

A Comparison of Air Quality in Arid and Temperate Climatic Conditions - a Case Study of Leeds and Makkah

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Abstract : In this paper air quality conditions in Makkah and Leeds are compared. These two cities have totally different climatic conditions. Makkah climate is characterised as hot and dry (arid) whereas that of Leeds is characterised as cold and wet (temperate). This study uses air quality data from year 2012 collected in Makkah, Saudi Arabia and Leeds, UK. The concentrations of all pollutants, except NO are higher in Makkah. Most notable, the concentrations of PM10 are much higher in Makkah than in Leeds. This is probably due to the arid nature of climatic conditions in Makkah and not solely due to anthropogenic emission sources, otherwise like PM10 some of the other pollutants, such as CO, NO, and SO2 would have shown much greater difference between Leeds and Makkah. Correlation analysis is performed between different pollutants at the same site and the same pollutants at different sites. In Leeds the correlation between PM10 and other pollutants is significantly stronger than in Makkah. Weaker correlation in Makkah is probably due to the fact that in Makkah most of the gaseous pollutants are emitted by combustion processes, whereas most of the PM10 is generated by other sources, such as windblown dust, re-suspension, and construction activities. This is in contrast to Leeds where all pollutants including PM10 are predominantly emitted by combustions, such as road traffic. Furthermore, in Leeds frequent rains wash out most of the atmospheric particulate matter and suppress re-suspension of dust. Temporal trends of various pollutants are compared and discussed. This study emphasises the role of climatic conditions in managing air quality, and hence the need for region-specific controlling strategies according to the local climatic and meteorological conditions.

Keywords : air pollution, climatic conditions, particulate matter, Makkah, Leeds

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