



Impact air quality by wildfire and agricultural fire in Mexico city 2015

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A forest fire is a large-scale process natural combustion where different types of flora and fauna of different sizes and ages are consumed. Consequently, forest fires are a potential source of large amounts of air pollutants that must be considered when trying to relate emissions to the air quality in neighboring cities of forest areas as in the Valley of Mexico.

The size, intensity and occurrence of a forest fire directly dependent variables such as weather conditions, topography, vegetation type and its moisture content and the mass of fuel per hectare.

An agricultural fire is a controlled combustion, which occurred a negligence can get out of control and increase the burned area or the possibly become a wildfire.

Once a fire starts, the dry combustible material is consumed first. If the energy release is large and of sufficient duration, drying green material occurs live, with subsequent burning it. Under proper fuel and environmental conditions, this process can start a chain reaction. These events occur mainly in the dry season.

Forest fires and agriculture fires contribute directly in the increase of carbon dioxide (CO₂) into the atmosphere; The main pollutants emitted to the atmosphere by a wildfire are the PM₁₀, PM_{2.5}, NO_x and VOC's, the consequences have by fire are deforestation, soil erosion or change of structure and composition of forests (Villers, 2006), also it affects ecosystems and the health of the population.

In this study the impact of air quality for the emissions of particulate matter less than ten microns PM₁₀, by wildfire and agricultural fire occurred on the same day and same place, the study was evaluated in Mexico City the Delegation Milpa Alta in the community of San Lorenzo Tlacoyucan, the fire occurred on 3rd March, 2015, the wildfire duration 12 hours consuming 32 hectares of oak forest and the agricultural fire duration 6 hours consumed 16 hectares of corn.

To evaluate the impact of air quality the WRF-Chem, WRF-Fire and METv3 models were used, four scenarios were made, in the first forest fire emissions were included, in the second agricultural fire emissions were included, the third was the difference between agricultural burning and forest fire and the last stage model without fire emissions. In making the interpolation of the modeled scenarios forest and agricultural fires the impact of air quality in the Valley of Mexico was obtained by increasing the concentration of particles smaller than ten micrometers PM₁₀, with the results of the modeling are obtained that the PM₁₀ concentration is ten times higher in the wildfire regarding agricultural fire.

By making interpolation between this difference and considering the fire scenario without emissions by that date, a maximum PM₁₀ concentration was 170 μg /m³ during the hours of the fires, which exceeds the Mexican standard NOM-025-SSA1-2014 that provides that the maximum allowable limit of exposure to particulate matter less than ten microns is 75 μg/m³ on average 24 hours, forest and agricultural fires have an impact of 226% in the PM₁₀ air quality affecting ecosystems and human health