LSTM and CAMS evaluation metrics, MAE, RMSE ( $\mu\text{g m}^{-3}$ ), and R, for Thermi, during 2023 taking into account the 24-hour forecasts at 00 UTC.





**Figure S9.** Same as Fig. 9 for Trilofos.



**Figure S10.** Same as Fig. 9 for Vasilika.

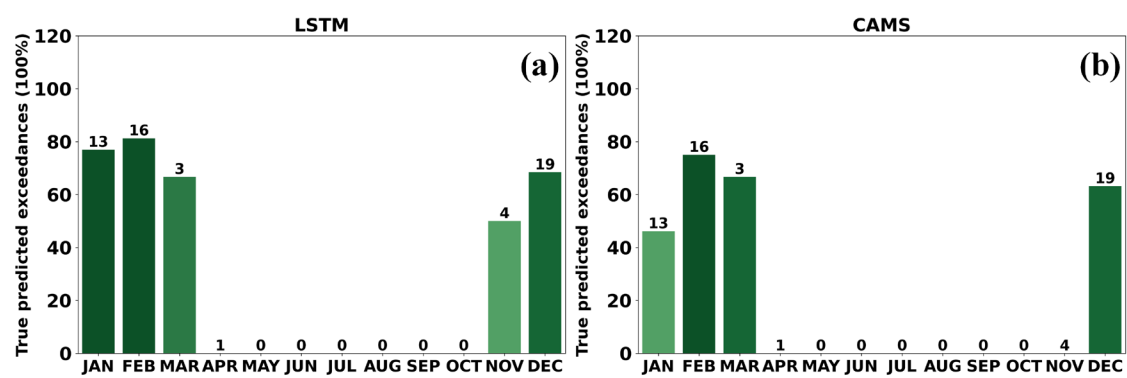


Figure S11. Same as Fig. 10 for Trilofos.

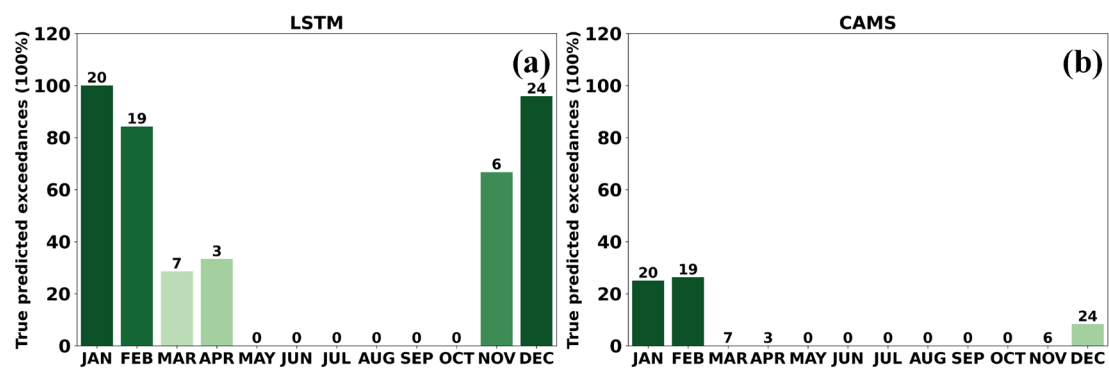


Figure S12. Same as Fig. 10 for Vasilika.

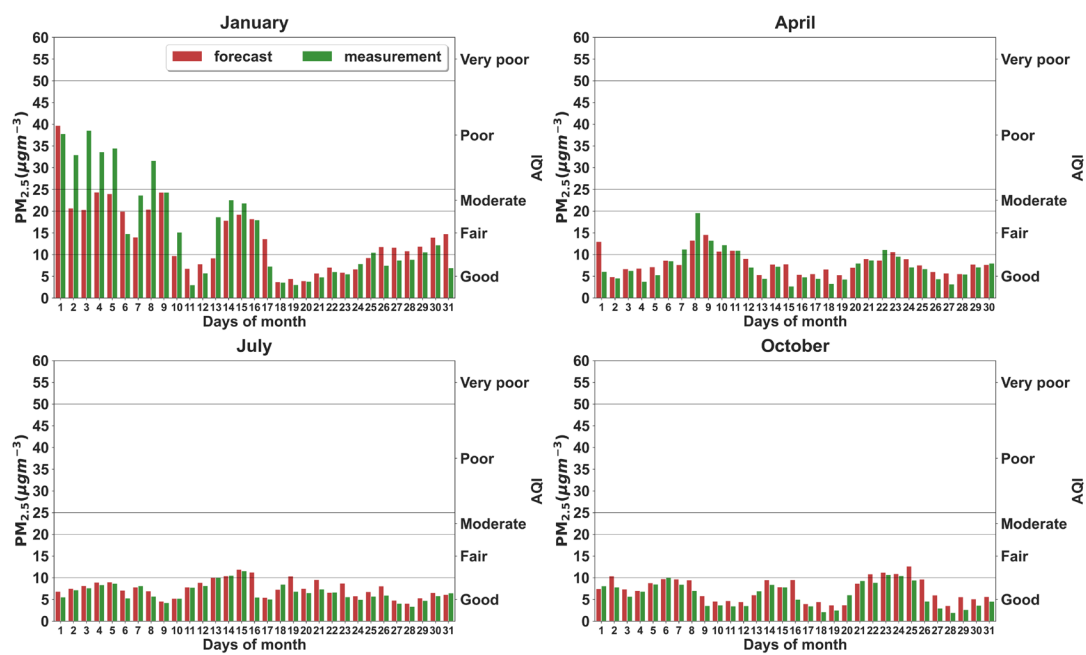
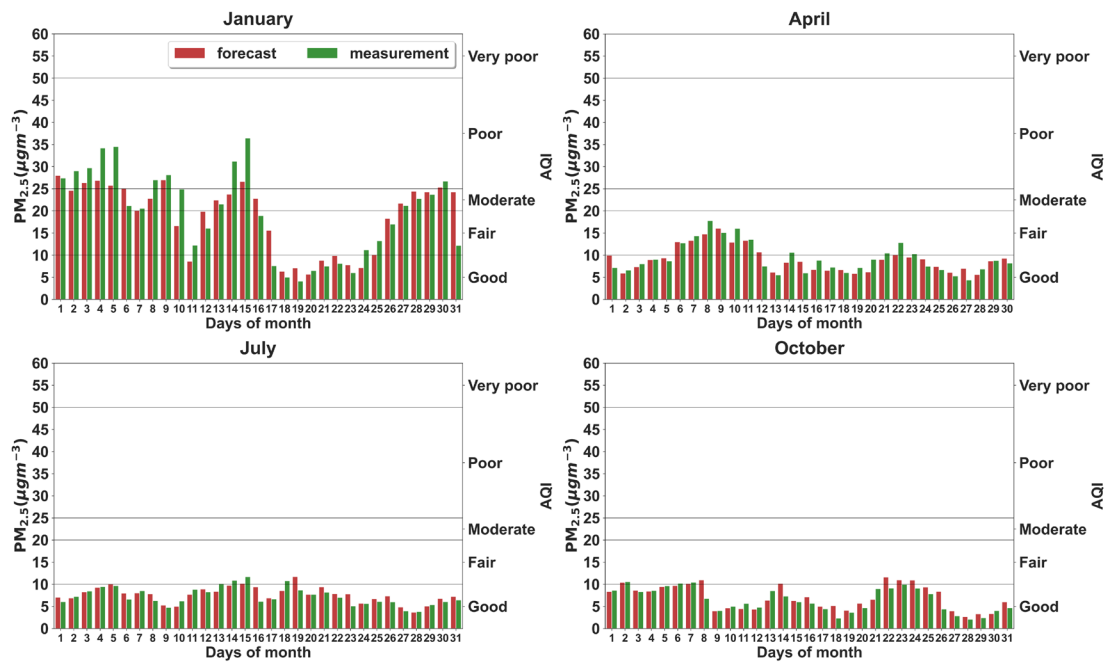


Figure S13. Same as Fig. 11 for Trilofos.



**Figure S14.** Same as Fig. 11 for Vasilika.

**Table S1.** Average PM<sub>2.5</sub> concentrations ( $\pm$  standard deviation) during winter, spring, summer and autumn in the 12 examined sites in Thermi. The averaged values have been calculated from the daily data. .

Site	Region	PM <sub>2.5</sub> ( $\mu\text{g m}^{-3}$ )			
		Winter	Spring	Summer	Autumn
Thermi #1	Thermi	17.1 $\pm$ 10.7	9.0 $\pm$ 4.5	6.7 $\pm$ 2.4	9.1 $\pm$ 6.6
Thermi #2	Thermi	15.9 $\pm$ 9.0	9.2 $\pm$ 4.6	7.3 $\pm$ 2.2	8.8 $\pm$ 5.9
Thermi #3	Thermi	15.6 $\pm$ 10.3	8.9 $\pm$ 4.6	6.9 $\pm$ 2.3	8.5 $\pm$ 6.2
Thermi #4	Thermi	16.7 $\pm$ 9.6	9.1 $\pm$ 4.3	7.8 $\pm$ 2.4	9.3 $\pm$ 5.6
Thermi #5	Thermi	17 $\pm$ 10.1	9.6 $\pm$ 4.7	8.1 $\pm$ 2.5	10.5 $\pm$ 6
Thermi #6	Thermi	21.1 $\pm$ 11	11.1 $\pm$ 5.7	7.4 $\pm$ 2.5	9.3 $\pm$ 7.3
Vasilika #1	Vasilika	20.9 $\pm$ 12.2	11.1 $\pm$ 6.2	7.2 $\pm$ 2.2	9.4 $\pm$ 7.0
Vasilika #2	Vasilika	23.9 $\pm$ 11.3	10.5 $\pm$ 5.9	6.7 $\pm$ 2.0	11.4 $\pm$ 7.9
Trilofos #1	Trilofos	13.2 $\pm$ 8.6	9.0 $\pm$ 5.0	6.7 $\pm$ 2.4	7.3 $\pm$ 5.0
Trilofos #2	Trilofos	8.7 $\pm$ 9.6	4.7 $\pm$ 2.1	4.4 $\pm$ 1.6	6.4 $\pm$ 4.6
Trilofos #3	Trilofos	21.4 $\pm$ 13.1	10.1 $\pm$ 5.5	7.1 $\pm$ 2.4	10.5 $\pm$ 8.1
Trilofos #4	Trilofos	17.9 $\pm$ 10.4	10.1 $\pm$ 5.1	7.1 $\pm$ 2.0	8.3 $\pm$ 5.8

**Table S2.** LSTM configuration. .

Hyperparameter	Value
Input time step	24h
Input feature dimensions	7
Epoch	50
Nodes	50 per layer
Layers	2
Batch size	72
Optimizer	Adam
Loss function	MAE
Dropout	0.2
LSTM activation function	tanh
Fully Connected Layer activation function	linear