Forecasting start of *platanus* pollen season and grass pollen peaks in the Madrid region (Spain)

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Medical urgencies related to allergenic pollens have increased in the last decades. More than 5% of the around 7 million people living at the autonomous Madrid region had an asthma crisis connected to this hazard only in the last year. PalinoCAM Network has ten stations monitoring up to 24 pollen species. Madrid Health Institute issues daily data and forecasts in close cooperation with Spanish National Institute of Meteorology. First objective of the present study is to improve start of *Platanus* pollen season forecasts, in order to provide early warning to allergists and allergic patients due to the high number of asthma cases just after the first peak of the season. Usually, this date happens on mid-March but it could range from early to late March, so accurate warning brings a social and economic benefit. Second objective is monitoring and forecasting grass pollen peaks inside the core of the pollination season. Such peaks also provoke a high number of urgencies related to asthma cases. As grass pollen season has duration that ranges between one to two months, forecasting such peaks helps in hospital management and in adequate information delivered to the public and mass media. Data and tools used: Meteorological data from INM stations within the Madrid region and European Centre for Medium-Range Weather Forecasts operational numerical prediction model. Statistical models: ARIMA, Multivariate. Pollen accounts from PalinoCAM network (1994 – 2006). Pollen records from 1979 to 2006 at Madrid (General Pardiñas). Methods: Definition of the climate variables related to start of Platanus pollination season and peaks inside the grass pollen season using statistical techniques. Multivariate and auto-regressive integrated moving average models

are used to provide climate patterns and forecasts. Once climate scenarios are defined for those events, numerical prediction models are running at the appropriate time of the year to forecast in advance weather that match with such scenarios to provide early warning. Climate variables are correlated to numerical prediction model outputs and direct correlations from numerical model outputs and pollen counts were established to refine the forecasting tool. This work is a result from close interdisciplinary cooperation between National Institute of Meteorology and institutions at different levels at Madrid Region integrated at the PalinoCAM network: national and regional, public and private. It is scheduled to broadcast those forecasts on the Internet.