**Supplementary material to**

# Study of the unknown HONO daytime source at an European suburban site during the MEGAPOLI summer field campaigns.

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**Supplementary material S1: HONO production and loss rates, including the missing HONO source**

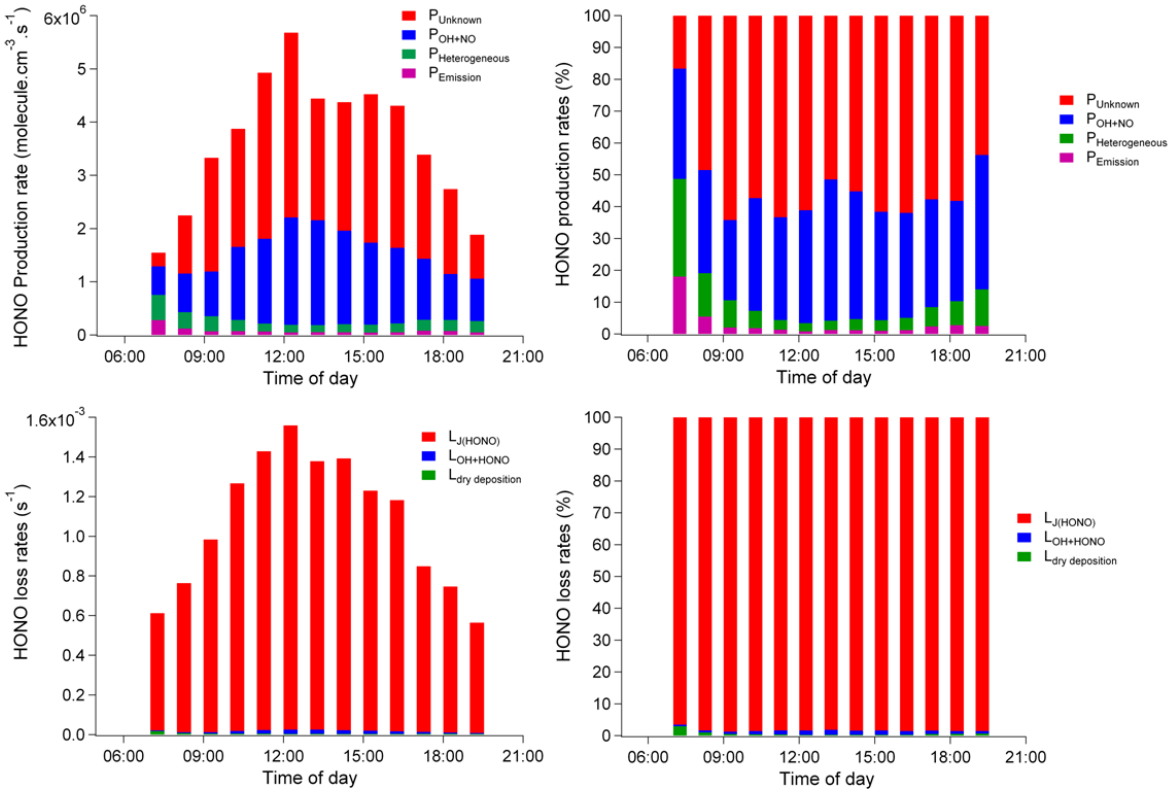



Figure S1.1: Contribution of HONO production and loss terms (hourly averaged between 9 and 26 July), including the calculated unknown HONO source from equation (4) during the MEGAPOLI summer campaign.

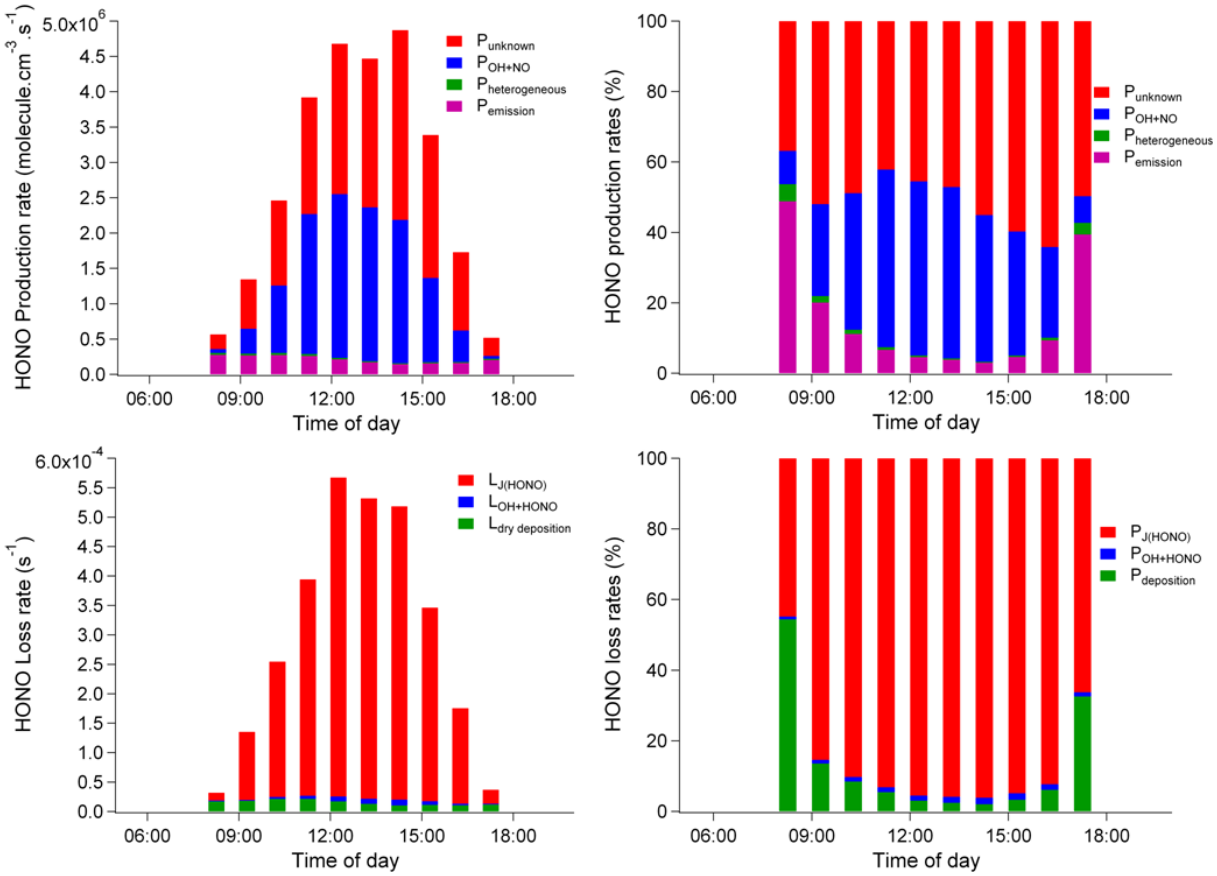



Figure S1.2: Contribution of HONO production and loss terms (hourly averaged between 20 of January and 5 of February), including the calculated unknown HONO source from equation (4) during the MEGAPOLI winter campaign.

**Supplementary material S2: Correlation plots between the unknown HONO source and various parameters**

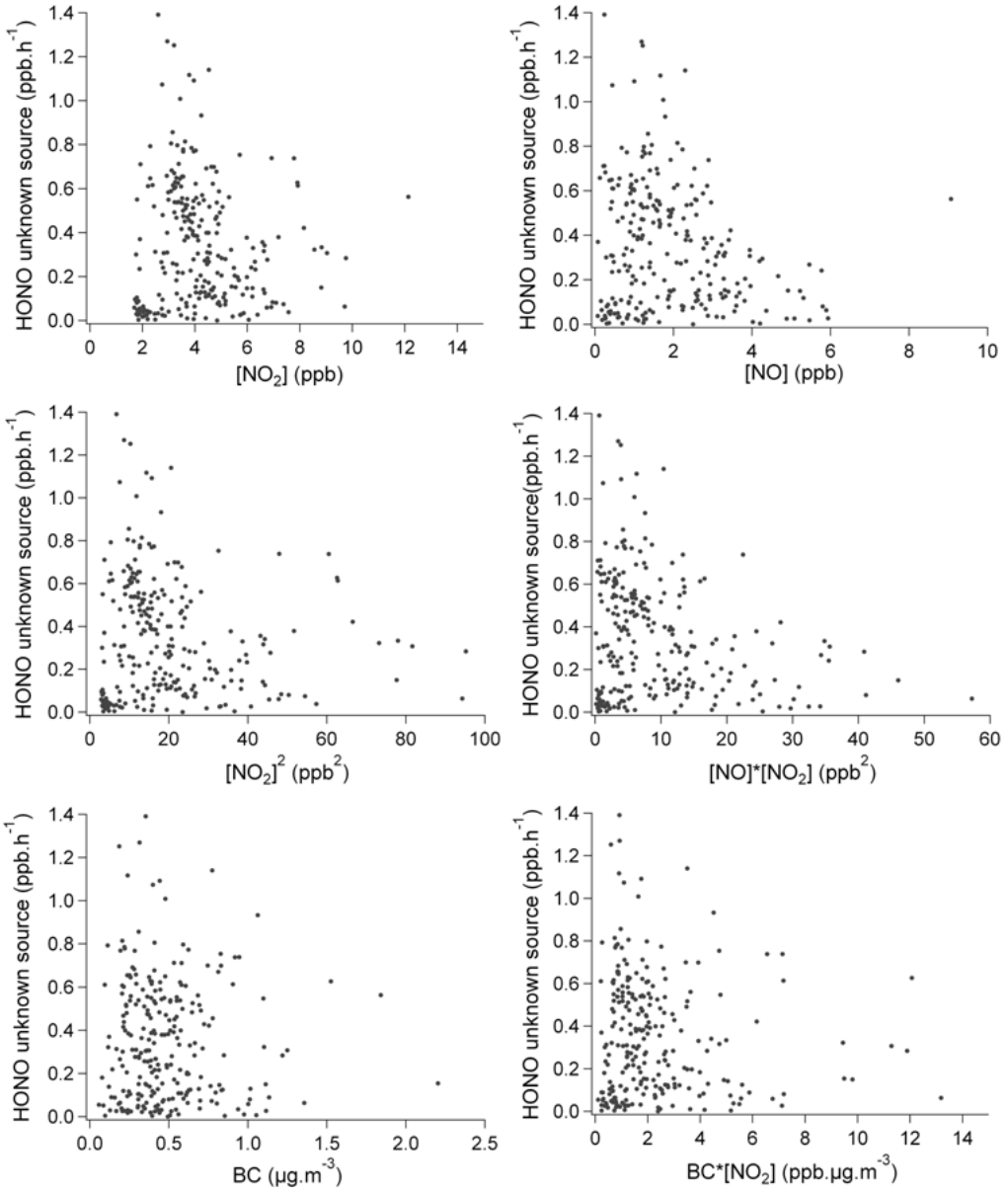



Figure S2.1: Correlation plots between the unknown HONO source and measured $[NO_2]$, $[NO]$, $[NO_2]^2$, the product between measured $[NO]$ and $[NO_2]$, measured black carbon aerosols concentrations (BC) and the product between measured $[NO_2]$ and black carbon aerosols concentrations during the MEGAPOLI summer campaign at SIRTA observatory.

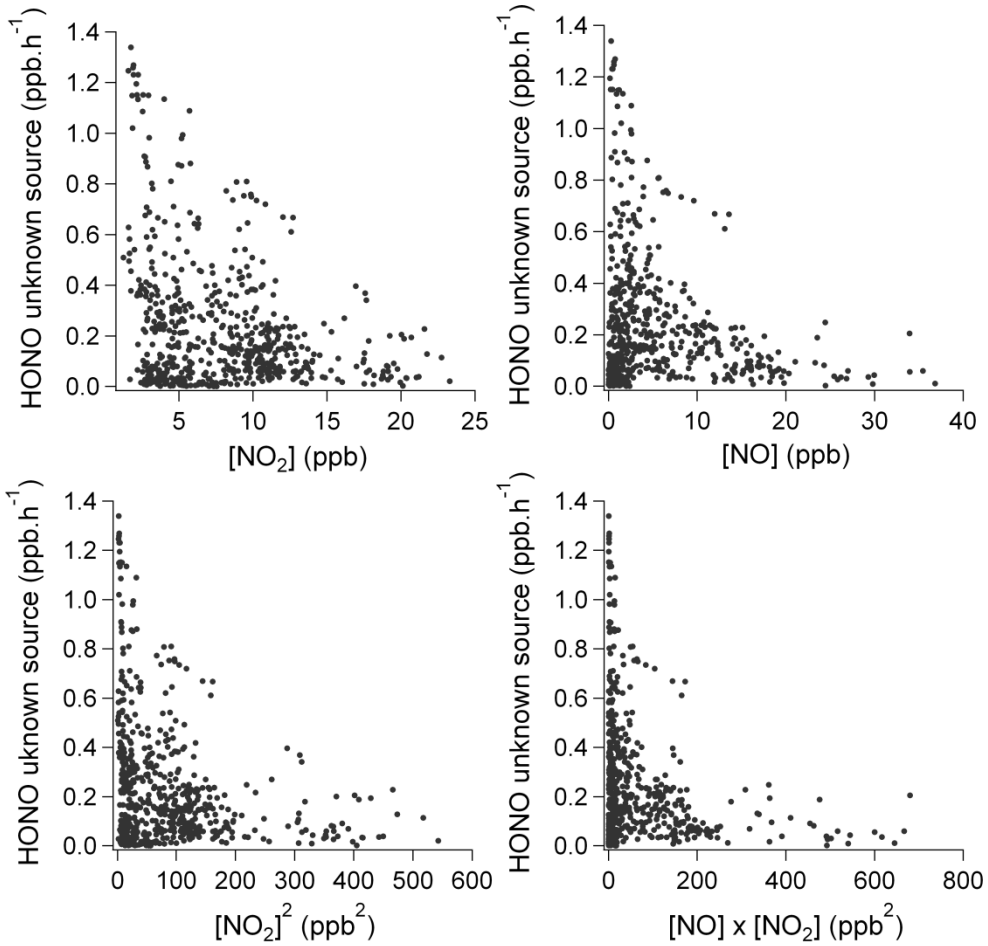



Figure S2.2: Correlation plots between the unknown HONO source and measured $[NO_2]$, $[NO]$, $[NO_2]^2$ and the product between measured $[NO]$ and $[NO_2]$ during the MEGAPOLI winter campaign at SIRTA observatory.

**Supplementary material S3: Simulated OH concentrations for the MEGAPOLI winter campaign**

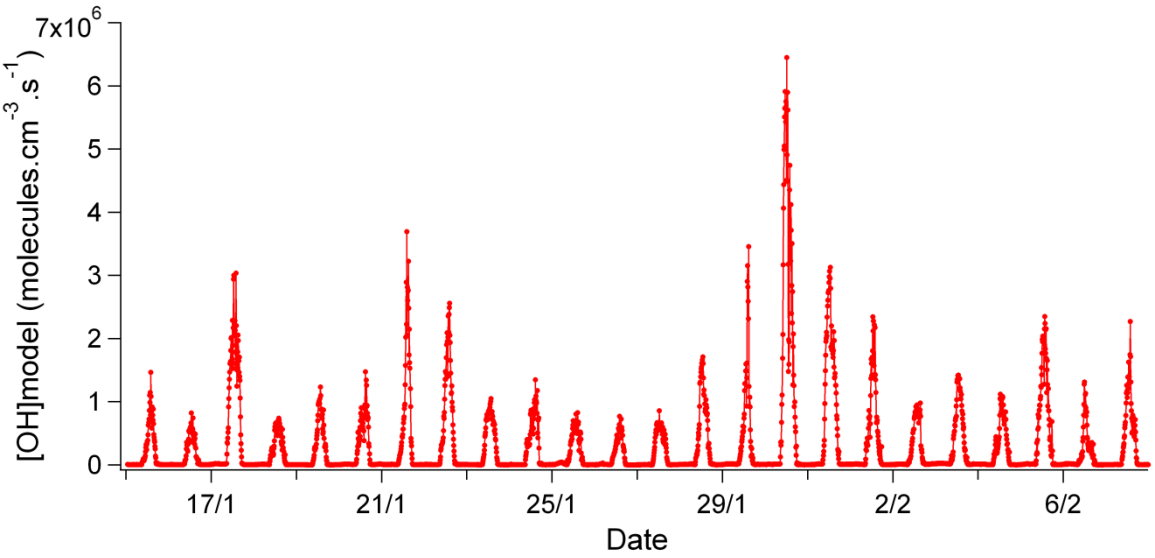



Figure S3: Simulated OH concentrations (molecules.cm$^{-3}$.s$^{-1}$) for the MEGAPOLI winter campaign, using a 0D-box model containing the Master Chemical Mechanism (v3.1) and constrained with all measured species and parameters. Details of the model are given in Michoud et al., 2012.

**Supplementary material S4: Scatter plots between the HONO unknown source and the product between $J(NO_2)$ and $NO_2$**

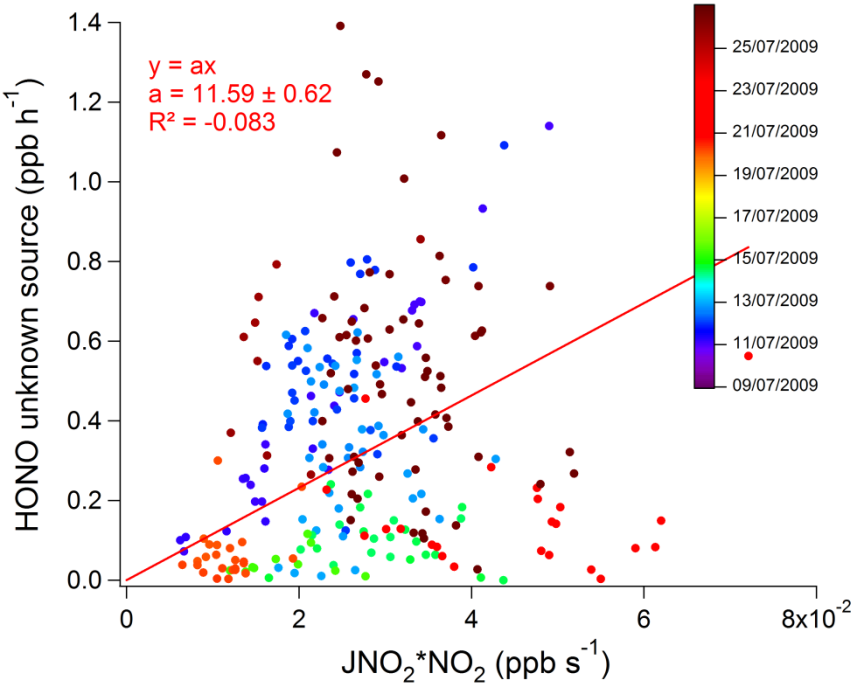



Figure S4.1: Scatter plot between the unknown HONO source and measured $J(NO_2)x[NO_2]$ during the MEGAPOLI summer campaign at SIRTA observatory. The dots of the scatter plot have been coloured as a function of the date.

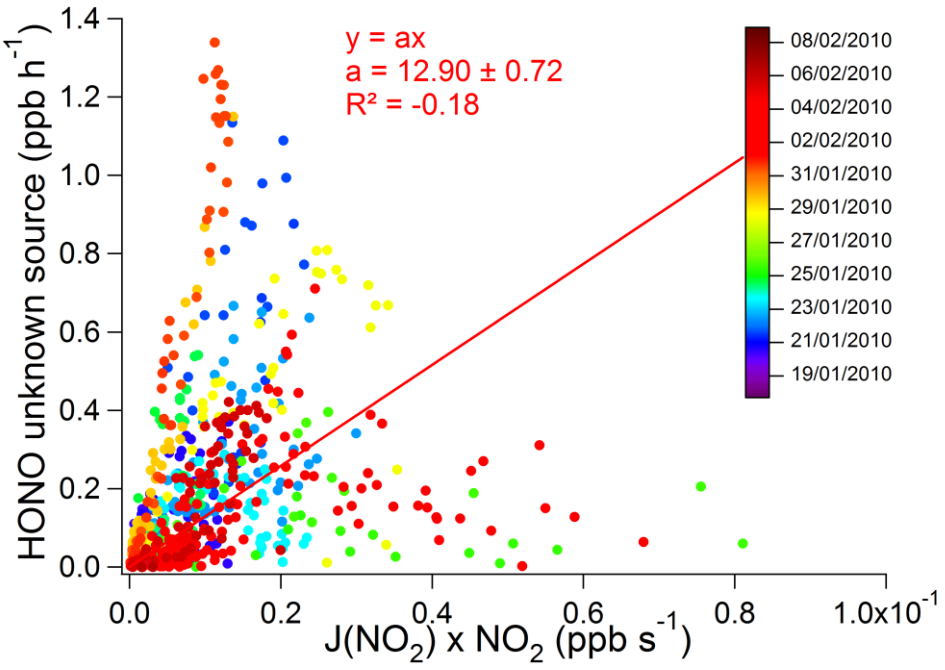



Figure S4.2: Scatter plot between the unknown HONO source and measured $J(NO_2)x[NO_2]$ during the MEGAPOLI winter campaign at SIRTA observatory. The dots of the scatter plot have been coloured as a function of the date.

**Supplementary material S5: Scatter plots between the HONO unknown source and $J(O^1D)$**

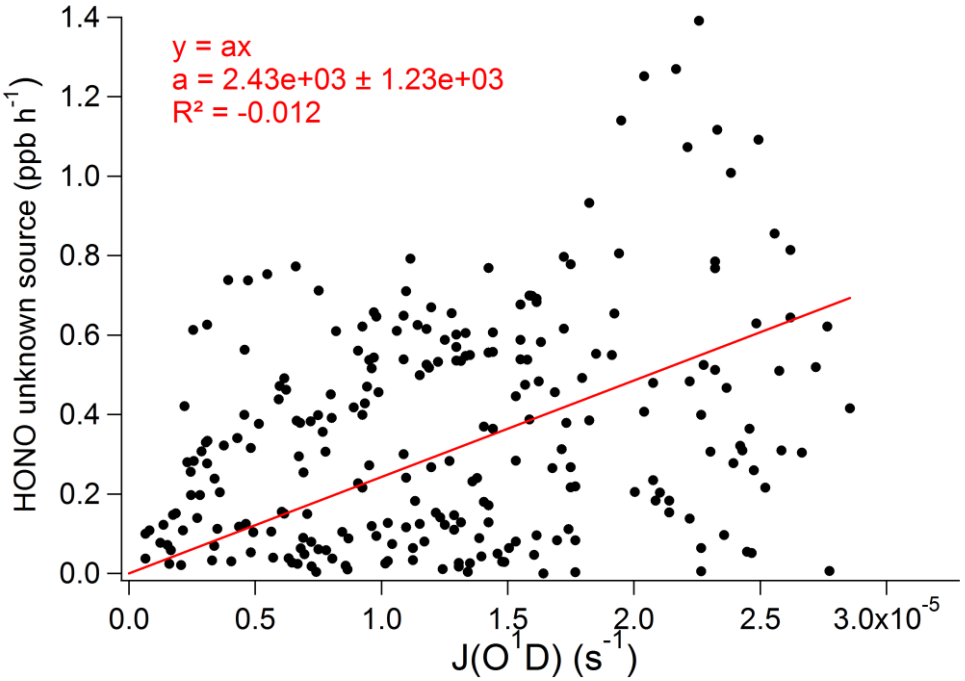
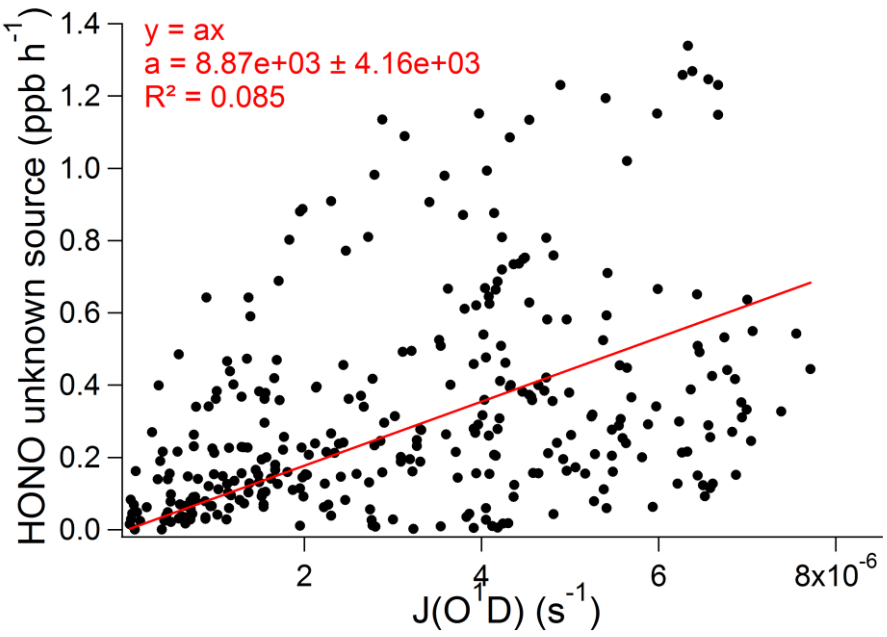



Figure S5.1: Scatter plot between the unknown HONO source and measured $J(O^1D)$ during the MEGAPOLI summer campaign at SIRTA observatory.

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93 Figure S5.2: Scatter plot between the unknown HONO source and measured $J(O^1D)$ during

94 the MEGAPOLI winter campaign at SIRTA observatory.

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**Supplementary material S6: Scatter plots between the HONO unknown source and $J(NO_2)$/wind speed**

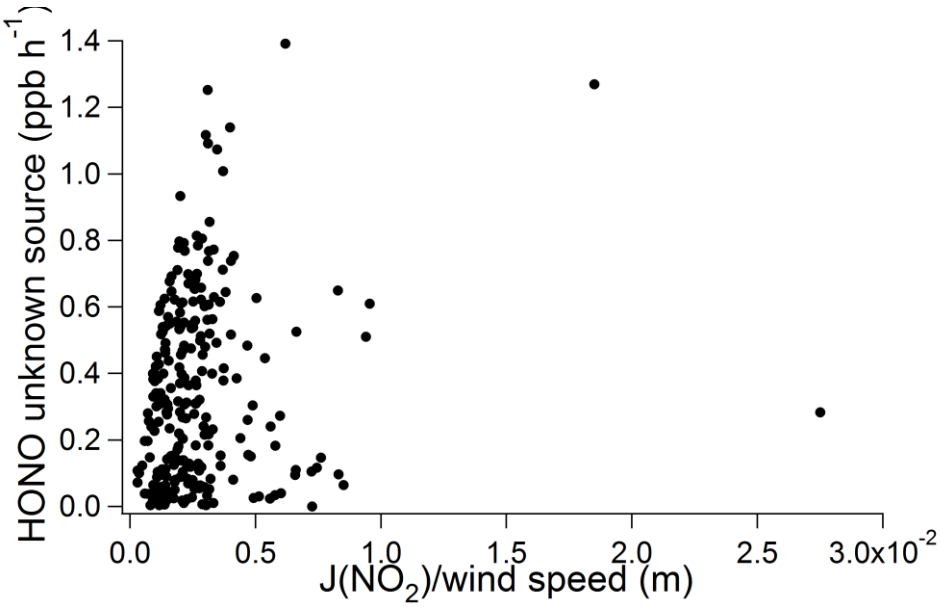


Figure S6.1: Scatter plot between the unknown HONO source and measured $J(NO_2)$/wind speed during the MEGAPOLI summer campaign at SIRTA observatory.

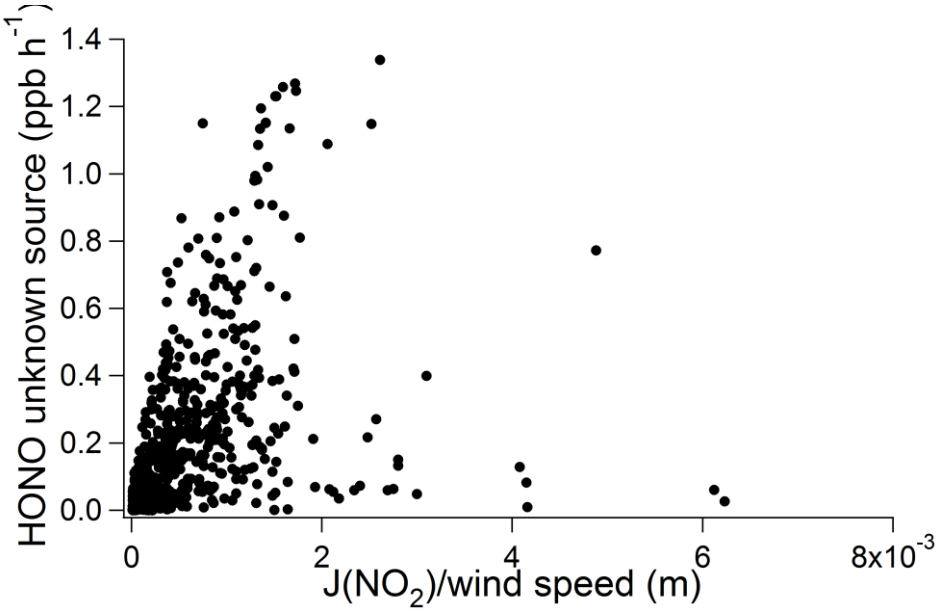


Figure S6.2: Scatter plot between the unknown HONO source and measured $J(NO_2)$/wind speed during the MEGAPOLI winter campaign at SIRTA observatory.

**Supplementary material S7: Slopes, correlation coefficients of the weighted correlations between the calculated unknown HONO source and J(NO2) including the difference between measured and calculated HONO concentrations for each days of the summer and winter campaigns**

| campaign | Day | slopes | correlation coefficients ($R^2$) |
|---|---|---|---|
| | 09/07 | 93.6 | 0.98 |
| | 10/07 | 92.2 | 0.92 |
| | 11/07 | 82.0 | 0.55 |
| summer | 13/07 | 22.1 | 0.74 |
| | 19/07 | 17.0 | 0.86 |
| | 21/07 | 37.6 | 0.08 |
| | 25/07 | 86.9 | 0.54 |
| | 26/07 | 96.9 | 0.42 |
| | 20/01 | 288.9 | 0.40 |
| | 21/01 | 281,2 | 0.88 |
| | 22/01 | 147.4 | 0.84 |
| | 23/01 | 221.6 | -0.29 |
| | 24/01 | 553.1 | 0.57 |
| | 25/01 | 230.2 | 0.44 |
| winter | 28/01 | 292.7 | 0.95 |
| | 29/01 | 247.1 | 0.99 |
| | 31/01 | 208.5 | 0.97 |
| | 01/02 | 99.7 | 0.74 |
| | 02/02 | 11.4 | -0.03 |
| | 03/02 | 23.9 | 0.79 |
| | 04/02 | 63.3 | 0.82 |
| | 05/02 | 79.9 | 0.82 |

## References

Michoud, V., Kukui, A., Camredon, M., Colomb, A., Borbon, A., Miet, K., Aumont, B., Beekmann, M., Durand-Jolibois, R., Perrier, S., Zapf, P., Siour, G., Ait-Helal, W., Locoge, N., Sauvage, S., Afif, C., Gros, V., Furger, M., Ancellet, G., and Doussin, J. F.: Radical budget analysis in a suburban European site during the MEGAPOLI summer field campaign, Atmospheric Chemistry and Physics, 12, 11951-11974, 10.5194/acp-12-11951-2012, 2012.