

A multi-dimensional non-homogeneous Markov chain of order  $K$  to jointly study multi-pollutant exceedances: an application to ozone and PM10 data from Mexico City

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It is well known that exposure to high levels of air pollution may have serious harmful effects in the human health. Also, it is well known that many cities around the world suffer from high levels of pollution. Mexico City is one of them. In order to reduce population exposure and, consequently, the health hazard associated to it, countries and cities around the world have implemented several preventive measures. In Mexico City environmental emergency alerts are declared whenever high levels of ozone and/or PM10 occur. When those are declared, several measures are taken in order to prevent population exposure and reduce the pollution levels. In the present talk, a particular case of a multi-dimensional Markov model of order  $K$  is used to jointly study ozone and PM10 exceedances of the Mexican environmental threshold defined for each pollutant. We consider daily maximum ozone and PM10 measurements to estimate the probability of having exceedances of one, none or both pollutants in a given day. The data used were provided by the Mexico City monitoring network and were collected from 01 January 1995 to 31 December 2019. Using this model, we may also obtain the probability of having a given sequence of exceedances in consecutive days in any part of the year. This is a joint work with Marco A. Gallegos-Herrada, Mario H. Tarumoto and Guadalupe Tzintzun.

Key words: air pollution, non-homogeneous Markov chains, Bayesian inference