Substantial degradation in Air Quality due to Saddleworth Moor Wildfire

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On June 24th 2018 one of the largest UK wildfires in recent history broke out on Saddleworth Moor, close to Manchester, in north-west England. June 2018 was anomalously hot and dry across the UK which led to the peat on the moor drying out and becoming susceptible to ignition. Since wildfires close to large populations in the UK have been relatively small and rare in the past, there is little knowledge about the impacts. This has prevented the development of effective strategies to reduce them. This paper uses a high-resolution coupled atmospheric-chemistry model to assess the impact of the fires on particulate matter with a diameter less than 2.5 µm (PM\(_{2.5}\)) air quality (AQ) across the north-west region and the subsequent impact on health from short-term exposure. We find that the fires substantially degraded AQ across the north-west. PM\(_{2.5}\) concentrations increased by more than 300% in Oldham and Manchester and up to 50% in areas up to 80 km away such as Liverpool, Wigan and Warrington. This led to a third of the population (4.7 million people) in the simulation domain (-4.9-0.7°E and 53.0-54.4°N) being exposed to moderate PM\(_{2.5}\) concentrations on at least one day, according to the Daily Air Quality Index (36-53 µg m\(^{-3}\)), between June 23\(^{rd}\) and 30\(^{th}\) 2018. This equates to 4.5 million people being exposed to PM\(_{2.5}\) above the WHO 24-hour safe-limit exposure of 25 µg m\(^{-3}\) on at least one day. Using a concentration-response function we calculate the short-term health impact which indicates that up to 60% of excess mortality between June 23\(^{rd}\) and 30\(^{th}\) 2018 was attributable to the fires. This represents up to a 165% increase in excess mortality across the region compared to a simulation with no fires. We find the impact of mortality due to PM\(_{2.5}\) from the fires on the economy was also substantial (£5.5m). Thus, our results indicate the need to introduce legislation and education to both reduce the likelihood of wildfires and reduce the population's exposure to harmful air pollutants during their occurrence. This is particularly relevant given that wildfires are projected to become more common in the future through climate change and land-use change.

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