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The influence from synoptic weather on the variation of air pollution and pollen exposure

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Exposure to elevated air pollution levels can make people more susceptible to allergies or result in more severe allergic reactions for people with an already pronounced sensitivity to pollen. The aim of this study was to investigate the relationships between urban air pollution (nitrogen oxides, ozone and particles) and airborne *Betula* pollen in Gothenburg, Sweden, during the pollen seasons for the years 2001-2012. Further, the influence from atmospheric weather pattern on pollen/pollution related risk, using Lamb Weather Types (LWT), was also considered. Daily LWTs were obtained by comparing the variation in atmospheric pressure from a 16 point grid over a given region on earth (scale $\sim$1000km) and essentially describe the air mass movement for the region. They include two non-directional types, cyclonic (C) and anticyclonic (A) and eight directional types depending on the wind direction (N, NE, E... etc.). LWTs with dry and calm meteorological character e.g. limited precipitation and low to moderate wind speeds (A, NE, E, SE) were associated with strongly elevated air pollution and pollen levels where *Betula* was exceptionally high in LWTs NE and E. The co-variation between *Betula* pollen and ozone was strong and significant during situations with LWTs A, NE, E and SE. The most important conclusion from this study was that LWTs A, NE, E and SE were associated with high pollen and air pollution levels and can therefore be classified as high risk weather situations for combined air pollution and pollen exposure. Our study shows that LWTs have the potential to be developed into an objective tool for integrated air quality forecasting and a warning system for risk of high exposure situations.