

## The impact of wildland fires on air quality and human health

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The smoke produced during wildland fires is one of the most disturbing consequences of these events with large amounts of gaseous and particulate (e.g., PM<sub>10</sub>) compounds emitted to the atmosphere and strongly impacting air quality and human health. The World Health Organization has already provided air quality guidelines for vegetation fire events to protect the population, particularly in wildland-urban interfaces due to the high risk of human exposure leading to acute health problems, which can be instantaneous rashes on the eyes, irritations in nose and throat and shortness of breath. These symptoms often evolve into headaches, dizziness and nausea, lasting up to several hours. Besides these effects, respiratory and cardiovascular diseases are also common.

Some works that explore this subject (Amorim et al., 2016; Martins et al., 2012; Miranda et al., 2010; Monteiro et al., 2013) are included as pdf files in the reference list below.

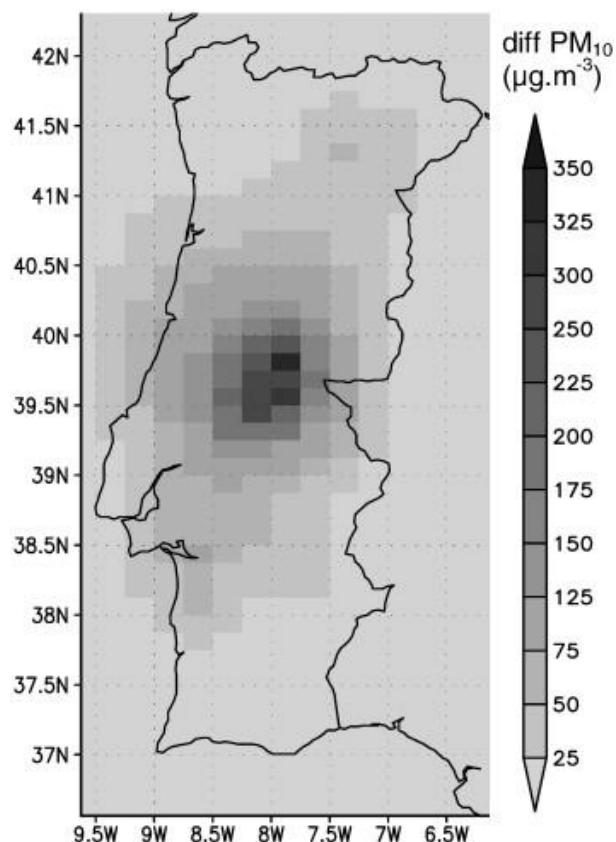


Figure 1. Spatial differences ( $\mu\text{g.m}^{-3}$ ) between simulation results with (forest fire simulation) and without (baseline simulation) smoke emissions, for PM<sub>10</sub> daily averages on August 3, 2003 (Martins et al., 2012).



Figure 2. Morning at the campus of the University of Aveiro (Portugal) strongly affected by smoke from neighbourhood cities (8 September 2020).

## References

- Amorim, J.H., Valente, J., Cascão, P., Ribeiro, L.M., Viegas, D.X., Ottmar, R., Miranda, A.I., 2016. Near-source grid-based measurement of CO and PM<sub>2.5</sub> concentration during a full-scale fire experiment in southern European shrubland. *Atmospheric Environment*, 145, 19-28. <https://doi.org/10.1016/j.atmosenv.2016.09.017> (PDF)
- Martins, V., Miranda, A.I., Carvalho, A., Schaap, M., Borrego, C., Sá, E., 2012. Impact of forest fires on particulate matter and ozone levels during the 2003, 2004 and 2005 fire seasons in portugal. *Sci. Total Environ.* 414, 53–62. <https://doi.org/10.1016/j.scitotenv.2011.10.007> (PDF)
- Miranda, A.I., Martins, V., Cascão, P., Amorim, J.H., Valente, J., Tavares, R., Borrego, C., Tchepel, O., Ferreira, A.J., Cordeiro, C.R., Viegas, D.X., Ribeiro, L.M., Pita, L.P., 2010. Monitoring of firefighters exposure to smoke during fire experiments in Portugal. *Environ. Int.* 36, 736–745. <https://doi.org/10.1016/j.envint.2010.05.009> (PDF)
- Monteiro, A., Corti, P., San Miguel-Ayanz, J., Miranda, A.I., Borrego, C., 2013. The EFFIS forest fire atmospheric emission model: Application to a major fire event in Portugal. *Atmos. Environ.* 84, 355–362. <https://doi.org/10.1016/j.atmosenv.2013.11.059> (PDF)