atmosphere

MDPI

Wildfires Impact Assessment on PM Levels Using Generalized Additive Mixed Models

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* Correspondence: gianluca.leone@isprambiente.it

Cerano - Bagno IT1509A

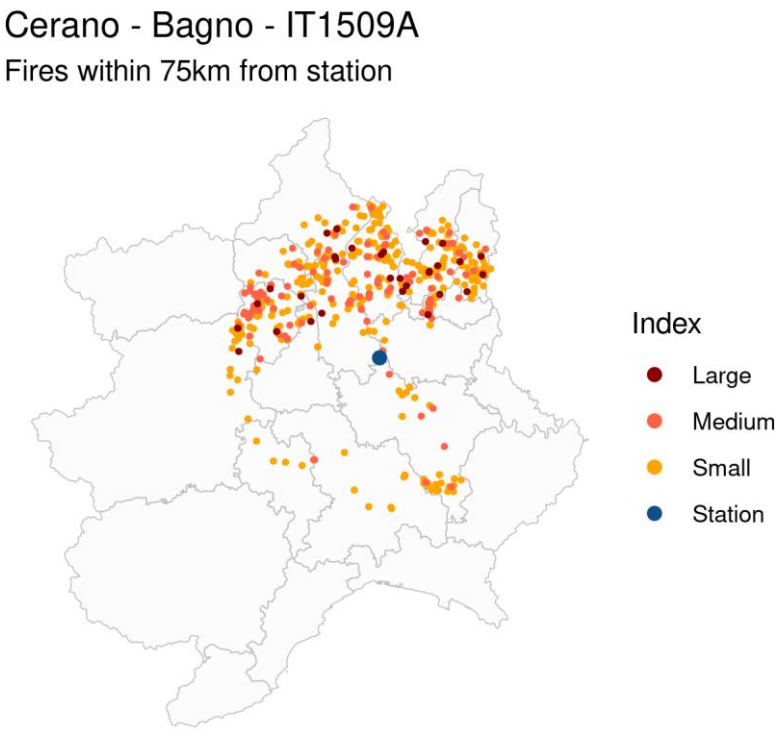

Figure S1a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S1. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	528	11.67	106.4	0.3231
Not wooded land area (ha)	230	7.972	25.96	0.08805
Distance (km)	528	53.15	14.78	55.44
Burned area (ha)	528	15.15	111.1	0.4375

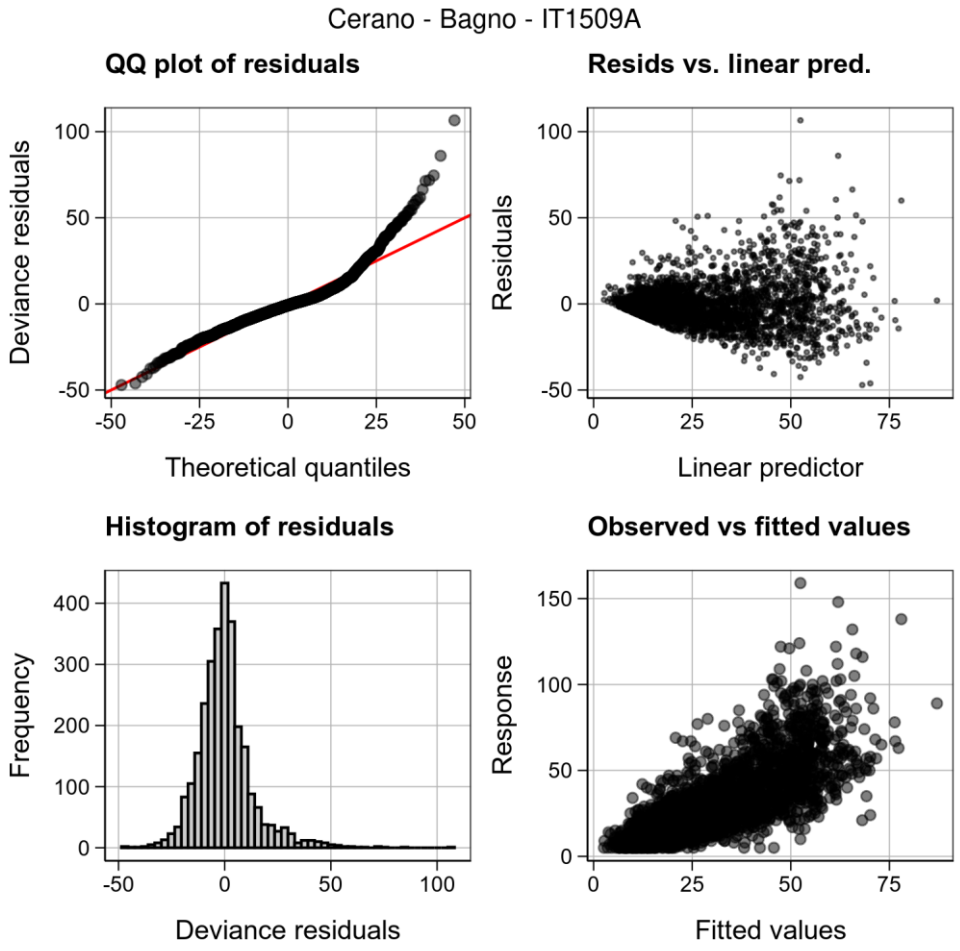

Figure S1b. Check of the basic assumptions: residual analysis of the PM_{10} model developed for the air quality monitoring station.

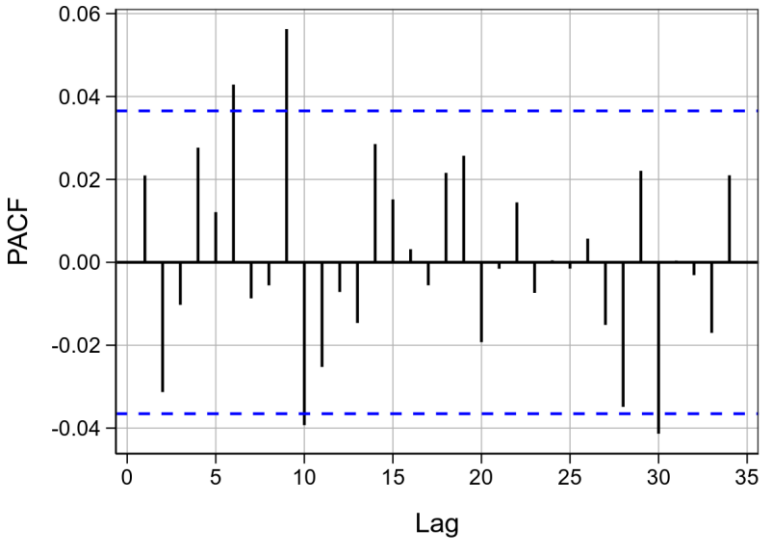

Figure S1c. Partial autocorrelation function (PACF) of the residuals at daily lags of the PM_{10} model developed for the air quality monitoring station.

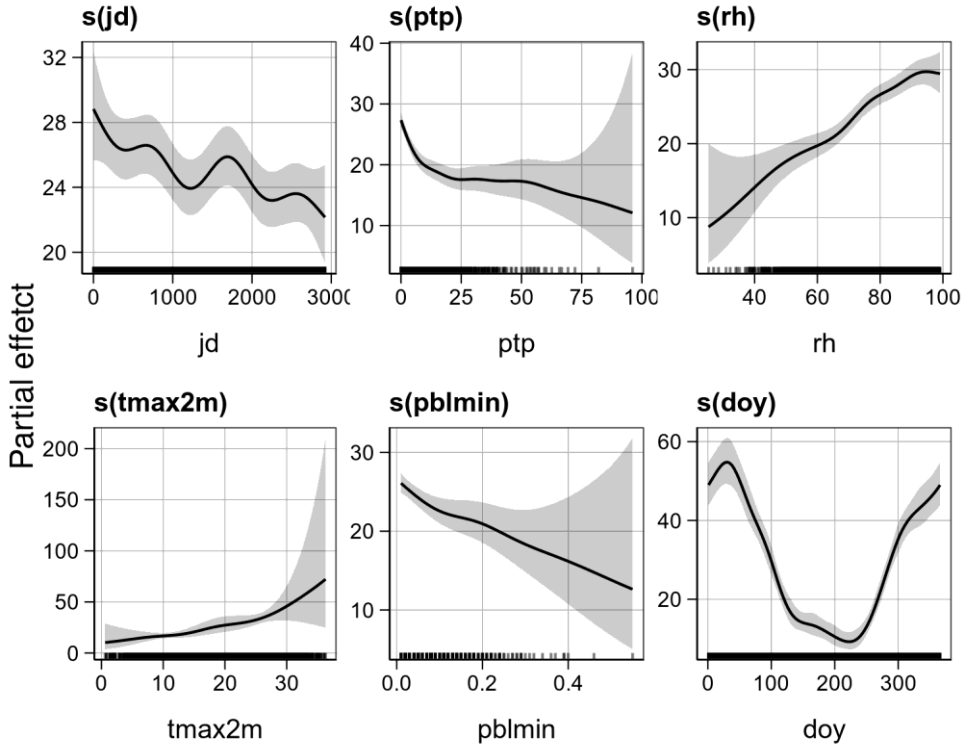

Figure S1d. Spline functions for single predictive variables selected in the PM_{10} model developed for the air quality monitoring station.

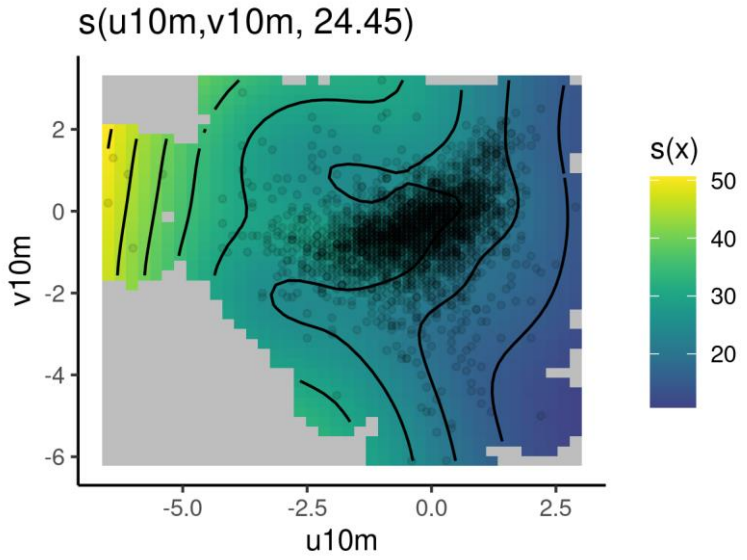

Figure S1e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the PM_{10} model developed for the air quality monitoring station.

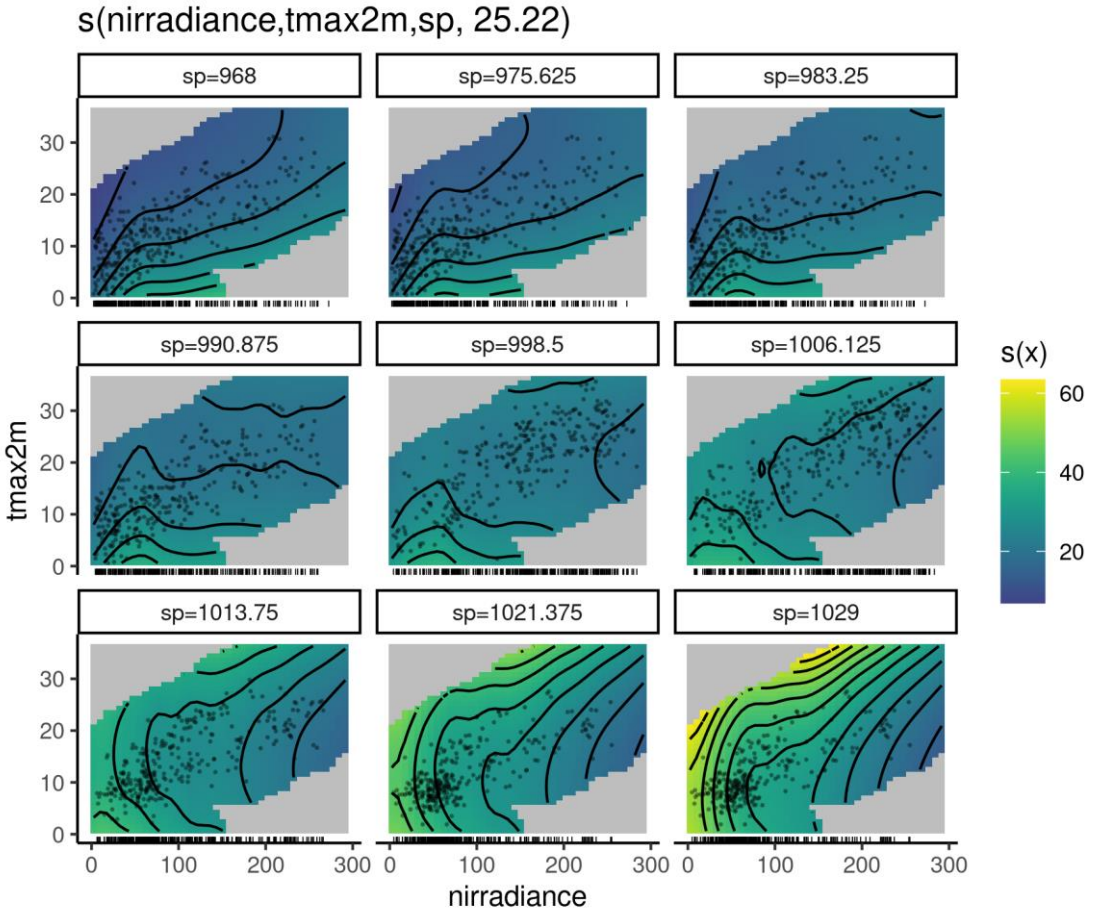

Figure S1f. Smooths for multiple meteorological variables interactions selected in the PM_{10} model developed for the air quality monitoring station.

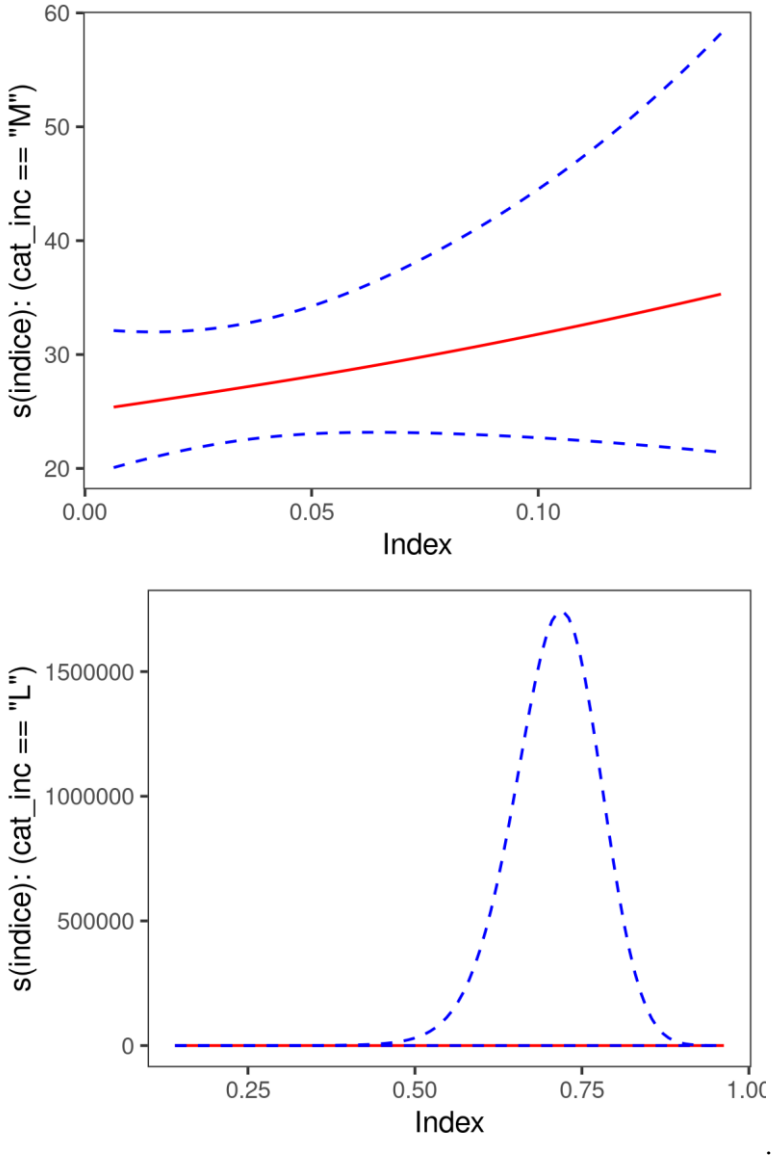

Figure S1g. Spline functions for categorial index variable selected in the PM_{10} model developed for the air quality monitoring station.

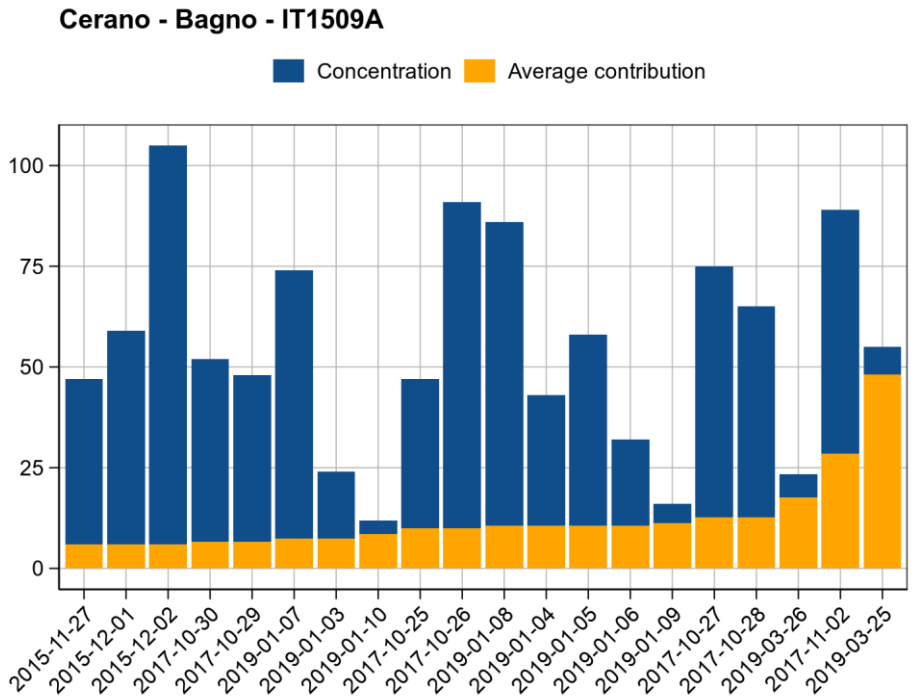

Figure S1h. Estimated model contribution of wildfires to daily average concentrations of PM_{10} observed in the air quality monitoring station.

Alba - Tanaro IT1524A

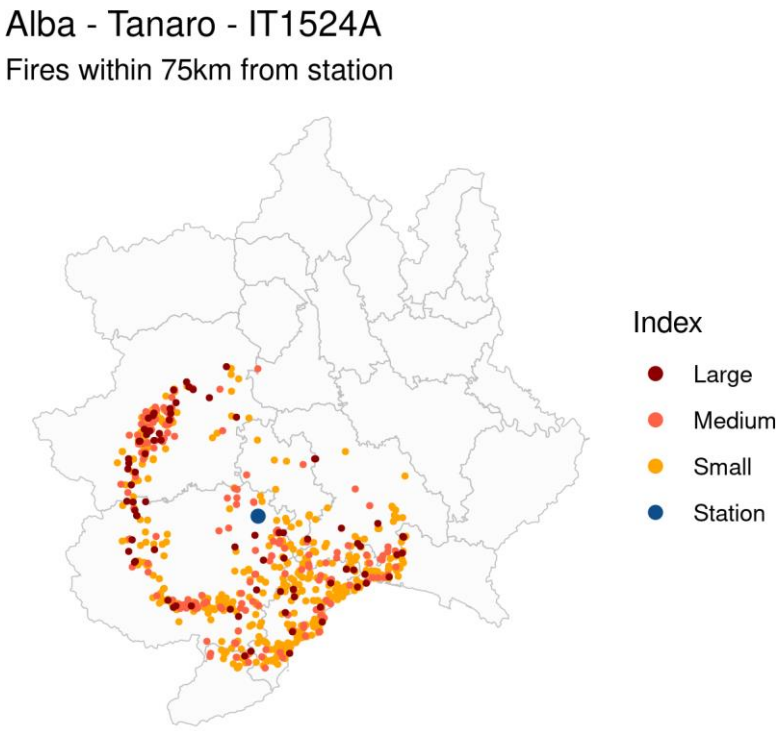

Figure S2a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S2. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	888	6.572	70.98	0.2172
Not wooded land area (ha)	277	2.512	14.9	0
Distance (km)	888	56.67	15.04	62.22
Burned area (ha)	888	7.356	71.87	0.2618

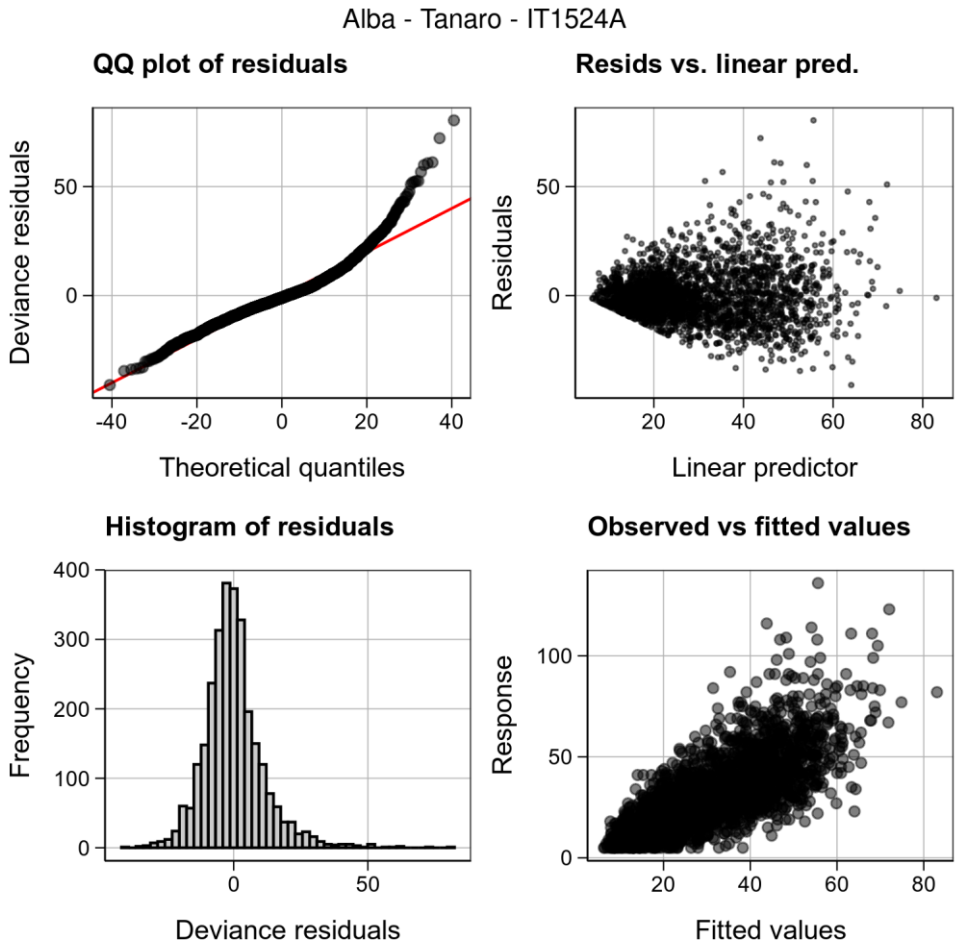

Figure S2b. Check of the basic assumptions: residual analysis of the PM_{10} model developed for the air quality monitoring station.

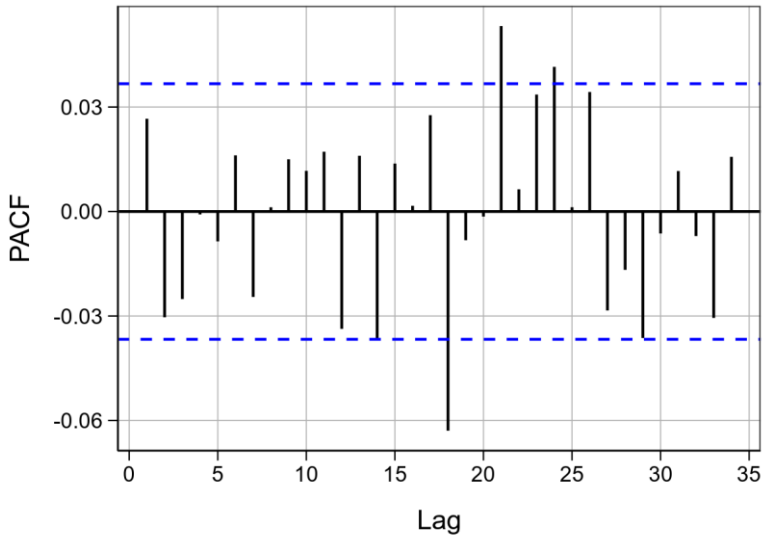

Figure S2c. Partial autocorrelation function (PACF) of the residuals at daily lags of the PM_{10} model developed for the air quality monitoring station.

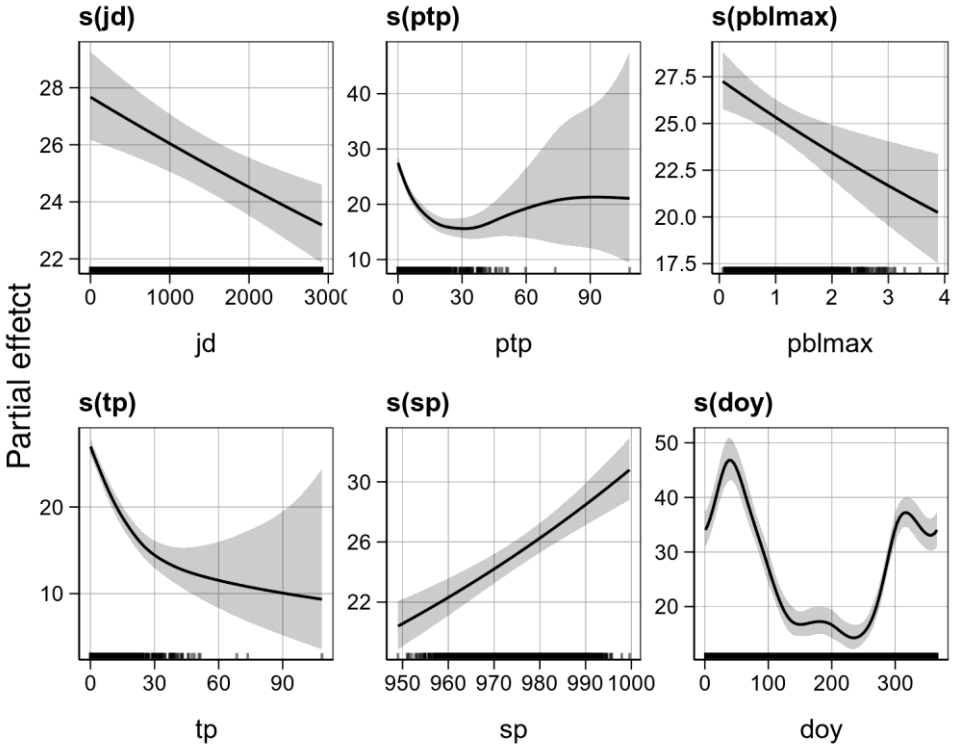

Figure S2d. Spline functions for single predictive variables selected in the PM_{10} model developed for the air quality monitoring station.

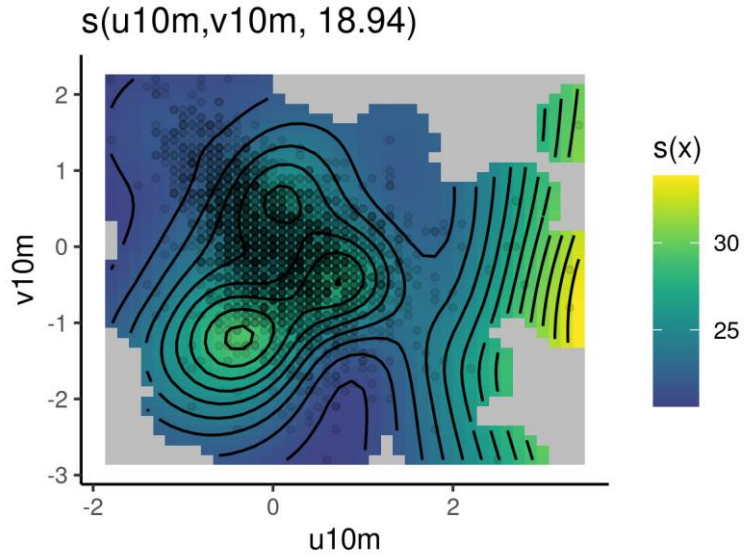

Figure S2e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the PM_{10} model developed for the air quality monitoring station.

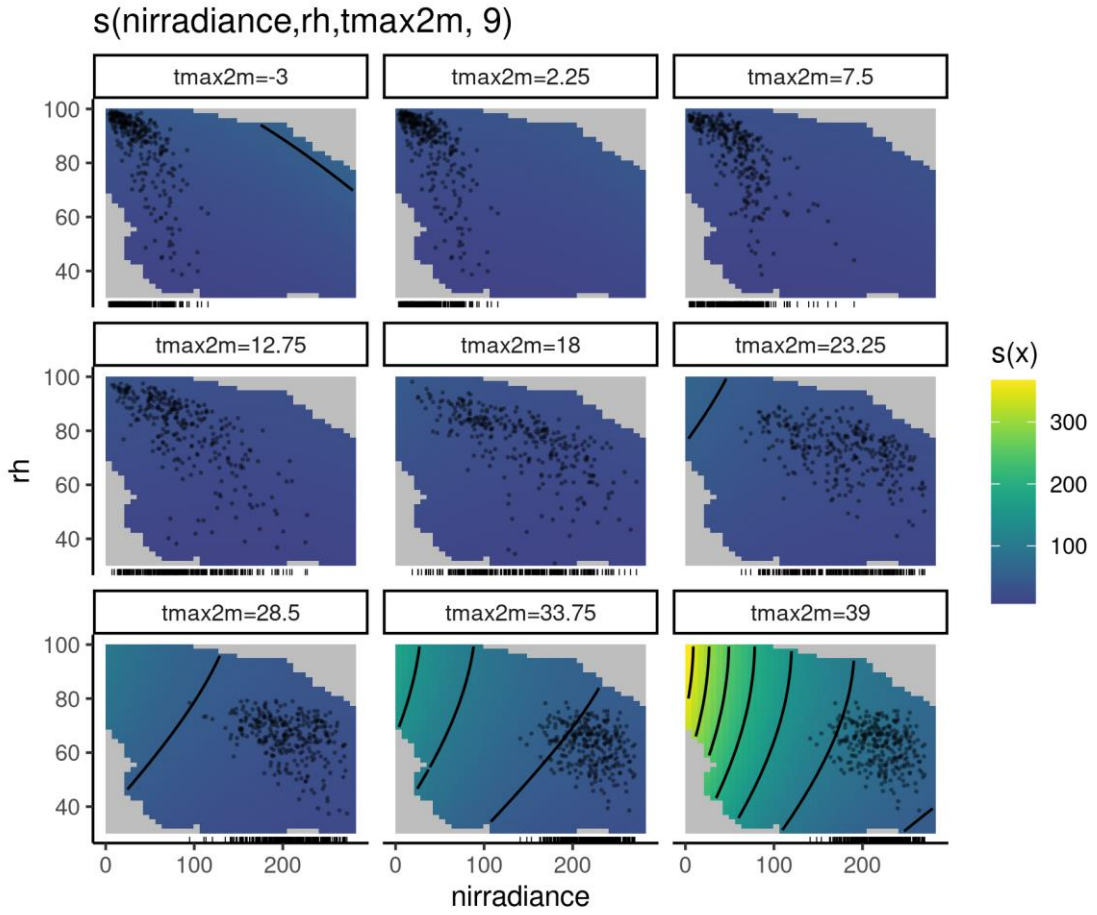

Figure S2f. Smooths for multiple meteorological variables interactions selected in the PM_{10} model developed for the air quality monitoring station.

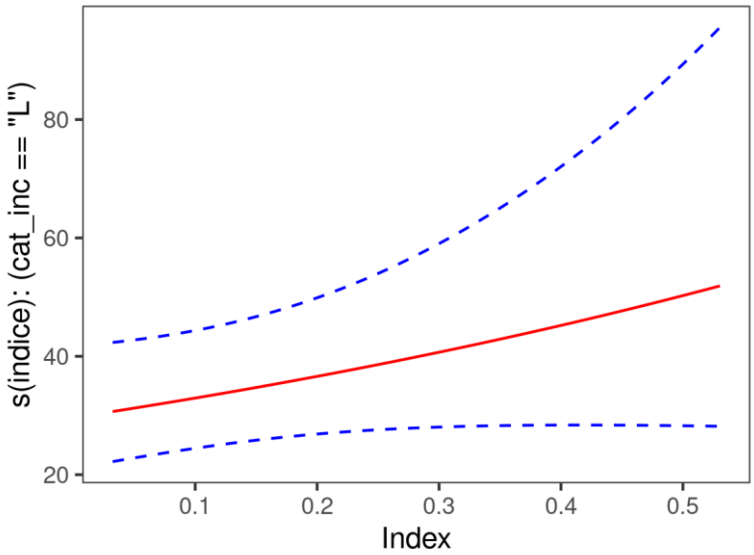

Figure S2g. Spline functions for categorial index variable selected in the PM_{10} model developed for the air quality monitoring station.

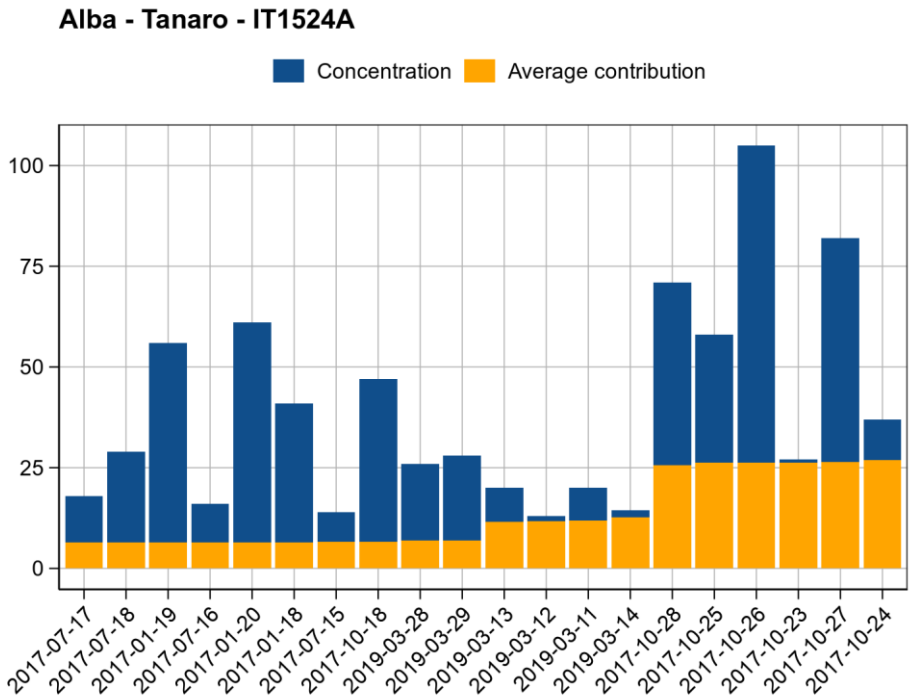

Figure S2h. Estimated model contribution of wildfires to daily average concentrations of PM_{10} observed in the air quality monitoring station.

Vercelli - Gastaldi IT1533A

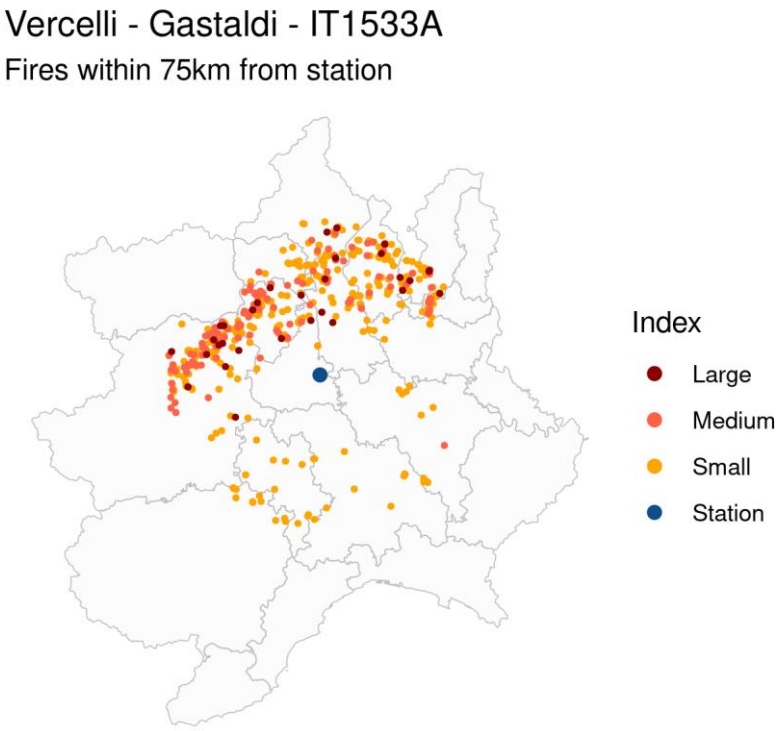

Figure S3a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S3. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	559	14.08	119.4	0.4577
Not wooded land area (ha)	222	15.14	49.57	0.0872
Distance (km)	559	55.05	12.49	56.41
Burned area (ha)	559	20.1	129.8	0.5716

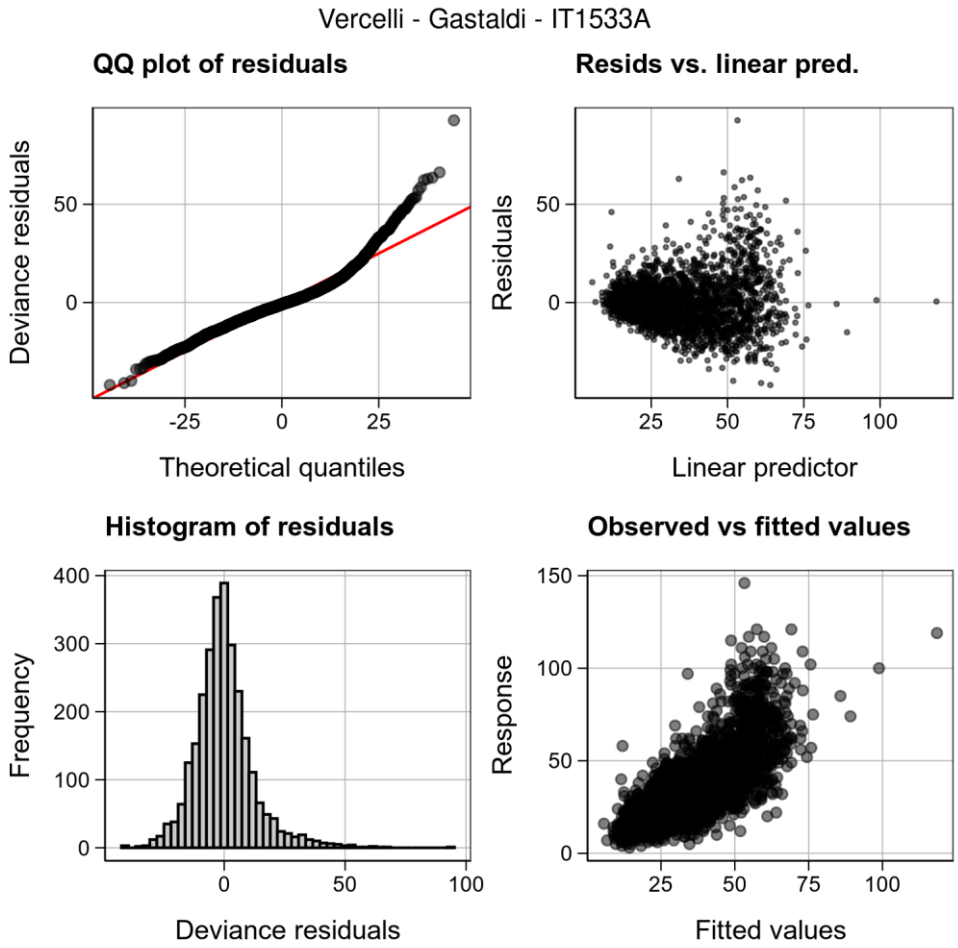

Figure S3b. Check of the basic assumptions: residual analysis of the PM_{10} model developed for the air quality monitoring station.

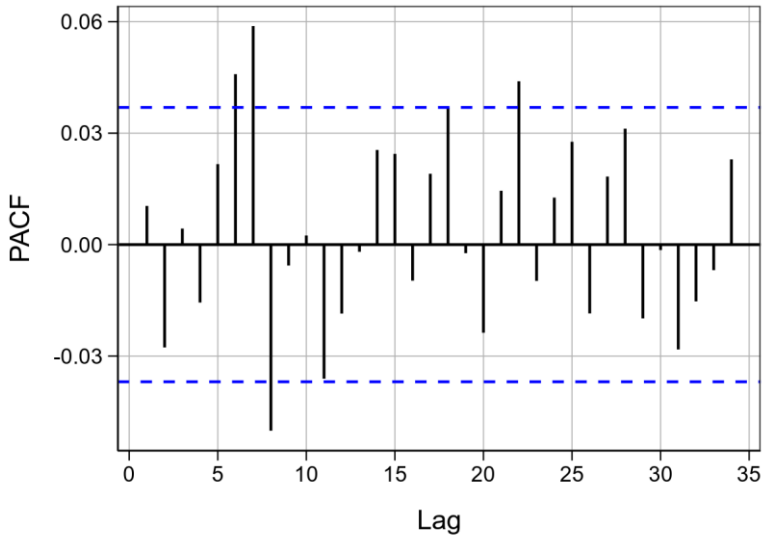

Figure S3c. Partial autocorrelation function (PACF) of the residuals at daily lags of the PM_{10} model developed for the air quality monitoring station.

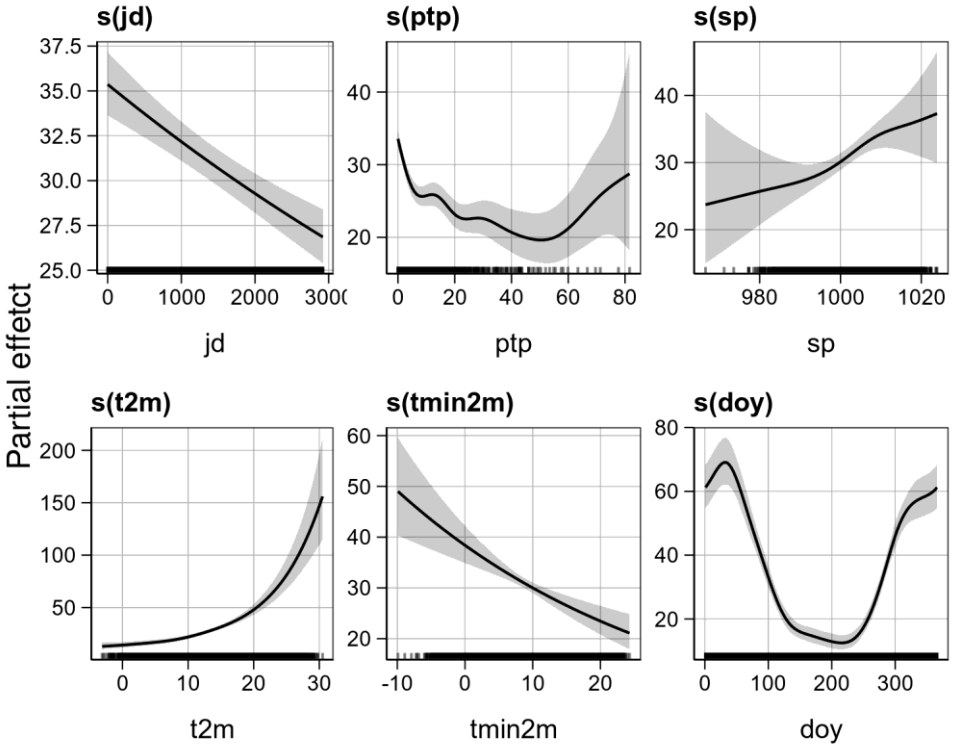

Figure S3d. Spline functions for single predictive variables selected in the PM_{10} model developed for the air quality monitoring station.

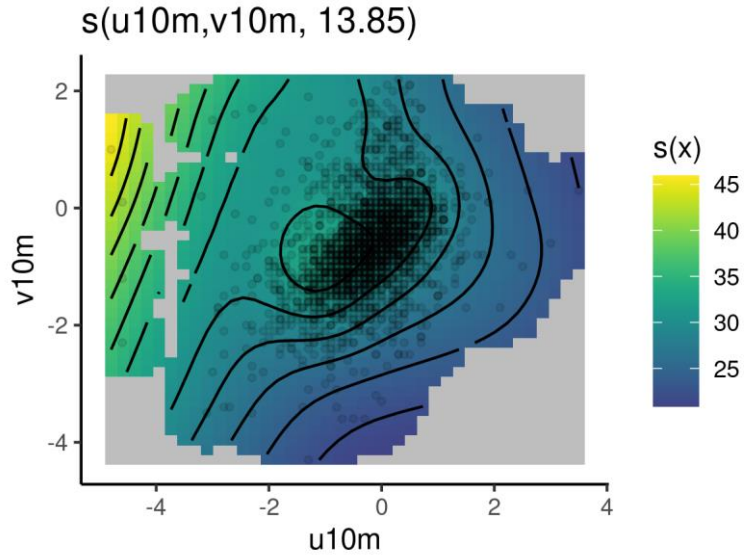

Figure S3e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the PM_{10} model developed for the air quality monitoring station.

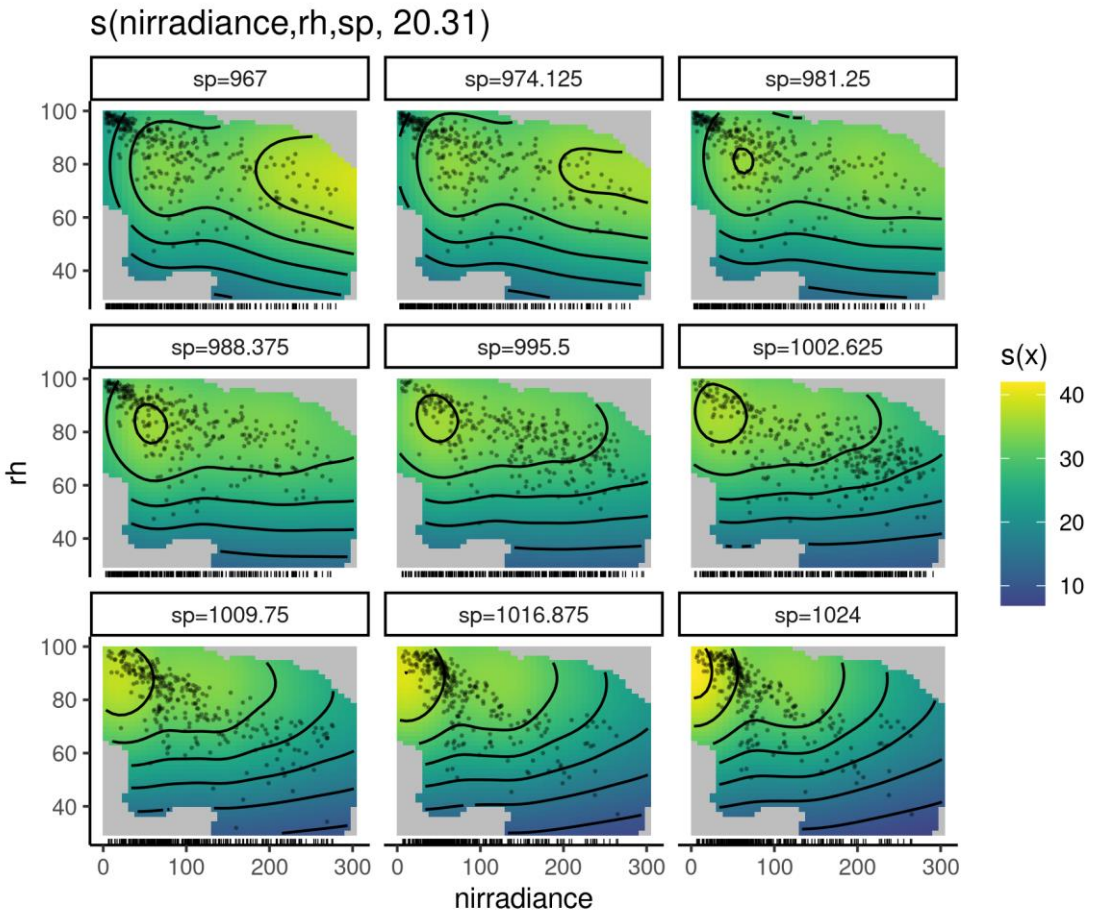

Figure S3f. Smooths for multiple meteorological variables interactions selected in the PM_{10} model developed for the air quality monitoring station.

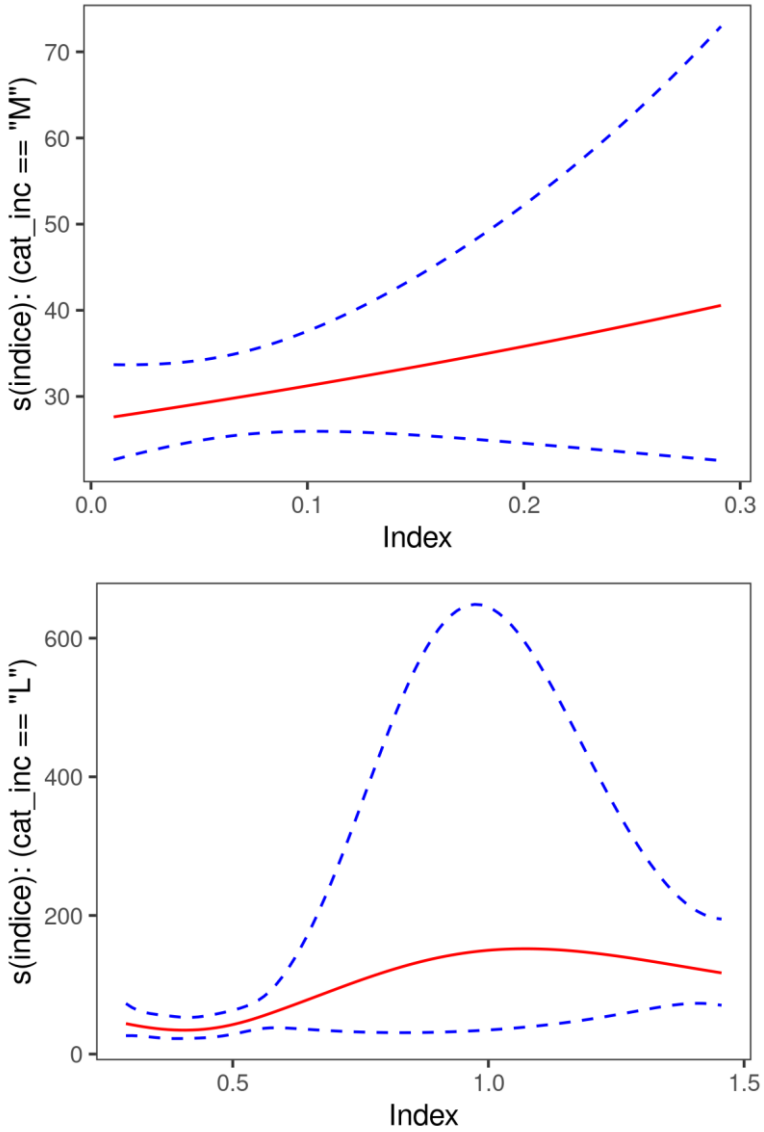

Figure S3g. Spline functions for categorial index variable selected in the PM_{10} model developed for the air quality monitoring station.

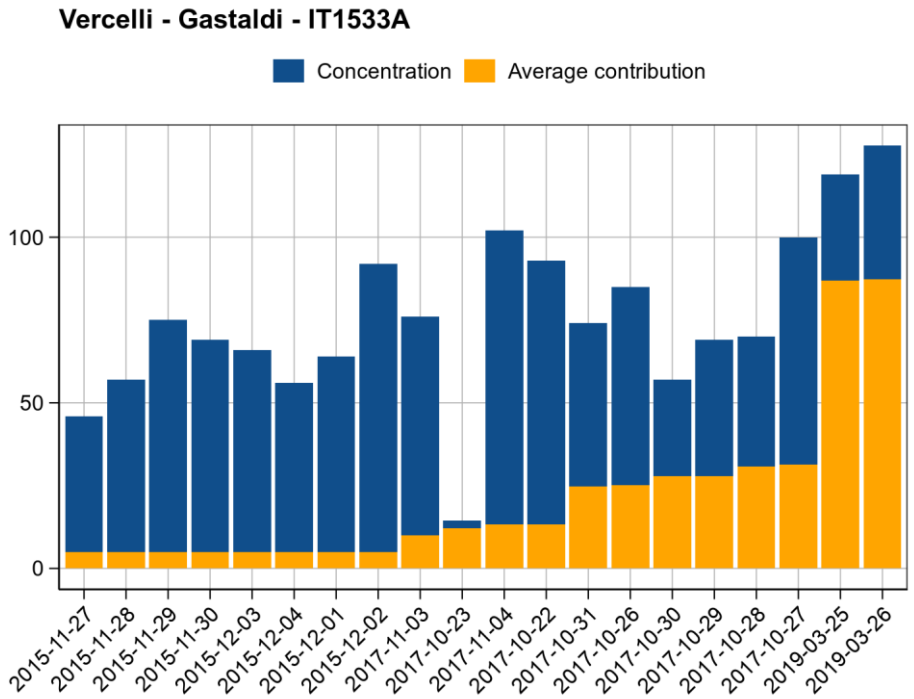

Figure S3h. Estimated model contribution of wildfires to daily average concentrations of PM_{10} observed in the air quality monitoring station.

Asti - Baussano IT1903A

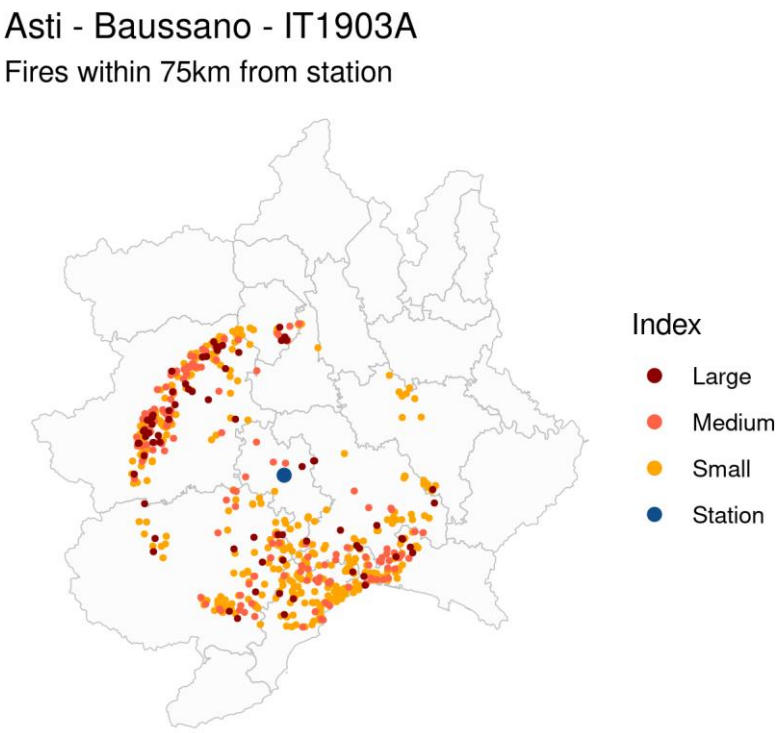

Figure S4a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S4. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	813	6.799	73.22	0.2296
Not wooded land area (ha)	250	3.531	16.33	0.0105
Distance (km)	813	62.12	12.61	65.91
Burned area (ha)	813	7.884	74.35	0.2723

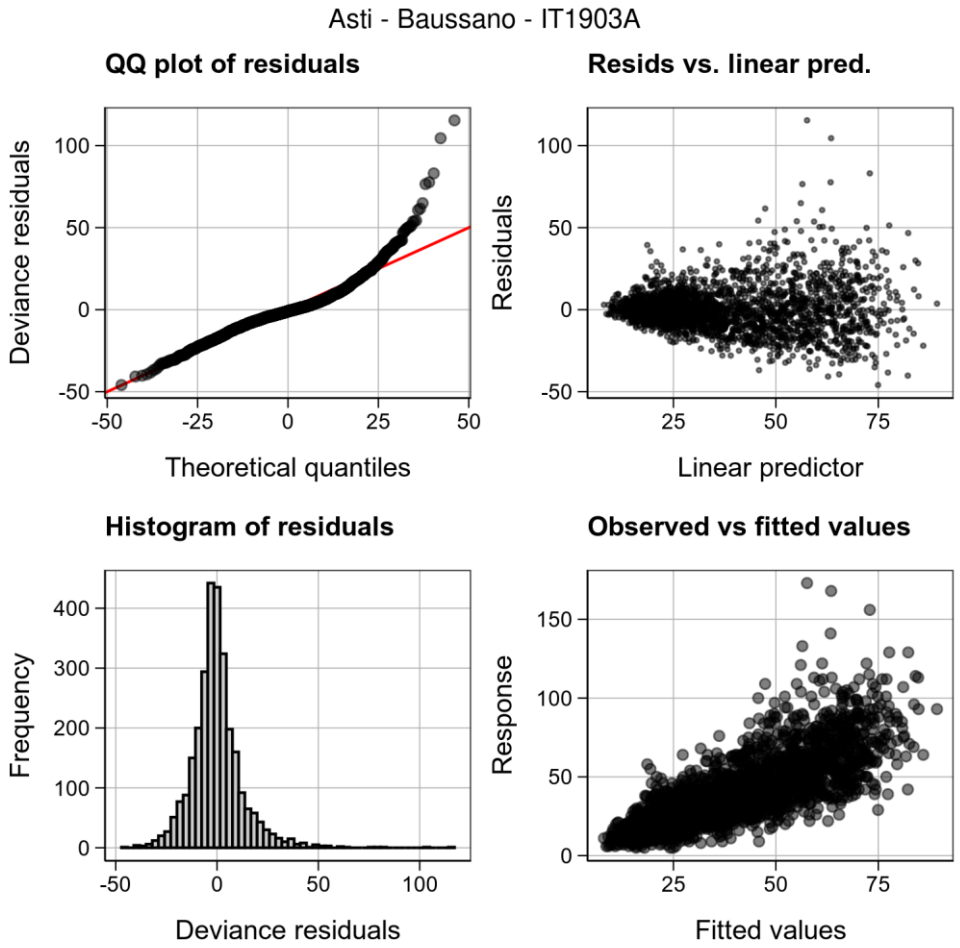

Figure S4b. Check of the basic assumptions: residual analysis of the PM_{10} model developed for the air quality monitoring station.

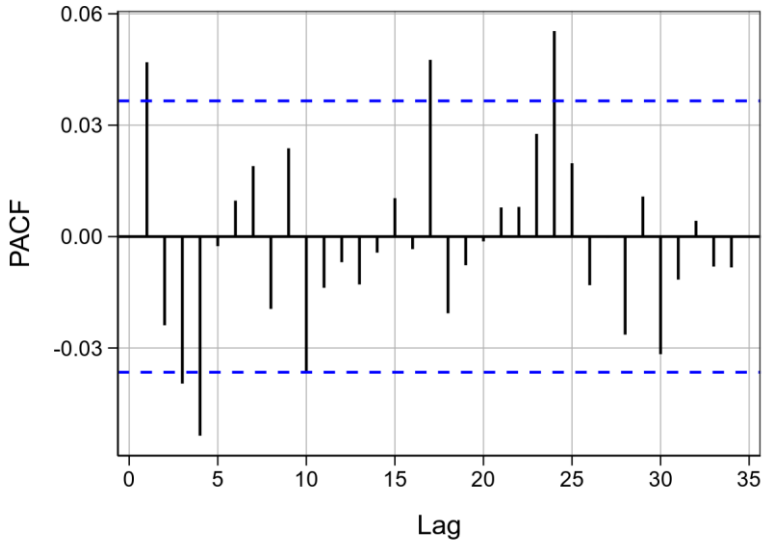

Figure S4c. Partial autocorrelation function (PACF) of the residuals at daily lags of the PM_{10} model developed for the air quality monitoring station.

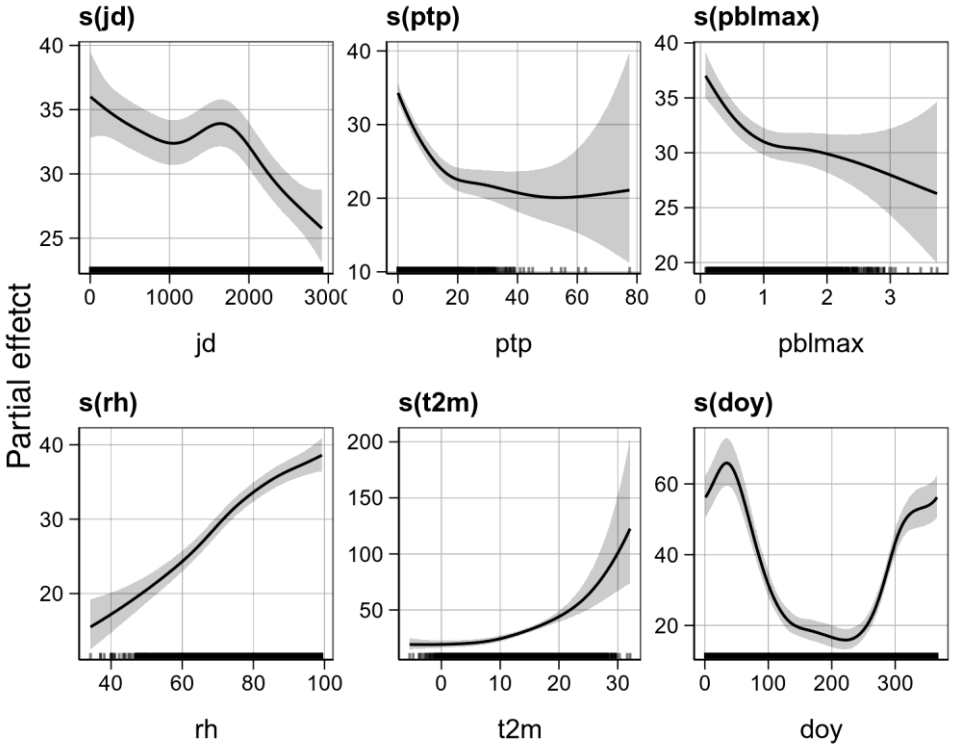

Figure S4d. Spline functions for single predictive variables selected in the PM_{10} model developed for the air quality monitoring station.

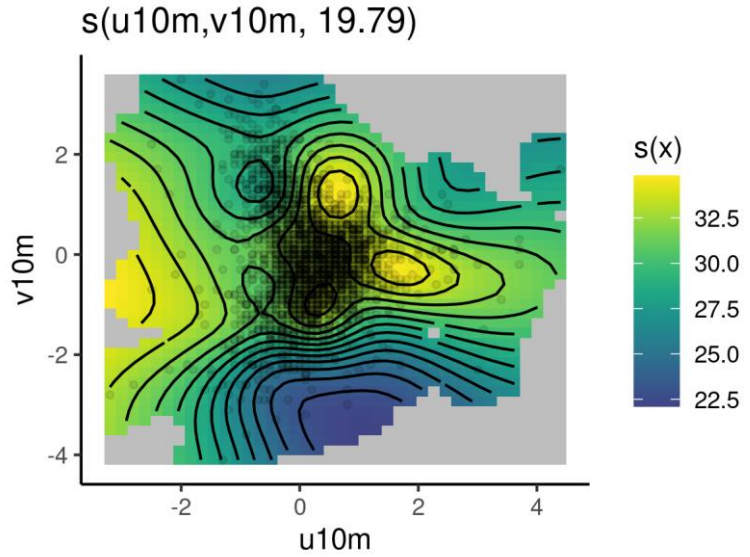

Figure S4e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the PM_{10} model developed for the air quality monitoring station.

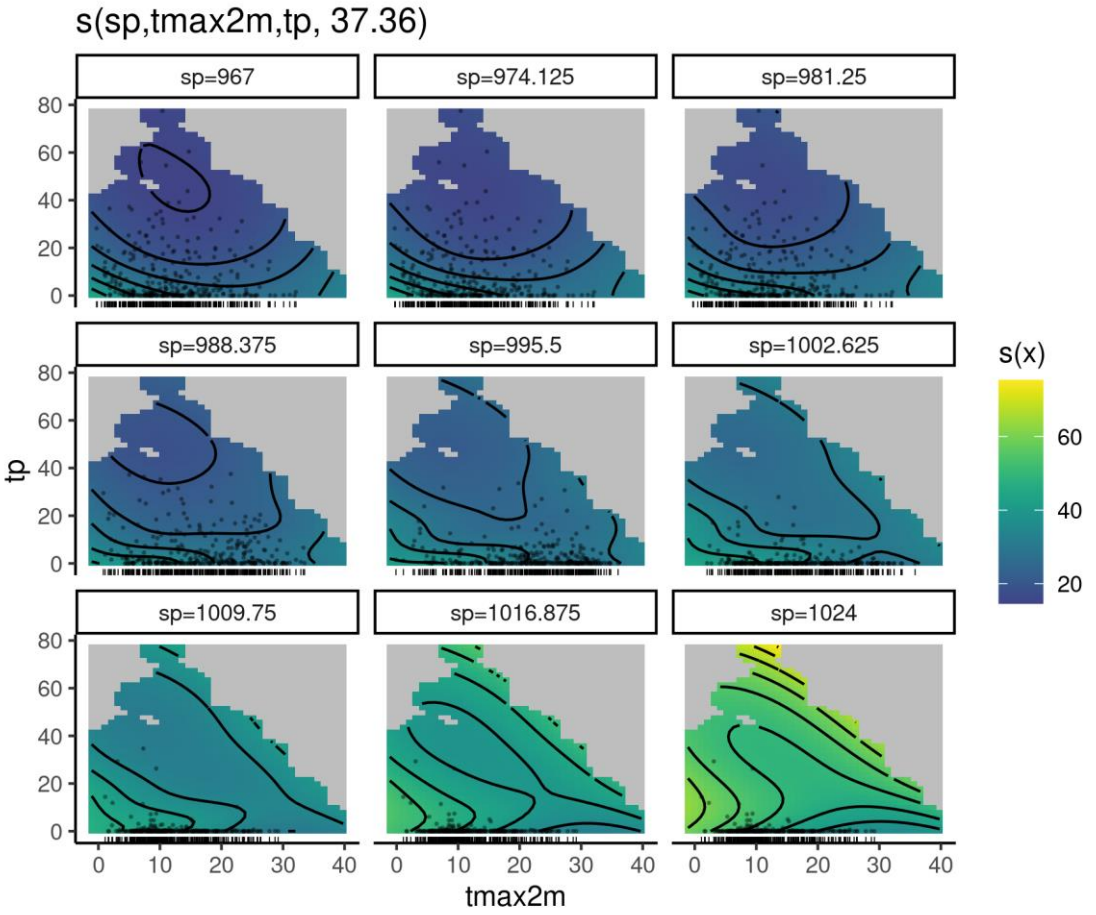

Figure S4f. Smooths for multiple meteorological variables interactions selected in the PM_{10} model developed for the air quality monitoring station.

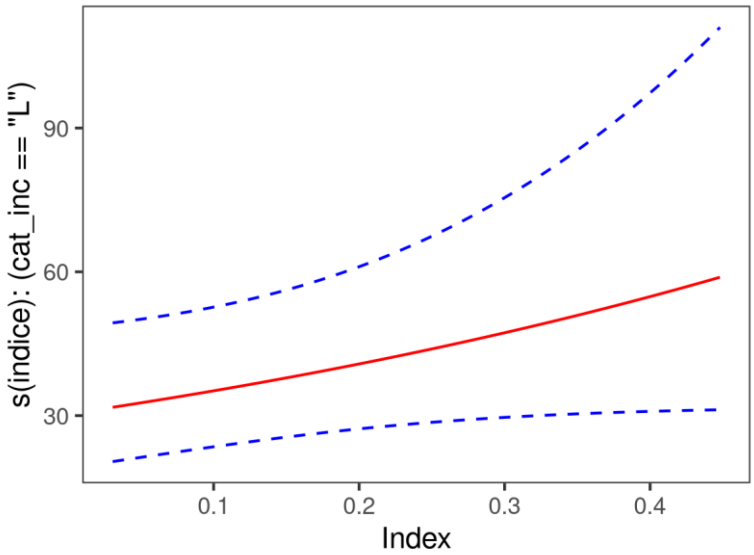

Figure S4g. Spline functions for categorial index variable selected in the PM_{10} model developed for the air quality monitoring station.

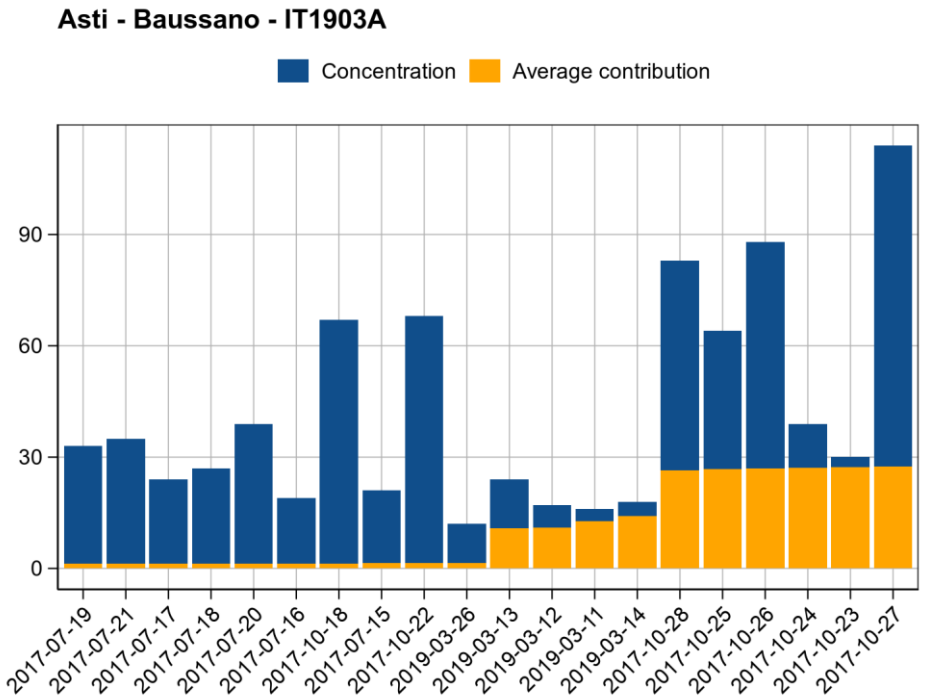

Figure S4h. Estimated model contribution of wildfires to daily average concentrations of PM_{10} observed in the air quality monitoring station.

Settimo T. - Vivaldi IT1130A

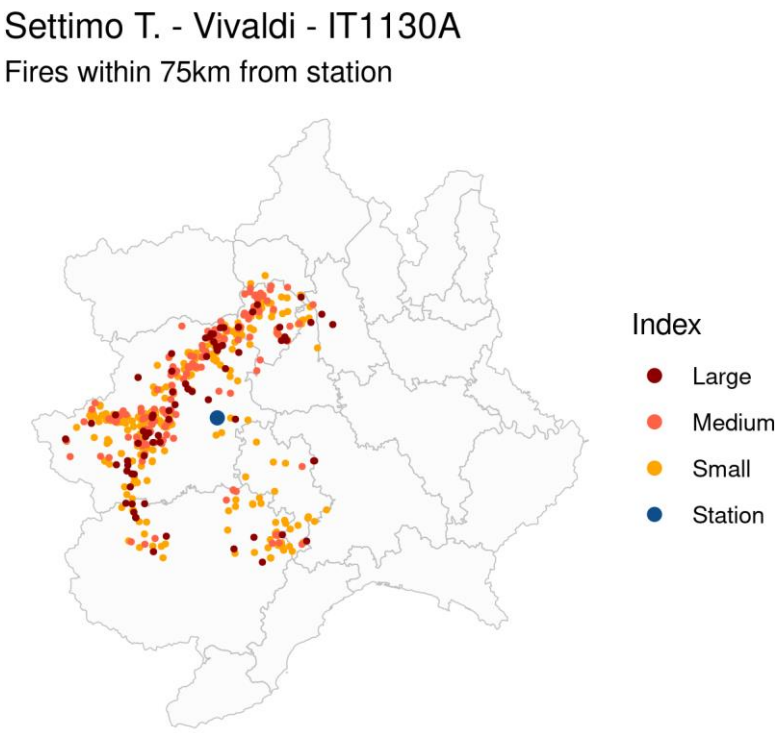

Figure S5a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S5a. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	726	19.72	173.1	0.2877
Not wooded land area (ha)	255	17.91	73.84	0.2606
Distance (km)	726	41.99	15.07	38.91
Burned area (ha)	726	26.01	202.9	0.3848

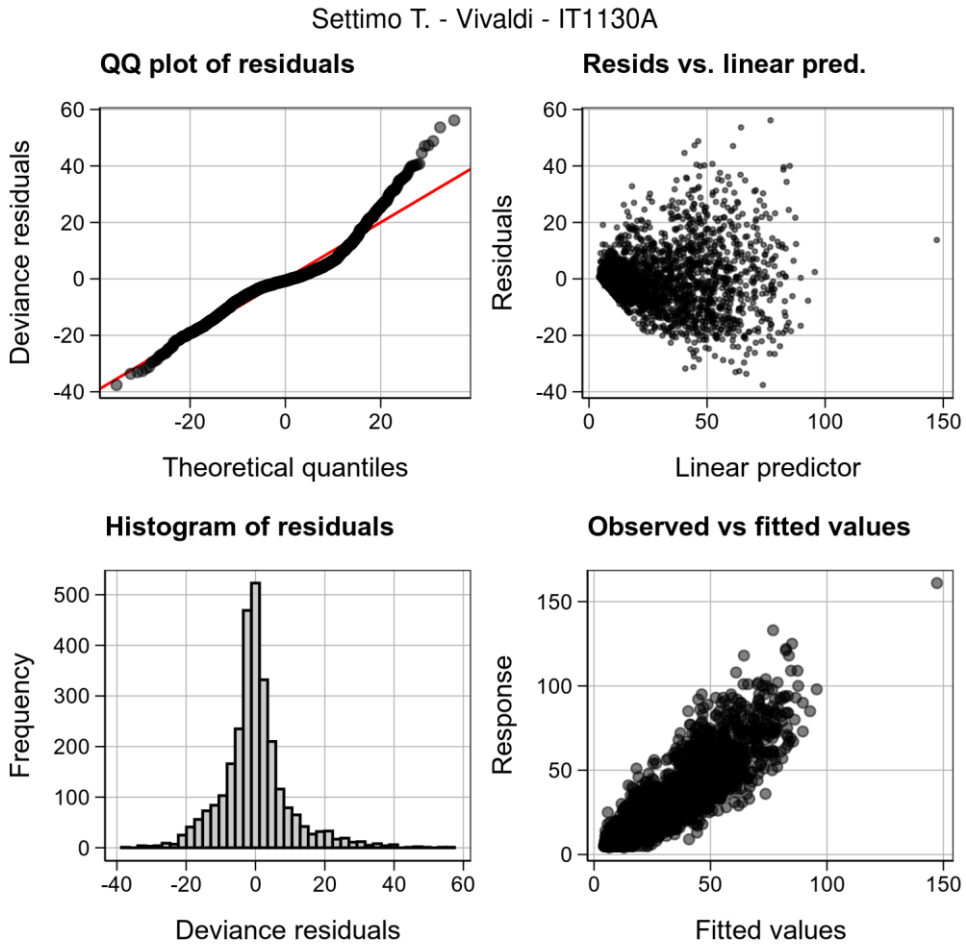

Figure S5b. Check of the basic assumptions: residual analysis of the $PM_{2.5}$ model developed for the air quality monitoring station.

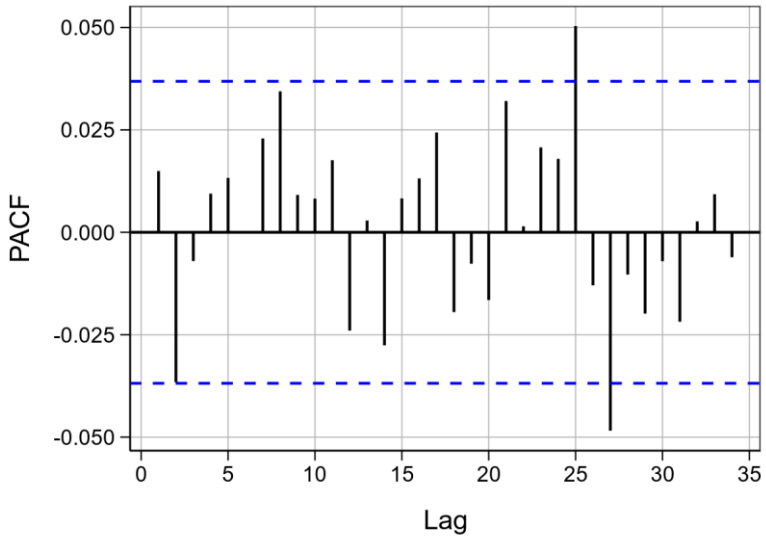

Figure S5c. Partial autocorrelation function (PACF) of the residuals at daily lags of the $PM_{2.5}$ model developed for the air quality monitoring station.

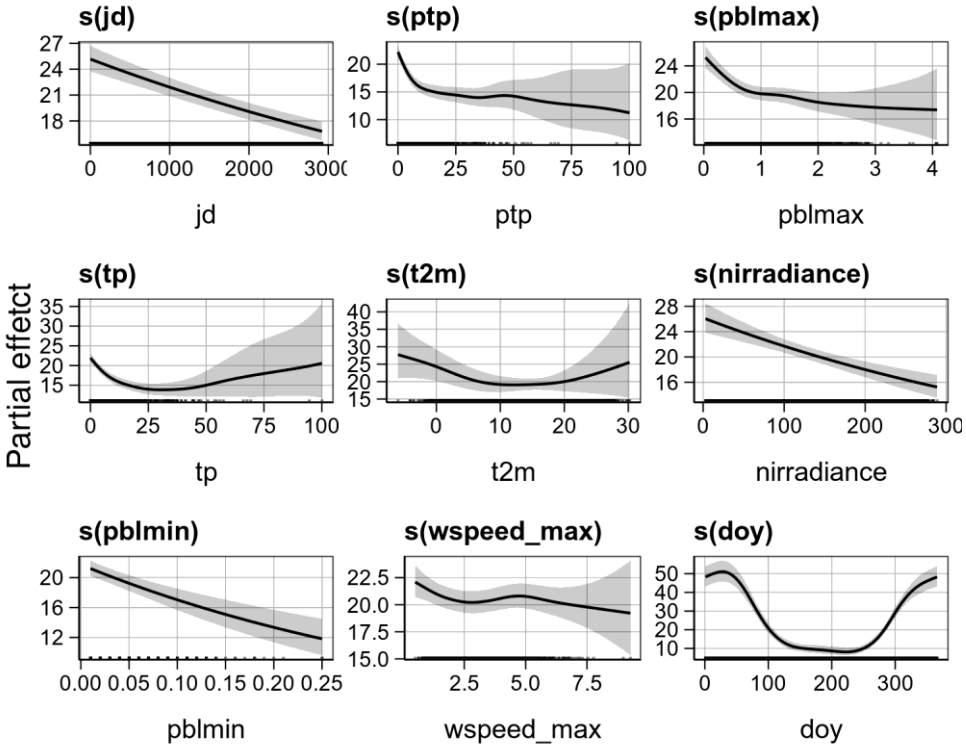

Figure S5d. Spline functions for single predictive variables selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

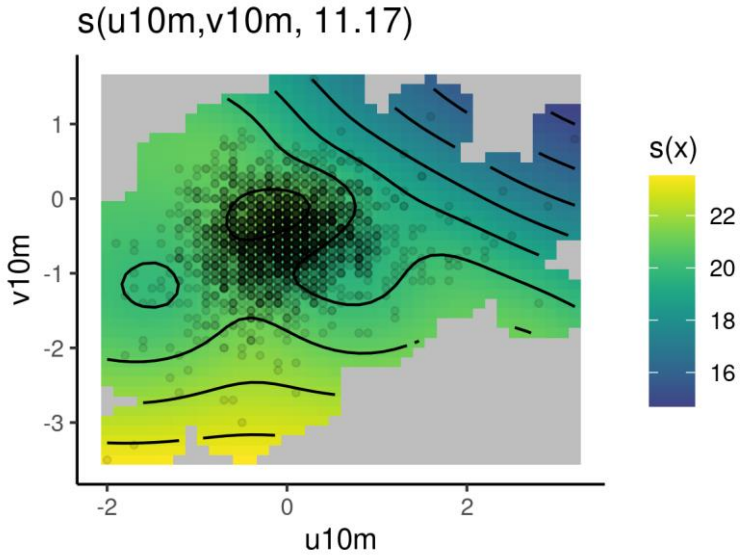

Figure S5e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

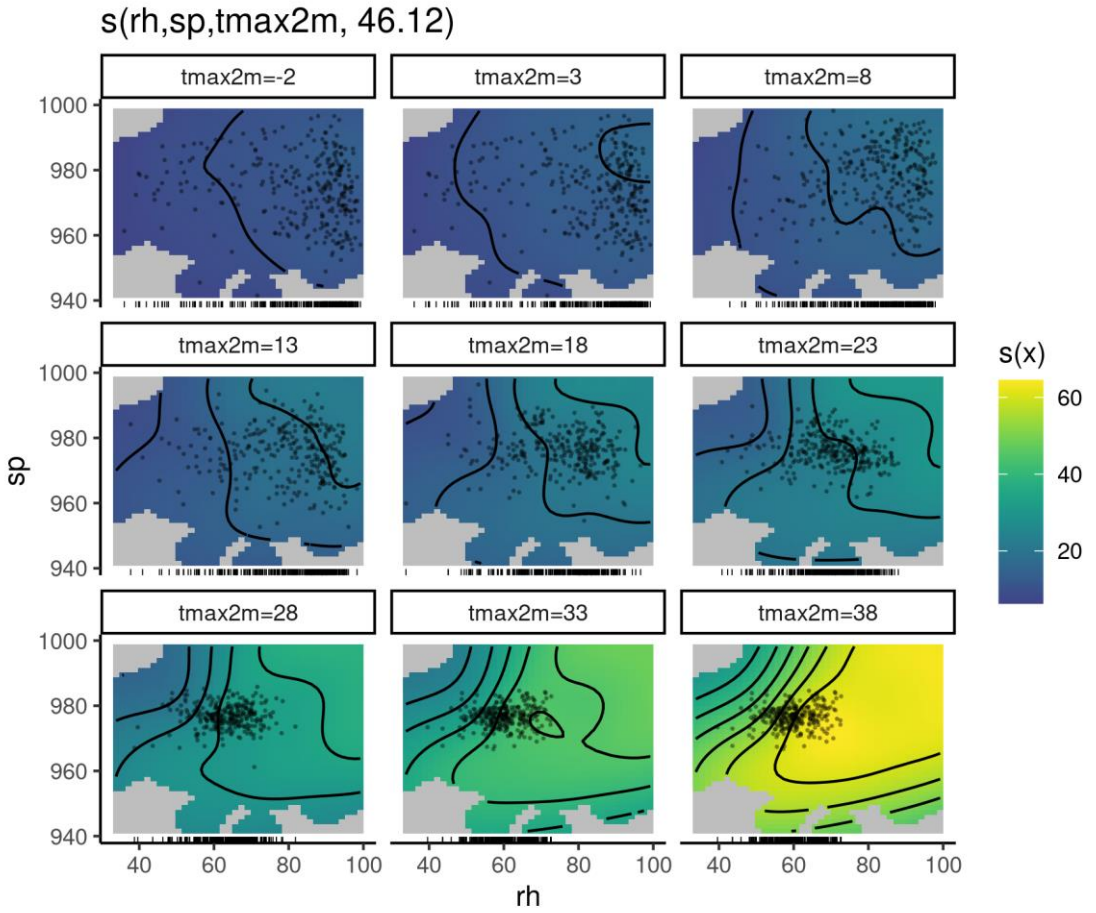

Figure S5f. Smooths for multiple meteorological variables interactions selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

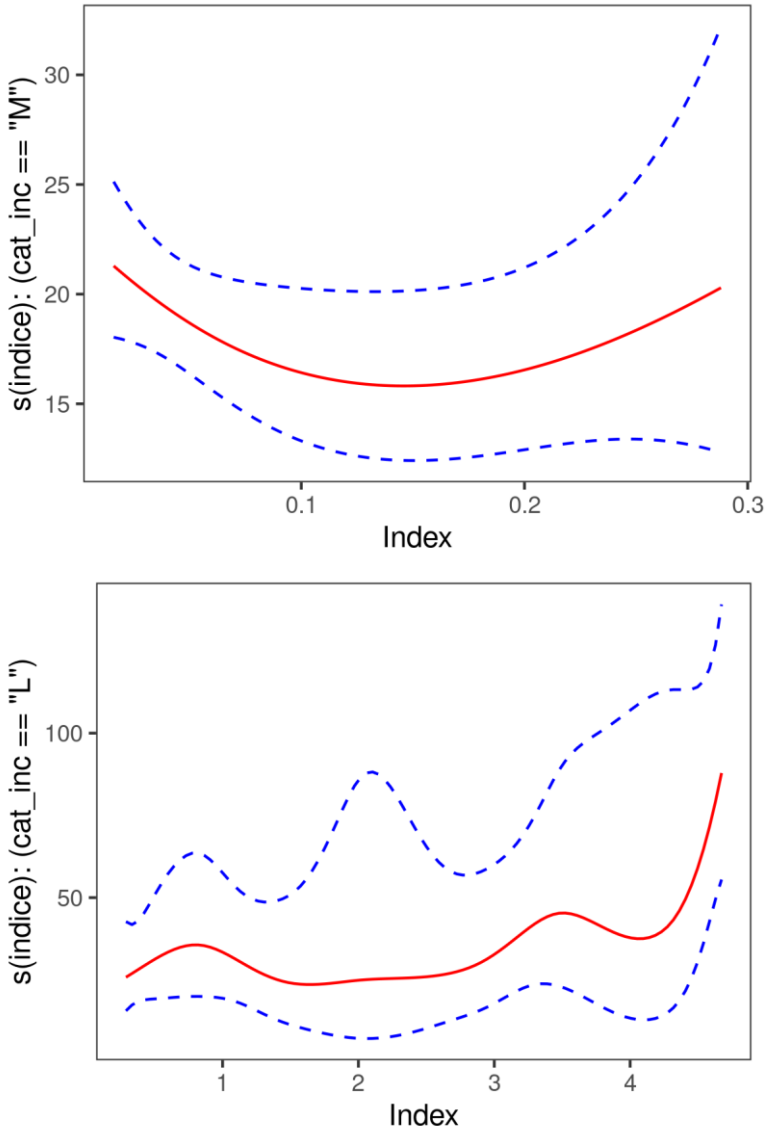

Figure S5g. Spline functions for categorial index variable selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

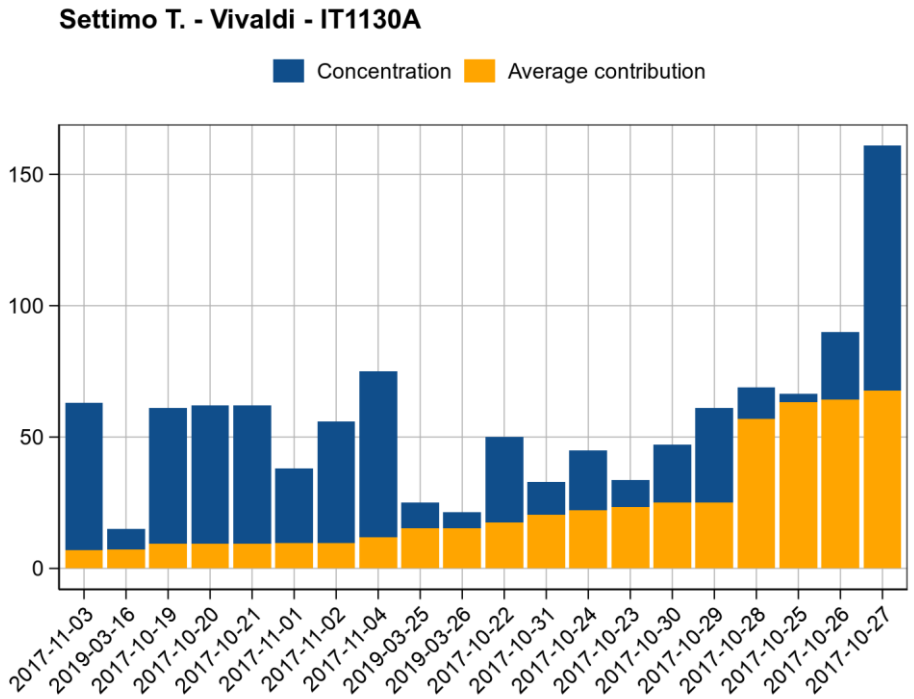

Figure S5h. Estimated model contribution of wildfires to daily average concentrations of $PM_{2.5}$ observed in the air quality monitoring station.

Borgosesia - Tonella IT1532A

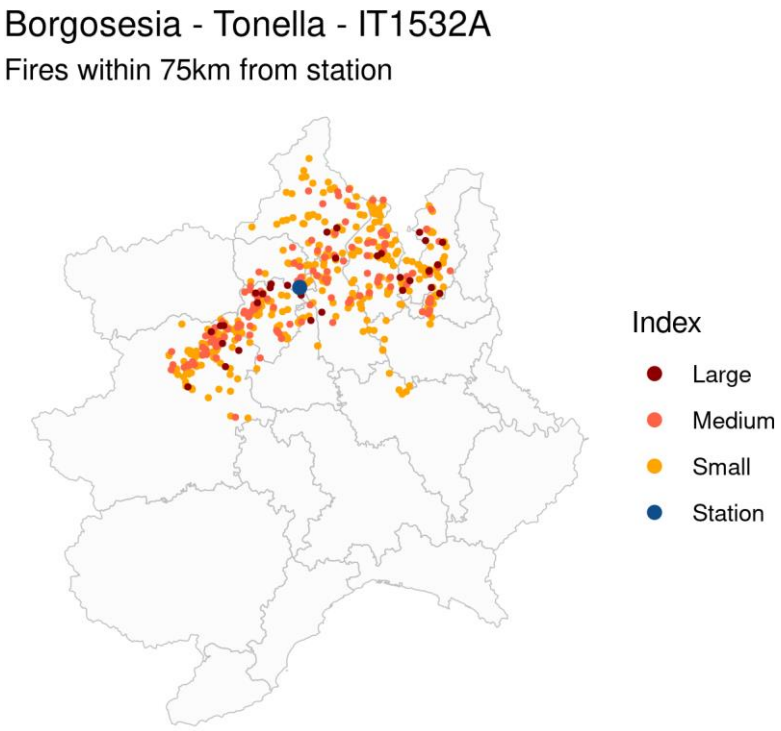

Figure S6a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S6. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	594	14.51	116.7	0.437
Not wooded land area (ha)	245	14.97	48.4	0.1096
Distance (km)	594	43.31	18.88	45.91
Burned area (ha)	594	20.68	127.3	0.5721

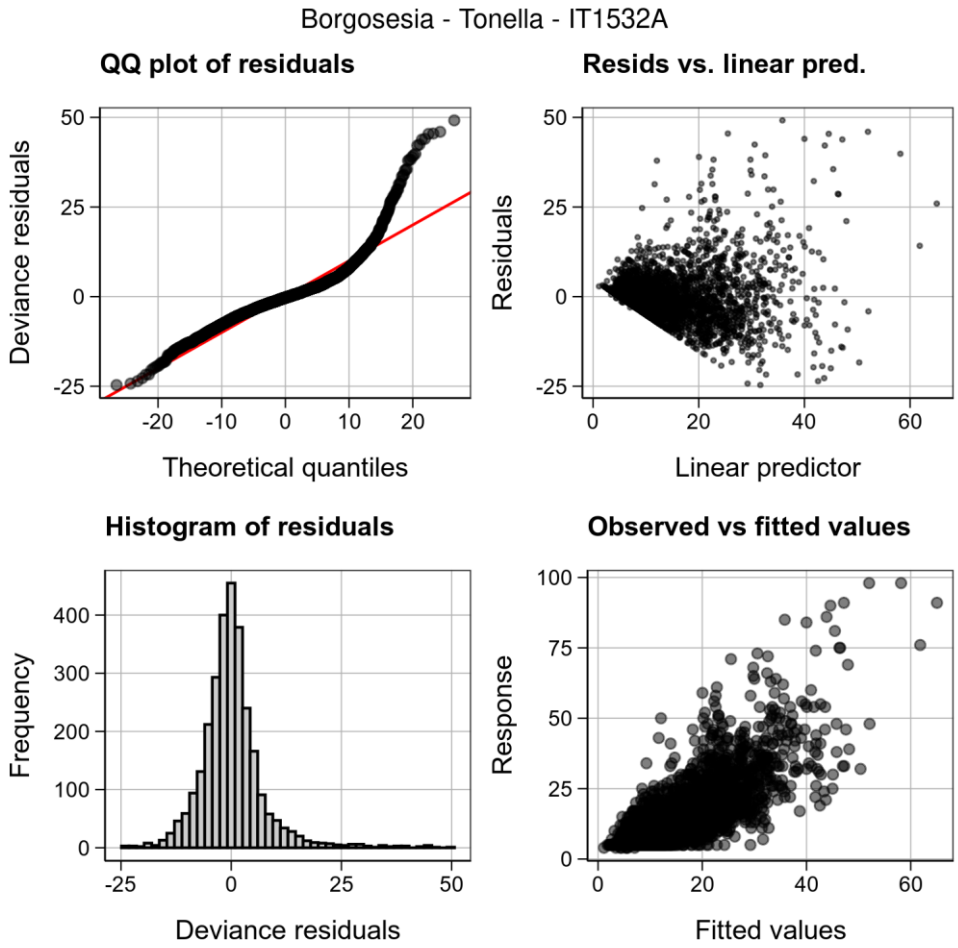

Figure S6b. Check of the basic assumptions: residual analysis of the $PM_{2.5}$ model developed for the air quality monitoring station.

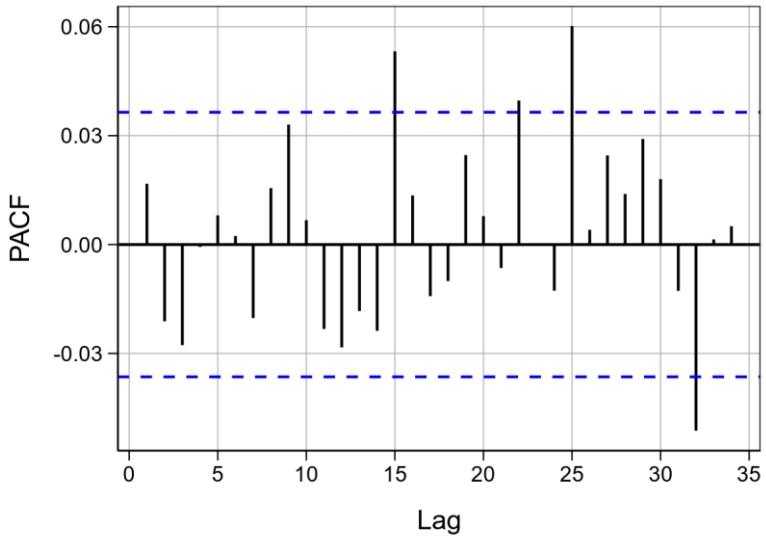

Figure S6c. Partial autocorrelation function (PACF) of the residuals at daily lags of the $PM_{2.5}$ model developed for the air quality monitoring station.

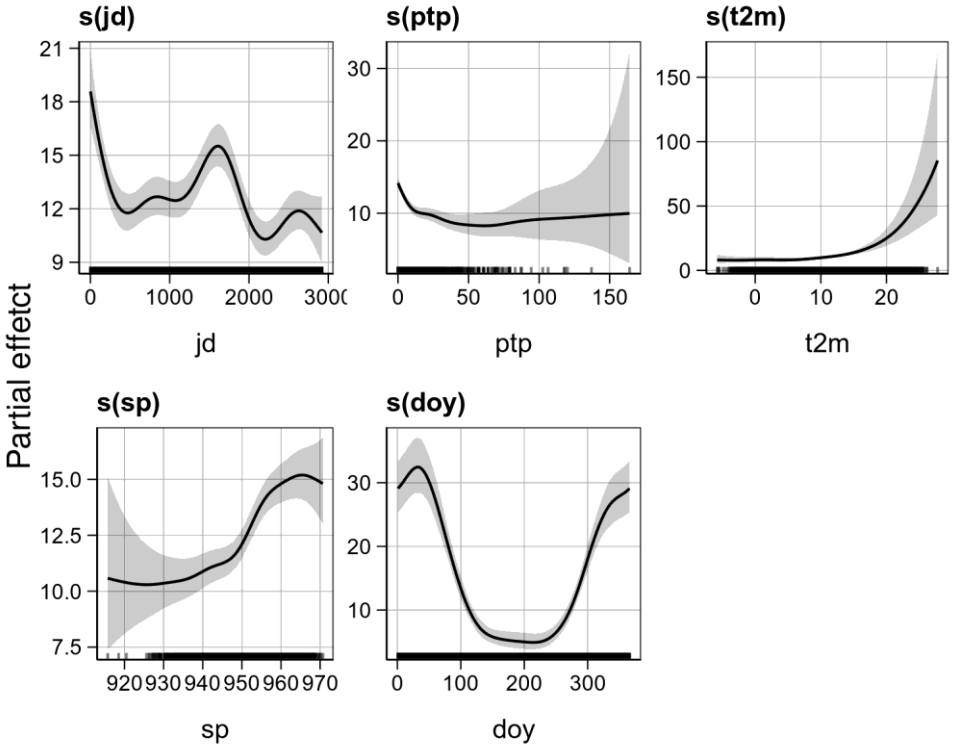

Figure S6d. Spline functions for single predictive variables selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

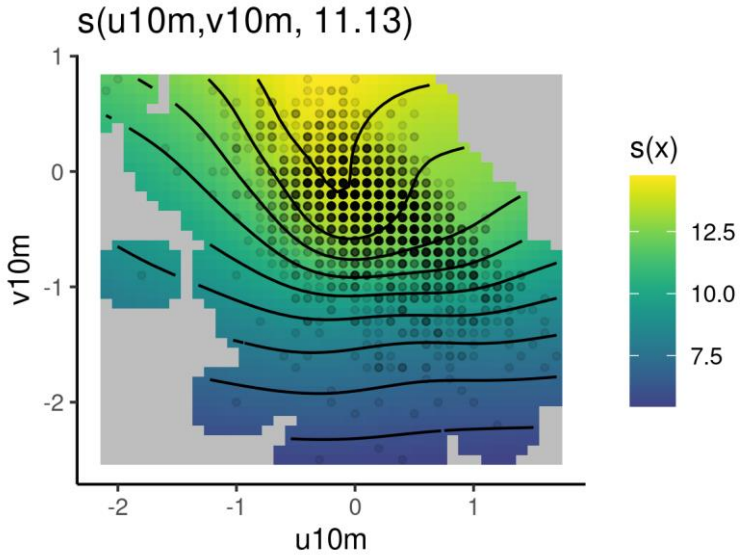

Figure S6e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

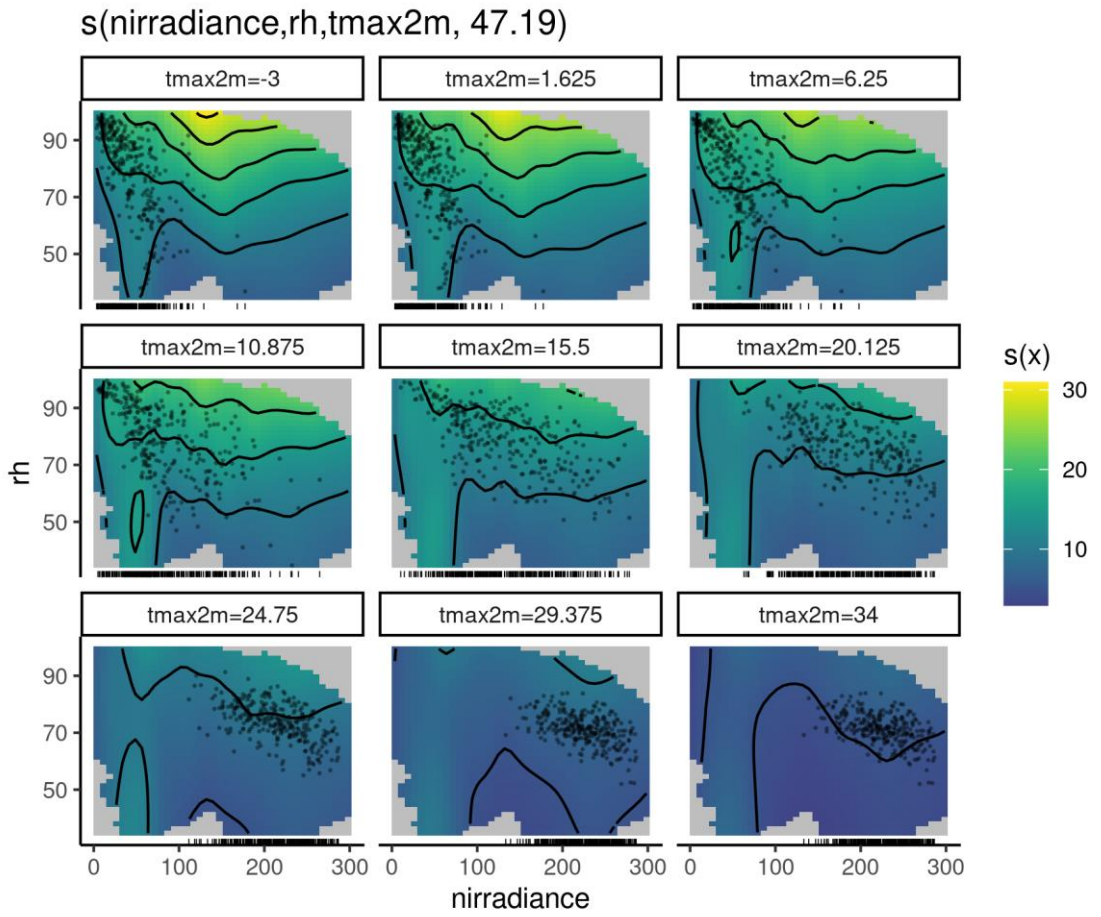

Figure S6f. Smooths for multiple meteorological variables interactions selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

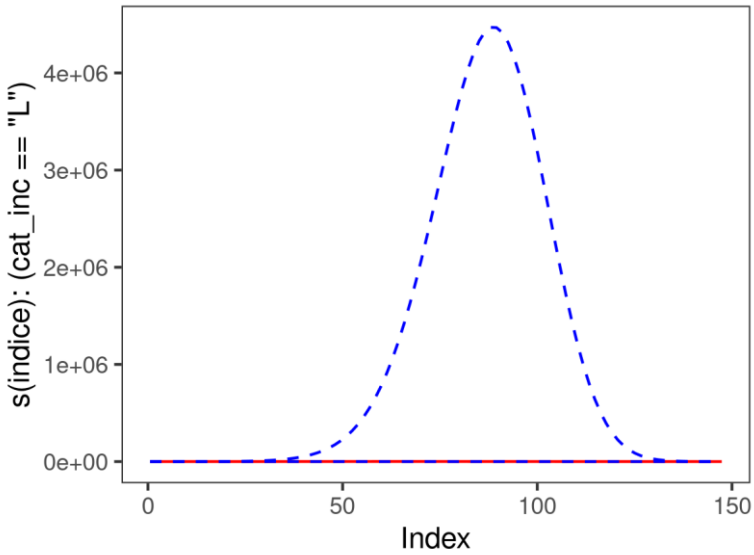

Figure S6g. Spline functions for categorial index variable selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

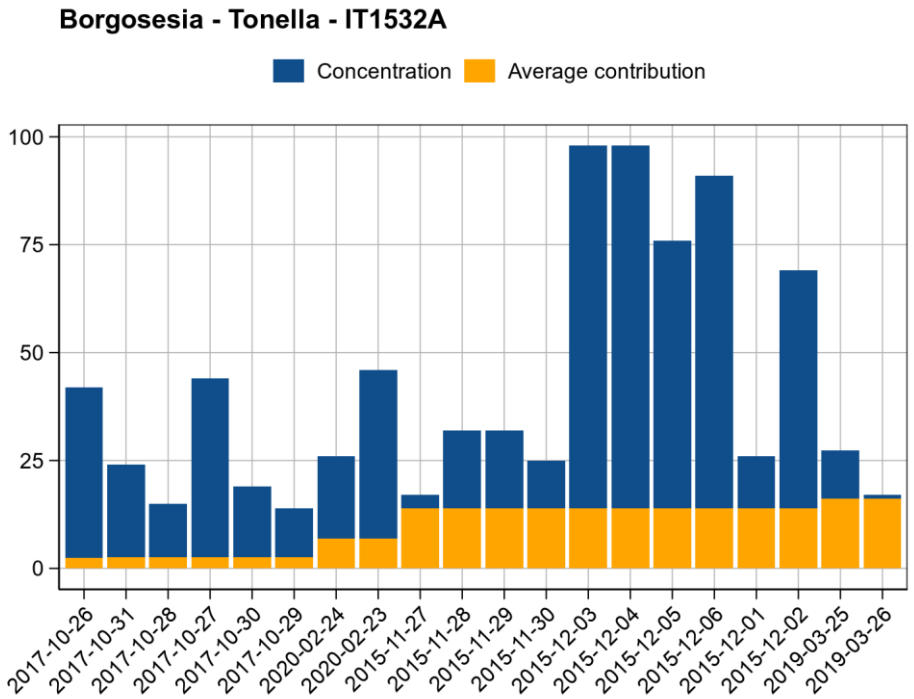

Figure S6h. Estimated model contribution of wildfires to daily average concentrations of $PM_{2.5}$ observed in the air quality monitoring station.

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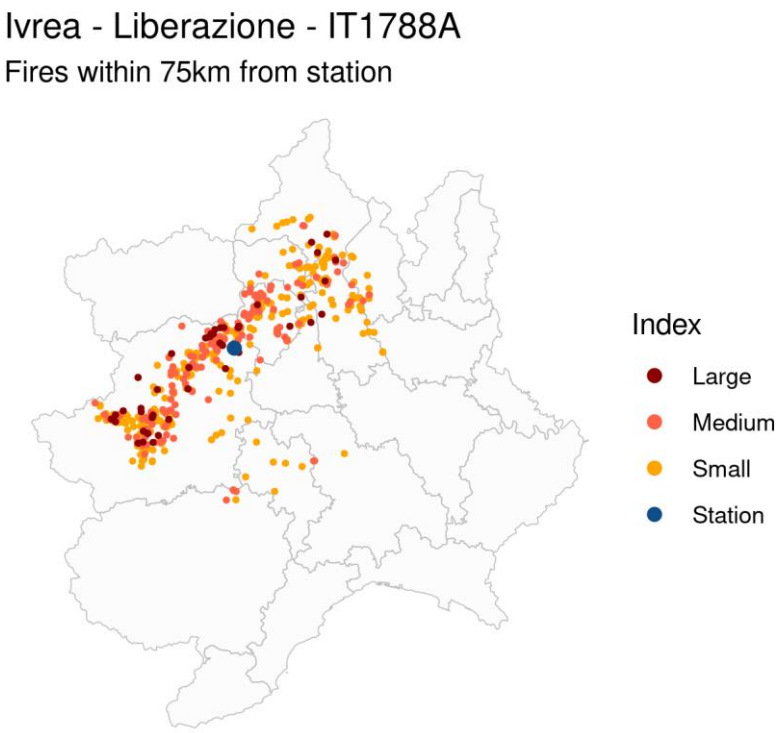

Figure S7a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S7. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	732	18.8	171.4	0.315
Not wooded land area (ha)	258	17.28	72.84	0.1712
Distance (km)	732	45.18	20.02	51
Burned area (ha)	732	24.89	200.6	0.3808

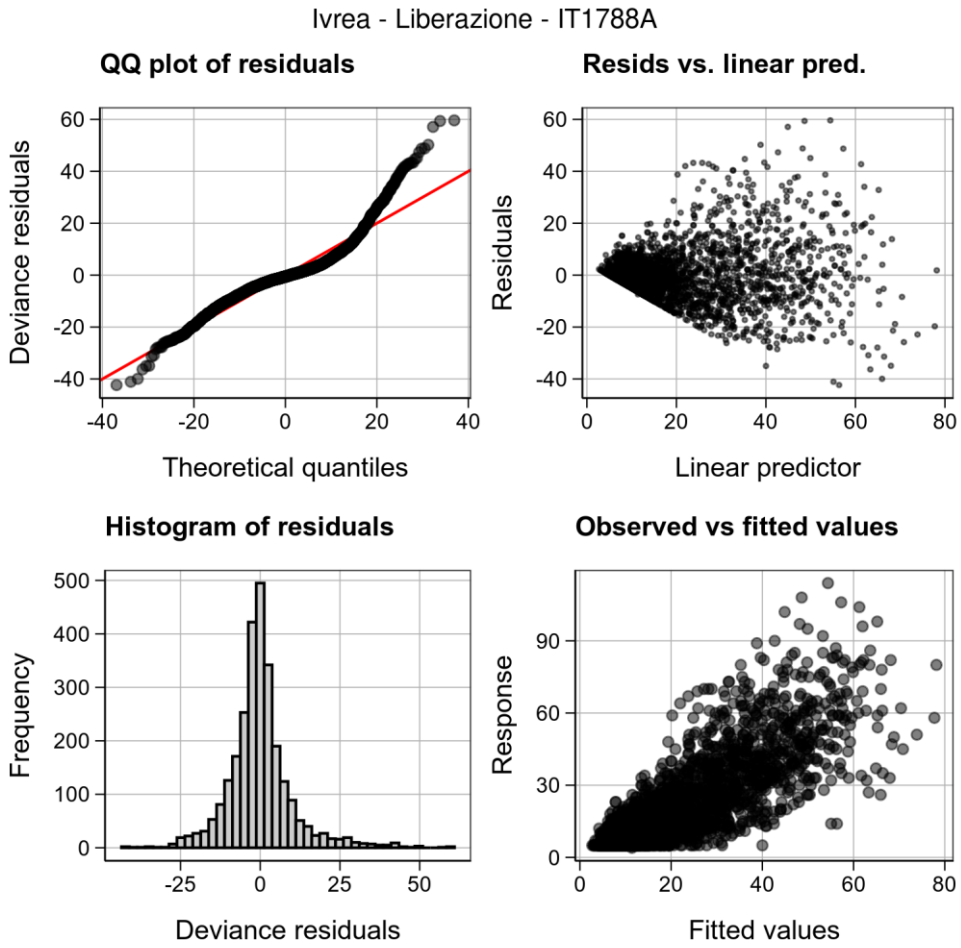

Figure S7b. Check of the basic assumptions: residual analysis of the $PM_{2.5}$ model developed for the air quality monitoring station.

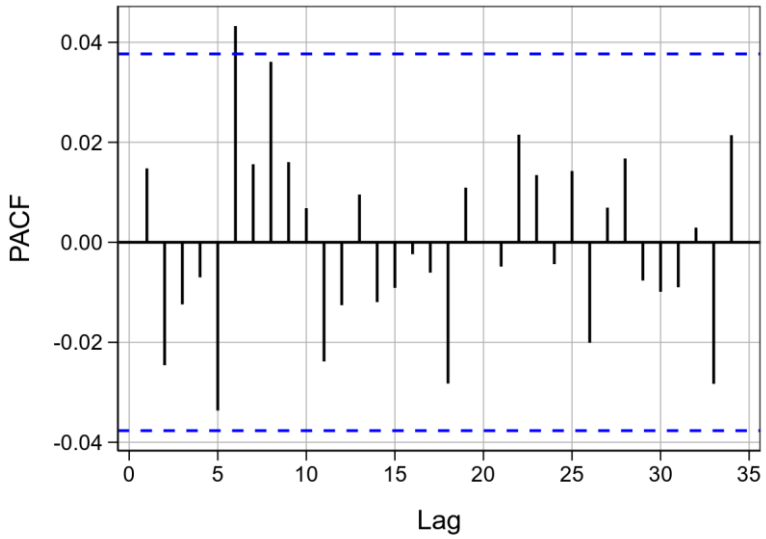

Figure S7c. Partial autocorrelation function (PACF) of the residuals at daily lags of the $PM_{2.5}$ model developed for the air quality monitoring station.

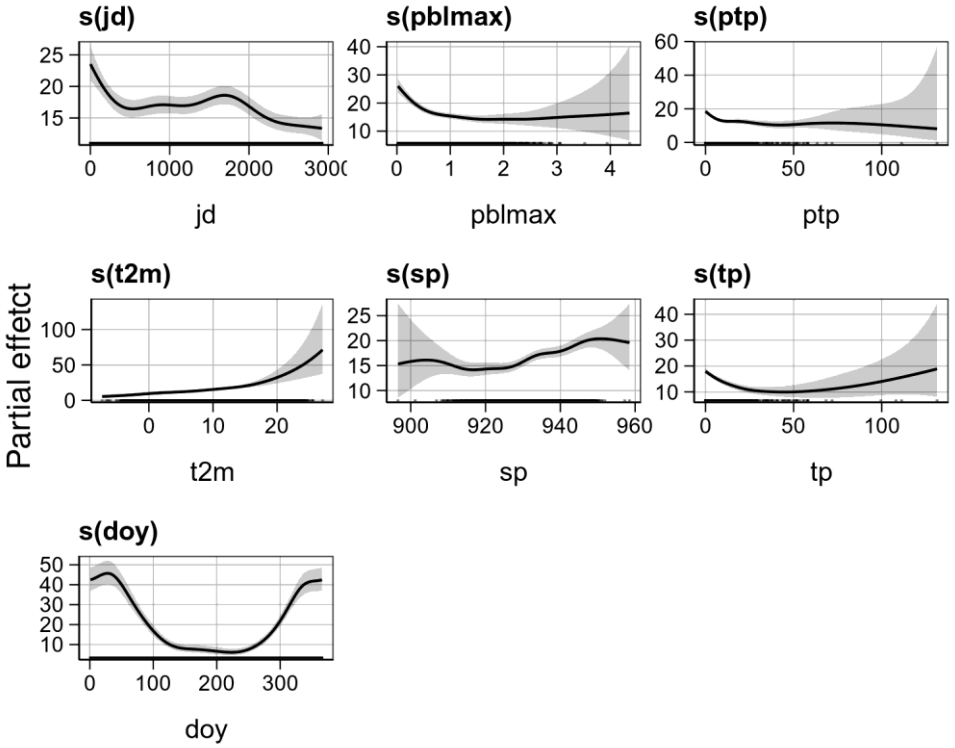

Figure S7d. Spline functions for single predictive variables selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

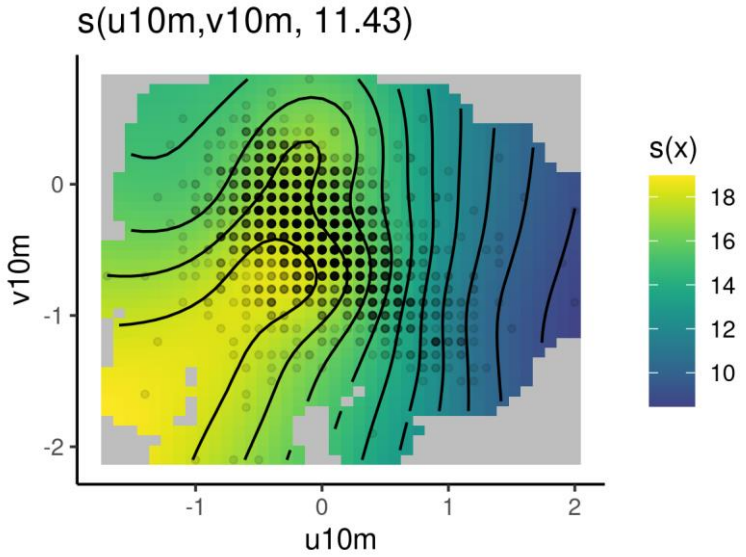

Figure S7e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

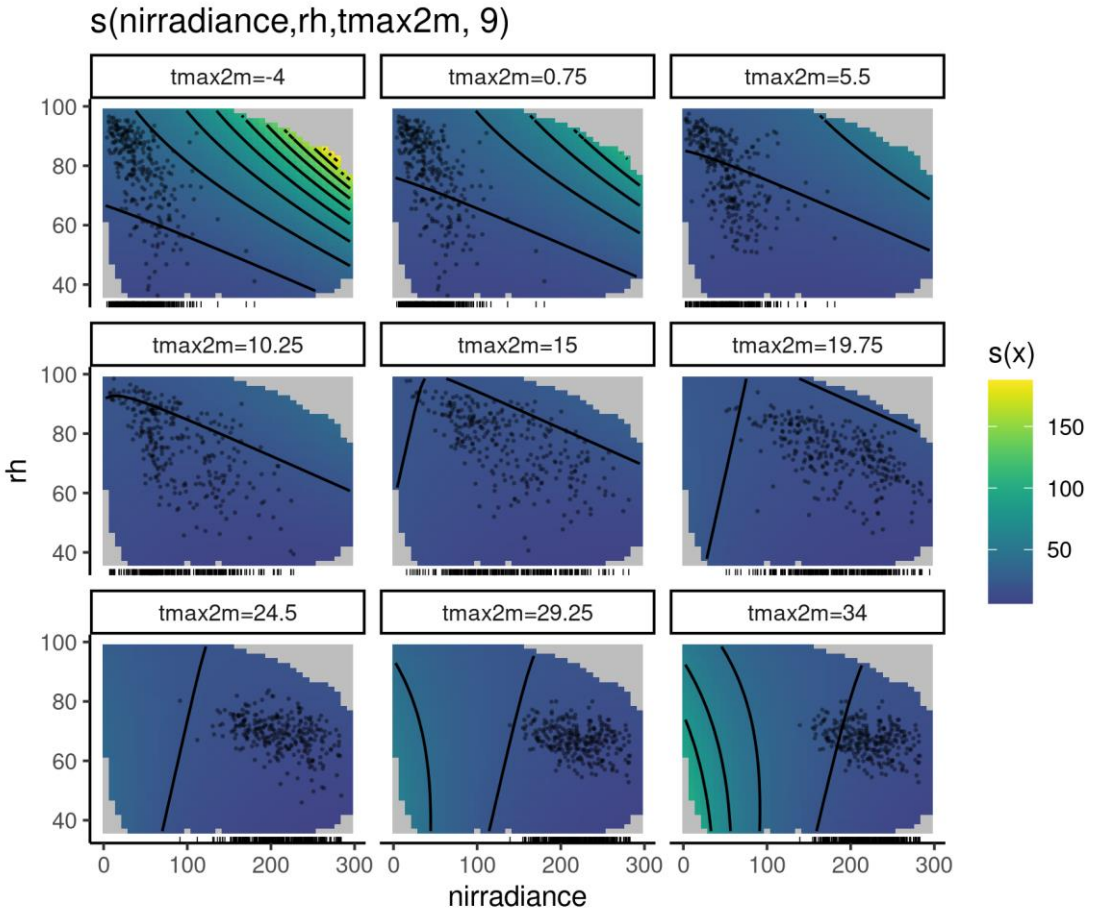

Figure S7f. Smooths for multiple meteorological variables interactions selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

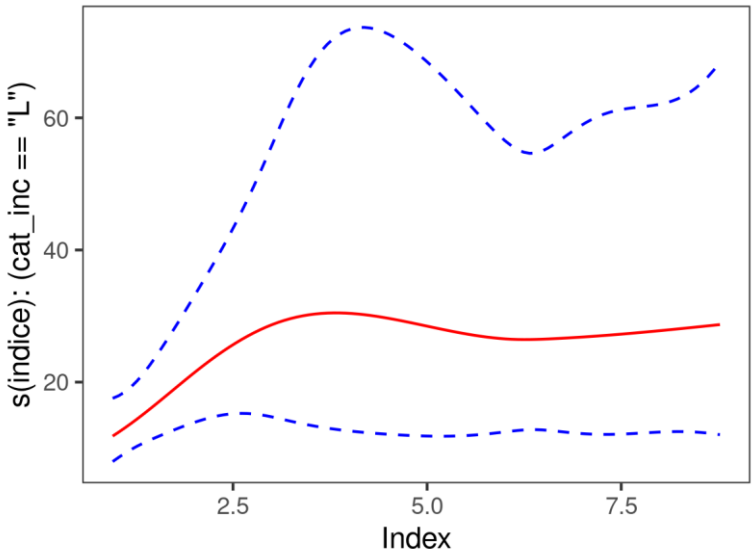

Figure S7g. Spline functions for categorial index variable selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

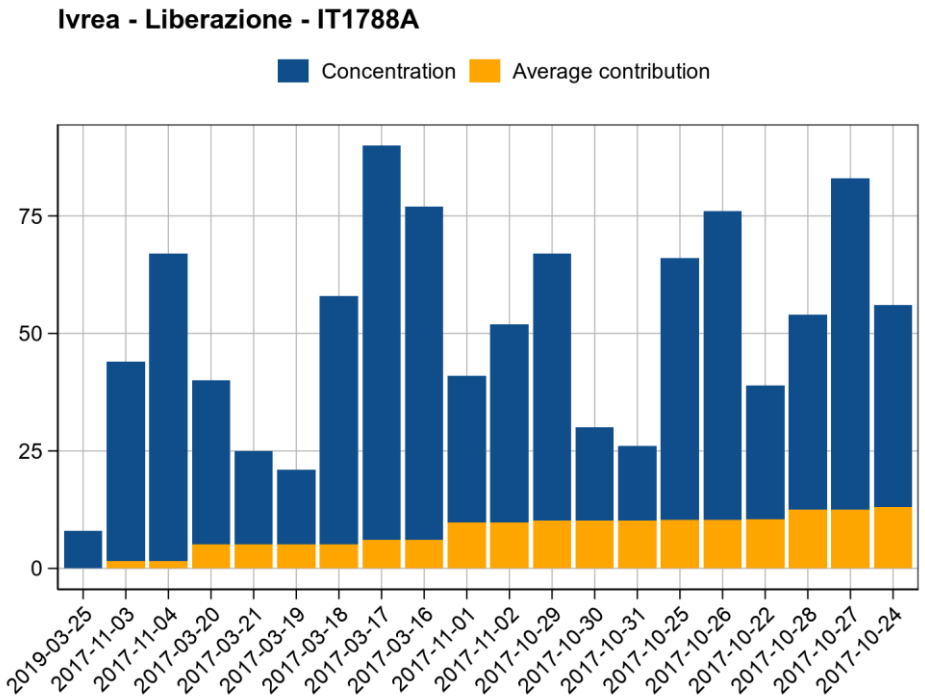

Figure S7h. Estimated model contribution of wildfires to daily average concentrations of $PM_{2.5}$ observed in the air quality monitoring station.

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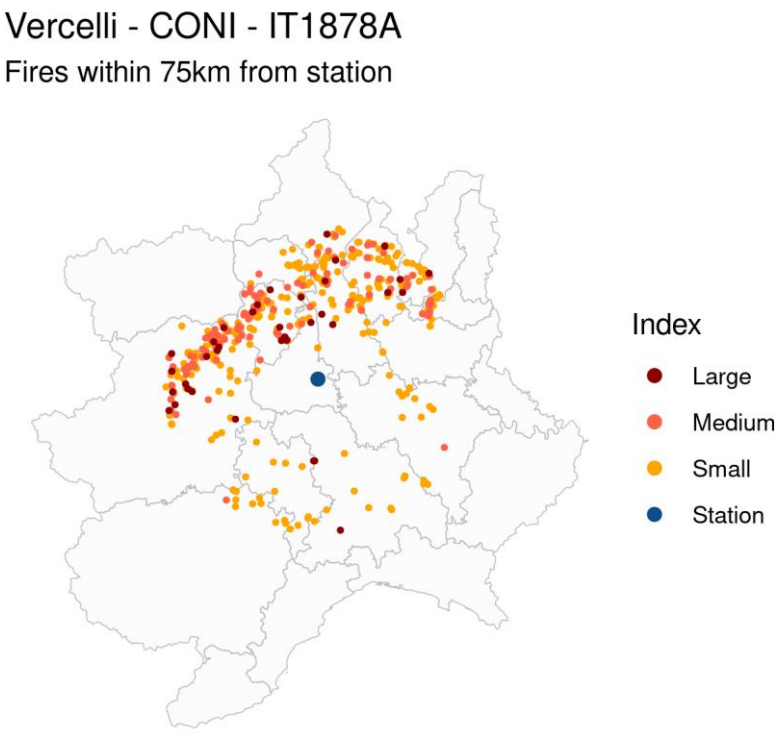

Figure S8a. Italy, Piedmont region: wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Table S8. Italy, Piedmont region: descriptive statistics for wildfires, classified by categorial index variable, within a buffer of 75 km from the air quality monitoring station.

Variable	n	mean	sd	median
Wooded land area (ha)	559	15.79	125.7	0.4766
Not wooded land area (ha)	220	15.35	49.75	0.1587
Distance (km)	559	55.36	12.45	56.49
Burned area (ha)	559	21.83	135.7	0.5895

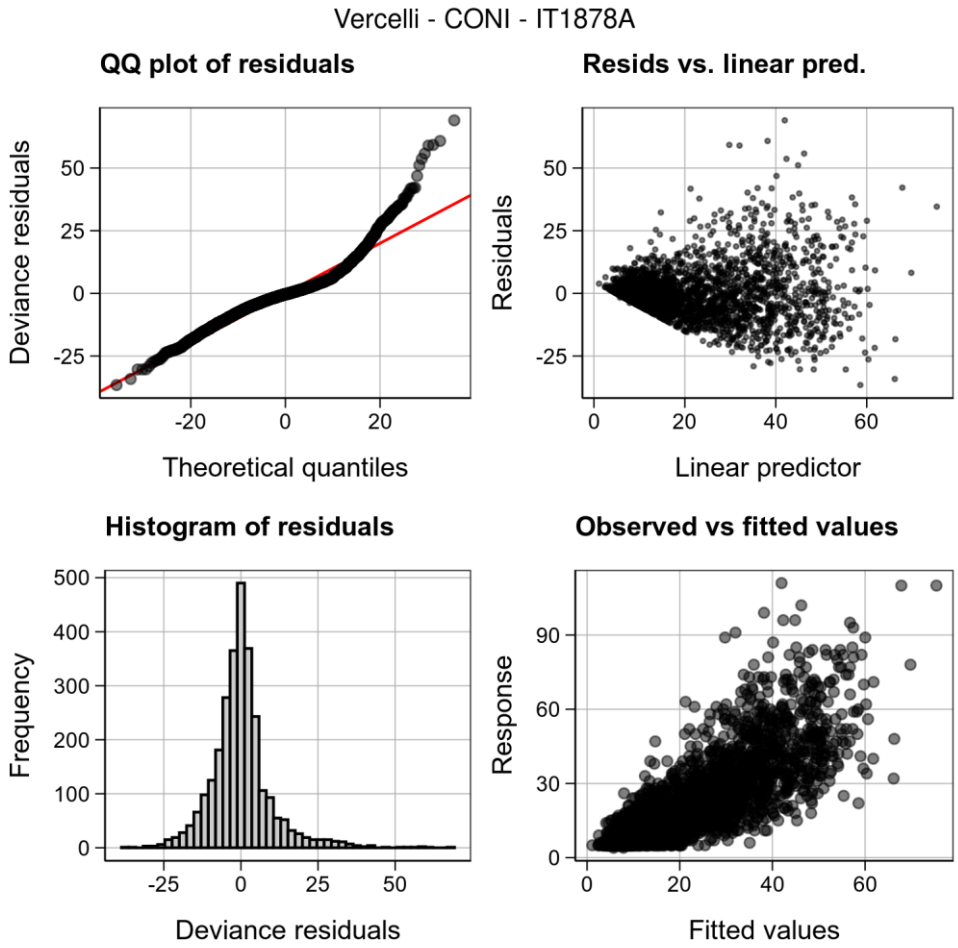

Figure S8b. Check of the basic assumptions: residual analysis of the $PM_{2.5}$ model developed for the air quality monitoring station.

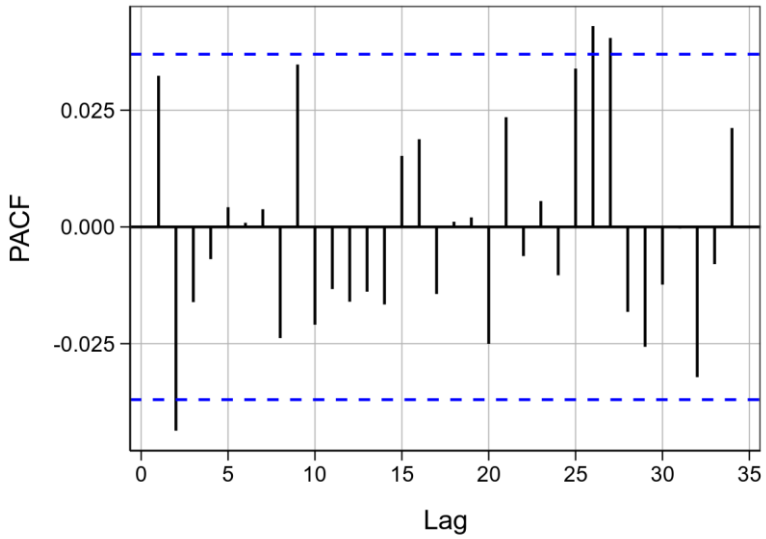

Figure S8c. Partial autocorrelation function (PACF) of the residuals at daily lags of the $PM_{2.5}$ model developed for the air quality monitoring station.

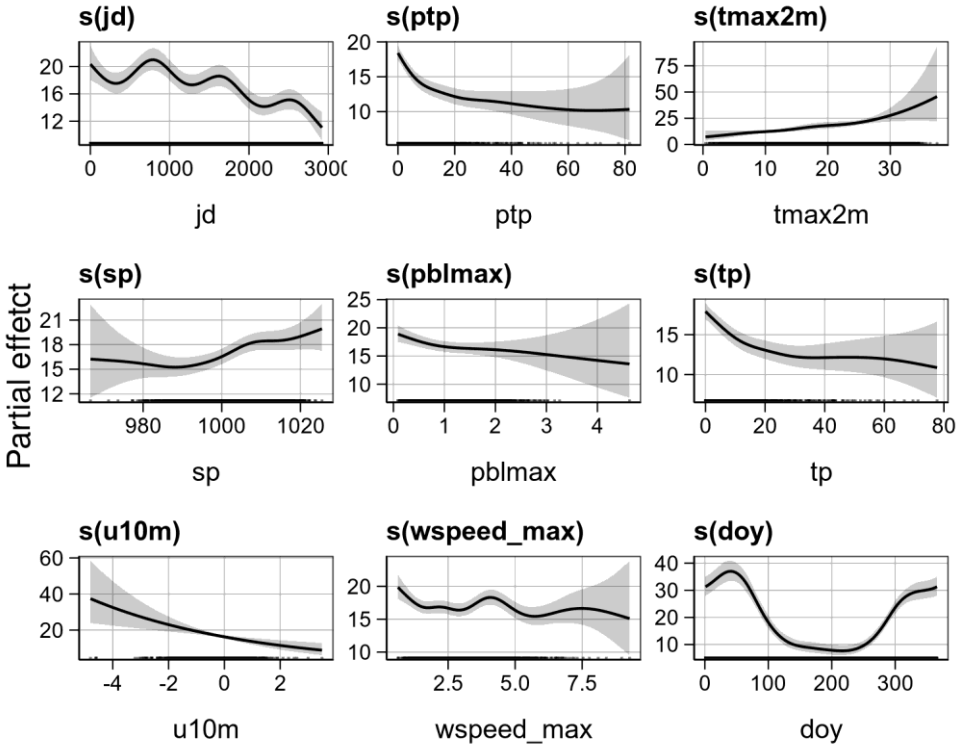

Figure S8d. Spline functions for single predictive variables selected in the $PM_{2.5}$ model developed for the air quality.

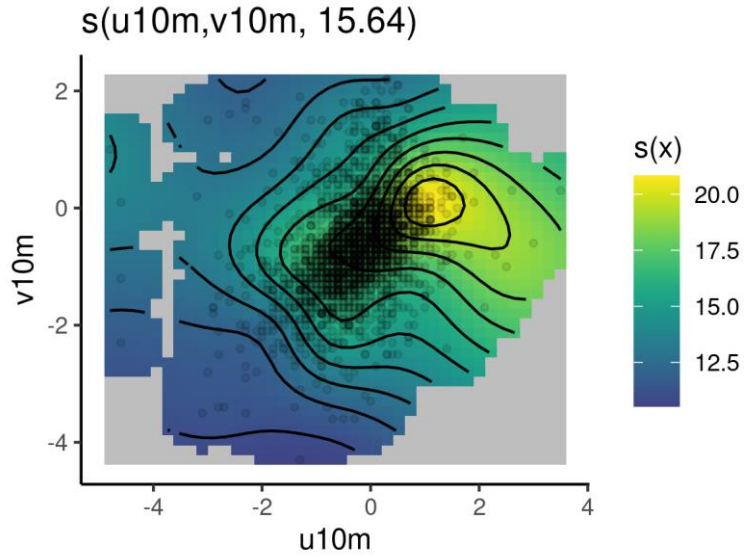

Figure S8e. Smooth surface for wind speed variables interaction (u10m, v10m) selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

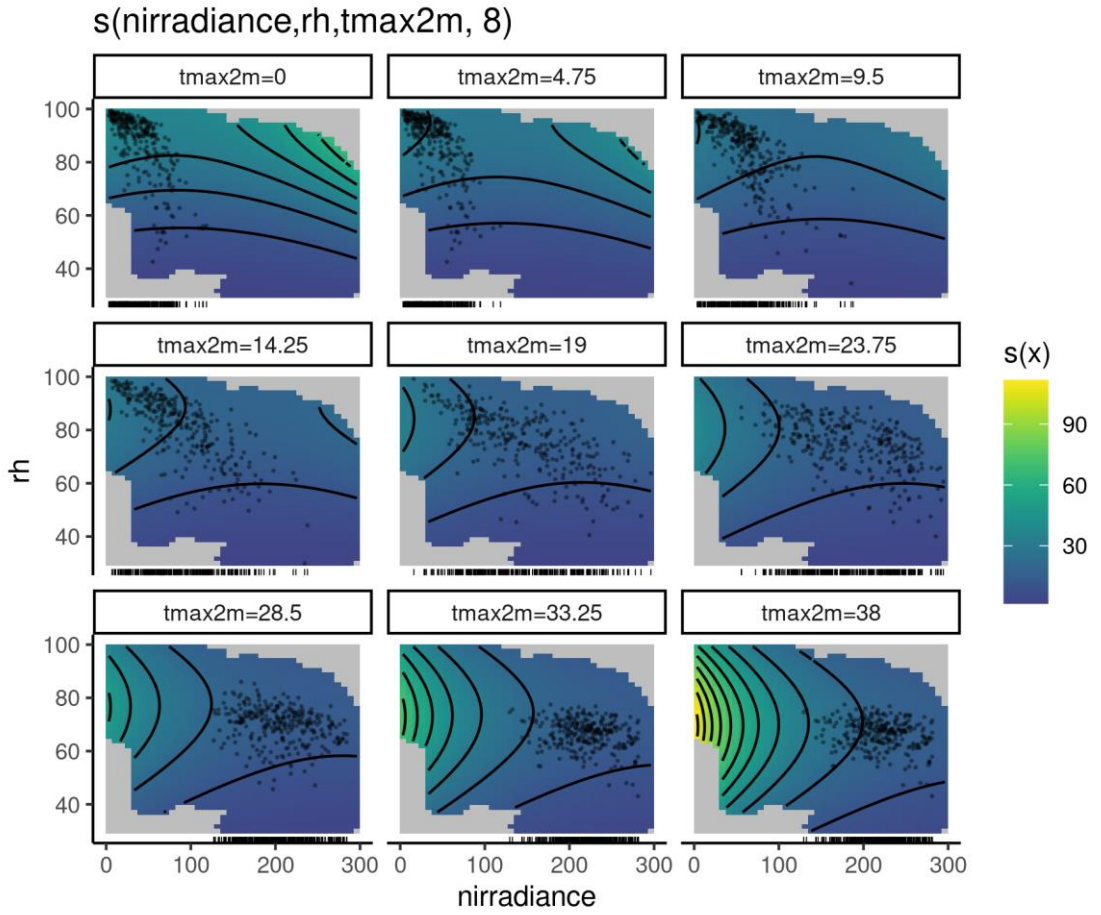

Figure S8f. Smooths for multiple meteorological variables interactions selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

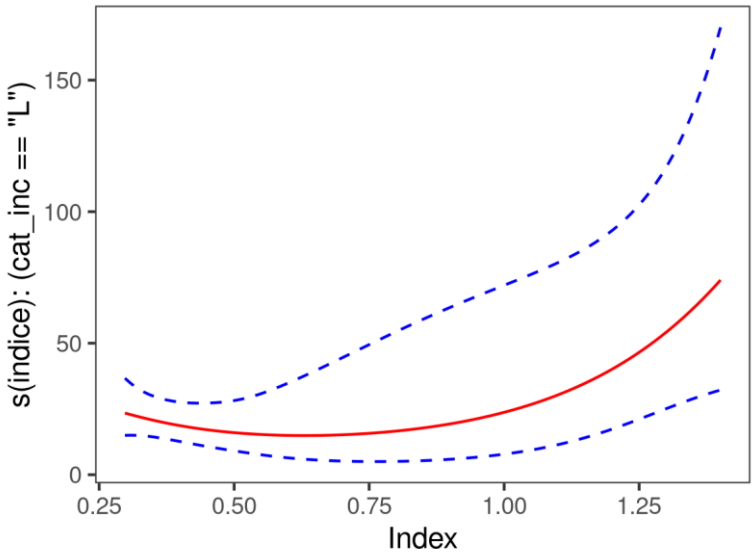

Figure S8g. Spline functions for categorial index variable selected in the $PM_{2.5}$ model developed for the air quality monitoring station.

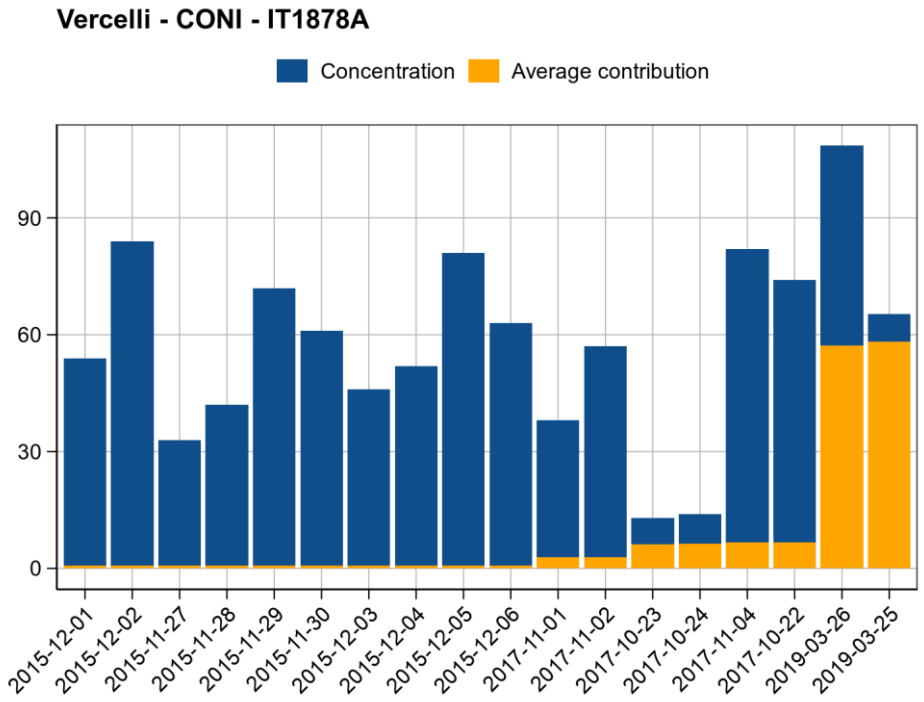

Figure S8h. Estimated model contribution of wildfires to daily average concentrations of $PM_{2.5}$ observed in the air quality monitoring station.

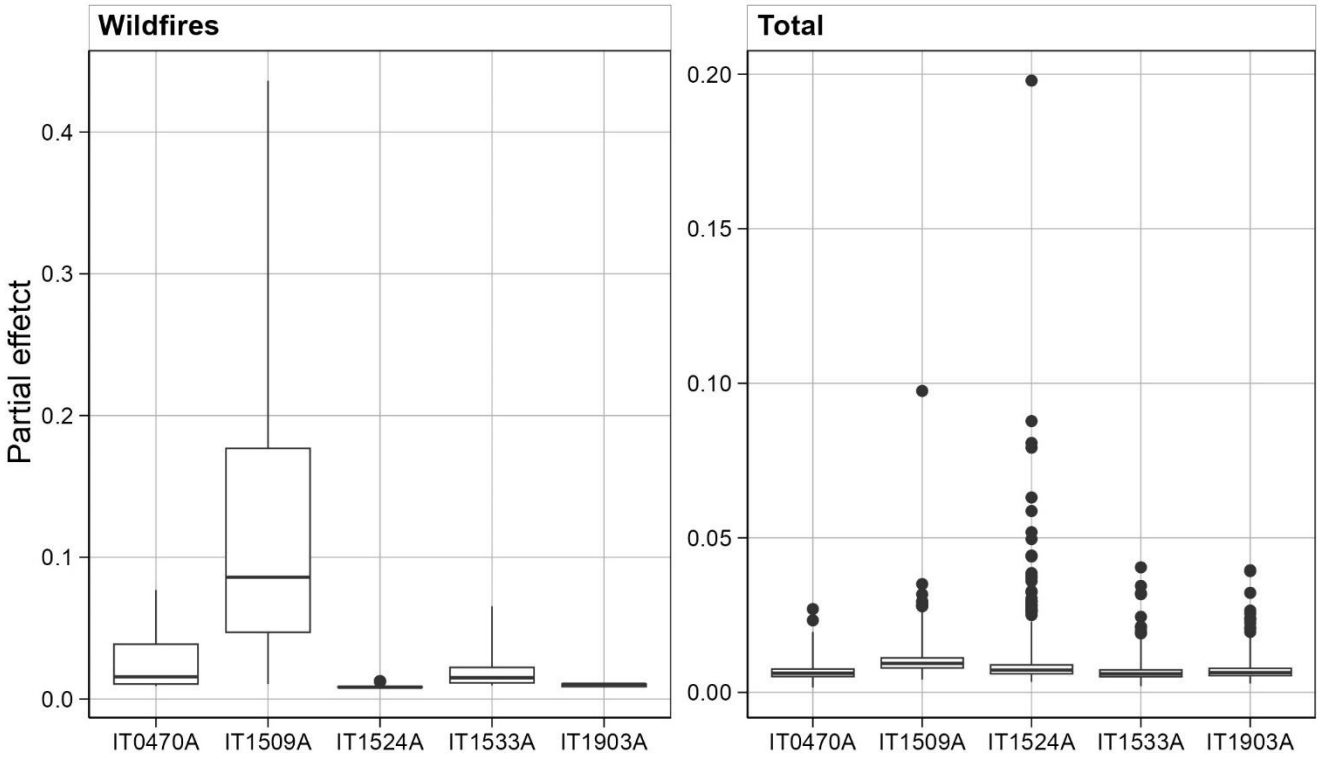

Figure S9. Relative uncertainty for, PM_{10}-models, total (right) and wildfire partial contribution (left).

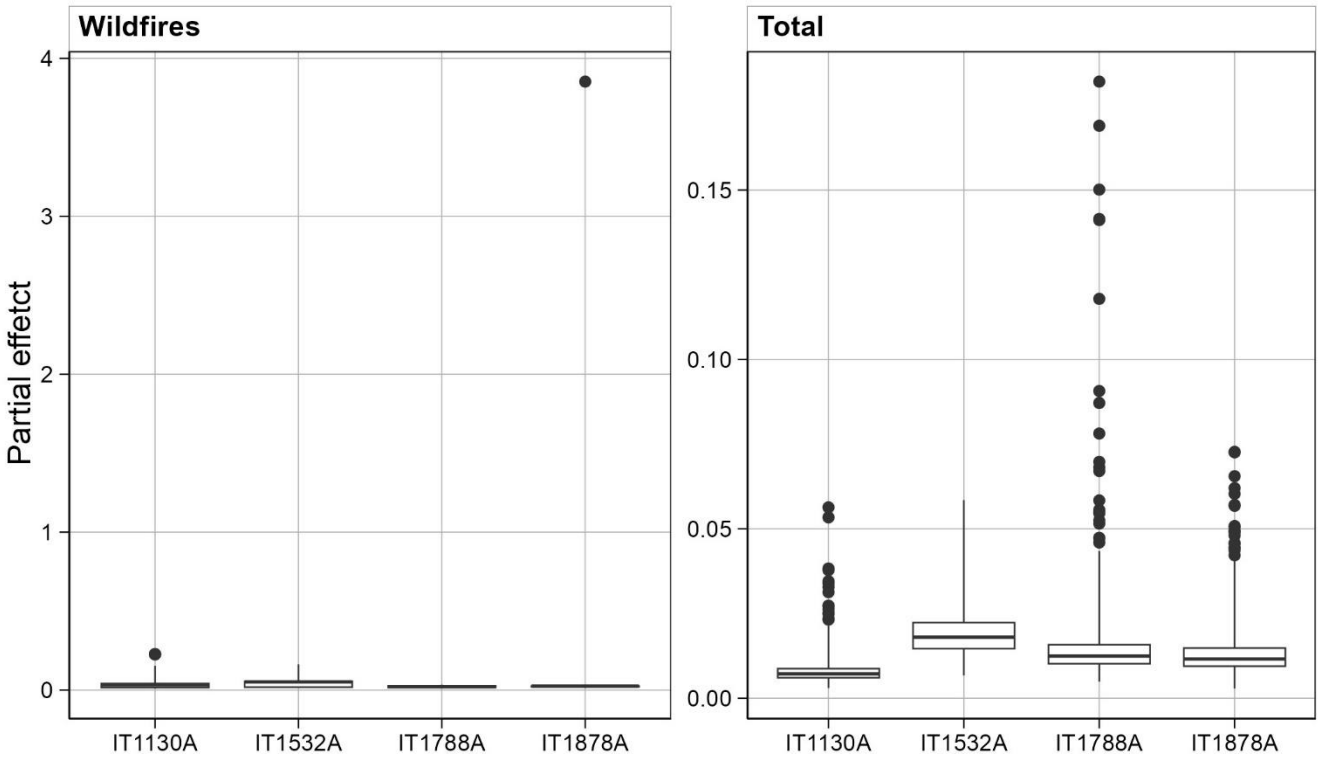

Figure S10. Relative uncertainty for, $PM_{2.5}$-models, total (right) and wildfire partial contribution (left).