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# Simulations of atmospheric dispersion of large forest fires emissions in Catalonia with the HYSPLIT model

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At the global level, forest fires are a source of significant emissions of gases and particulate matter to the atmosphere, emissions that disperse over large extents and can be transported over great distances at the continental level.
For this reason, it is necessary to apply tools that allow calculating the dispersion of pollutants from forest fires and explaining how, where and when the plumes of smoke from these forest fires are transported and dispersed. Knowing this behavior is essential to respond appropriately and prevent damage to health, allowing emergency systems to perform a proper evacuation and relocation of the affected population.
We simulated the dispersion of plumes of smoke from the large forest fires (over 500 ha) occurred in the last 10 years in the Autonomous Community of Catalonia, Spain. For this, the Lagrangian particles model HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory, https://www.ready.noaa.gov/index.php), was applied with data fed from emission inventories added to the meteorological data information provided by REANALYSIS (Global 1948-present). The simulation consisted of three components: transport of particles by the average wind, a component of turbulent transport, and the calculation of the concentration in air.
The results obtained from the dispersion of the pollutants (total simulation duration first 24 hours), mapped the areas that were affected by the plumes of smoke emitted during the fires. We obtained for each fire the boundaries of the plume for each time interval of 6 hours with their corresponding concentrations in t/m3. The highest concentrations were observed in the lower altitude areas, and in the areas of lower wind speed, and at the origin of each wildfire plume. Areas affected included some inhabited populations in the fire occurrence zones, with effects depending on fire size, burning intensity, vegetation (fuel) present and atmospheric conditions predominant during the emissions simulation.
Results are presented displaying wide variations in the pattern of distribution and concentration of plumes of smoke at different hours UTC. Significant differences were observed both in the direction of movement of plumes of smoke, and in their transport to considerable distances, mainly to the northwest of the European continent.