

PCW2



## Modelling desert dust exposure events for epidemiological short-term health effects studies

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Duration: half day

**Background:** Evidence on the health effects of desert dust remains unclear. Recently, a systematic review commissioned by the World Health Organization (WHO) reported inconsistent results across different studies and geographical areas, the main sources of heterogeneity being the study settings, the exposure assessment methods and the epidemiological study designs. The report concluded that there is an urgent need to develop a standardized protocol to quantify dust exposure and to conduct epidemiological studies, in and near hot spots.

**Research question:** The (apparently simple) question “does desert dust impact human health?” requires a careful definition of: a) what is the relevant exposure of interest, b) what kind of health effects are plausible, c) how such effects can be quantified, and d) which study design is the more appropriate to answer the question. All these aspects will be described, and then discussed through thematic working groups.

**Methodology proposed:** Effects of desert dust on human health will be investigated with a time series approach. Four alternative exposure definitions will be explored and discussed: 1) dust events as binary exposure (with and without adjustment for PM concentrations; 2) PM<sub>10</sub> as continuous exposure, and effect modification by dust days; 3) Independent effect of desert and anthropogenic sources of PM, via two-pollutant models; 4) Independent effect of desert and anthropogenic PM, plus effect modification of anthropogenic sources by dust events.

**Significance:** Each approach will be illustrated in practice with real time series data from Rome and Athens using the statistical software R. The discussion will focus on: different patterns of dust advections across geographic locations, alternative dust exposure definition, ways to quantify desert and anthropogenic sources, relative toxicity of different PM sources, exportability of the methodology in other areas, effects of dust near hot spots. A standardized protocol to be applied for future studies will be discussed.

### **Interest for the workshop**

The workshop is open to an audience with different background and expertise, including environmental epidemiologists, biostatistician, air quality modelers. Methodologies and results will be of relevance to different kinds of stake-holders, including biostatisticians interested in developing novel statistical models for short term effects of air pollution, epidemiologists aimed at identifying relevant biological mechanisms involved in desert dust exposure, and environmental agencies focused on predicting desert dust episodes for public health prevention strategies.

**Participants number: 30**