

2023 are analyzed and the model predictions are compared with data from the operational manual network using multiple statistical metrics. Comparison of the models for seven known pollen taxa (Alnus, Betula, Corylus, Fagus, Fraxinus, Quercus and Poaceae) show that the current operational automatic model has an excellent performance. It provides daily average pollen concentrations from the automatic measurements that correlate well with the manual data across all measurement sites, with Kendall and Spearman correlation coefficients both superior to 0.7 for nearly all of the taxa. Furthermore, a comparison of the different models for the seven above mentioned taxa showed that models that use only holographic images from the Poleno instrument perform remarkably well on a reference dataset consisting of the above mentioned seven pollen taxa having a balanced accuracy of 0.968 and an F-1 score of 0.964, which can be further improved by exploiting fluorescence data provided by the Poleno instrument (Erb et al. 2023).

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## **Increase in Airborne Allergenic Pollen in Trentino (North Italy) Over a 30-year Period (1989-2018) is Connected to Temperature Rise.**

Fabiana Cristofolini<sup>1</sup>, Antonella Cristofori<sup>2,3</sup>, Elena Gottardini<sup>4,3</sup>

<sup>1</sup>(a) Research and Innovation Centre, Fondazione Edmund Mach (FEM), San Michele all'Adige, Trento, Italy. <sup>2</sup>(a) Research and Innovation Centre, Fondazione Edmund Mach (FEM), San Michele all'Adige, Trento, Italy. <sup>3</sup>(b) NBFC, National Biodiversity Future Center, Palermo, Italy. <sup>4</sup>(a) Research and Innovation Centre, Fondazione Edmund Mach (FEM), San Michele all'Adige, Trento, Italy

### **Abstract**

The aim of this study is to verify if changes occurred in the seasonality and yearly amounts of airborne pollen in San Michele all'Adige - Northern Italy, and to evaluate their relation with climate change-related variables, such as air temperatures and frost days in the period 1989 - 2018.

The study of airborne pollen and its spatio-temporal changes is highly important due to the allergenicity of many pollen taxa. The pollen allergy, in fact, interests 25-40% of population, globally, and displays an increasing trend.

Climate change may impact pollen allergenicity and production, as well as plant distribution, with the potential spread of neophytes that produce allergenic pollen. The main hypothesis of our research is that climate change impacting our study area influences pollen dispersal in the atmosphere, and therefore on human-health related issues.

Airborne pollen was collected using a volumetric Hirst-type aerobiological sampler (Lanzoni VPPS 2000), and the daily concentration of airborne pollen ( $P \cdot m^{-3}$ ) was calculated for a total of 24 arboreal (AP; trees and shrubs) and non-arboreal pollen taxa (NAP; herbaceous) over a 30-year period. The sampling and analysis of airborne pollen have been performed in accordance with the UNI EN 16868:2019 European standard procedure. The main pollen season (MPS) descriptors were calculated for each taxon. The presence of a monotonic upward or downward temporal trend in pollen season descriptors was verified (non-parametric Mann-Kendall test) and changes were analyzed in relation to air temperature, precipitation, and land use; in addition, pollen data were analyzed clustered into three decadic blocks (non-parametric Kruskal-Wallis ANOVA) to minimize interannual fluctuations and maximize relevant change signals.

The major change observed during the study period was the significant increase in annual pollen integral (API<sub>n</sub>). This change is strongly emphasized when analyzing the pollen data in three decadic blocks, both for all the considered taxa (+58%) and for Arboreal Pollen (AP; +155%). When considering single taxa, API<sub>n</sub> shows a significant positive trend for Cupressaceae/Taxaceae, *Ulmus*, *Populus*, *Salix*, *Ostrya*, *Quercus*, *Olea*, *Plantago*, Cannabaceae, and *Ambrosia*; a significantly earlier start of the MPS is proved for *Rumex* and Poaceae. Cumulated API<sub>n</sub> shows a significant positive correlation with annual T min (<0.005) and T mean (<0.001), both of which showing a significant increase, and a negative correlation (<0.025) with the number of frost days.

The research demonstrates an increasingly larger amount of airborne pollen connected to climate change, such as rising temperatures and milder winter conditions in the study area, leading to a major threat to people suffering of pollen allergies.

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## **Long-term Trends in Airborne Pollen Levels in Thessaloniki, Greece, Over the Period 1987-2023: Higher, Earlier or More Complex?**

Apostolia Theodora Drakopoulou<sup>1</sup>, Athanasios Charalampopoulos<sup>1</sup>, Theodoros Mavromatis<sup>2</sup>, Despoina Vokou<sup>1</sup>, [Athanasios Damialis<sup>1</sup>](#)

<sup>1</sup>Department of Ecology, School of Biology, Faculty of Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece. <sup>2</sup>Department of Meteorology-Climatology, School of Geology, Faculty of Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece

### **Abstract**

Long-term trends in airborne pollen concentrations have been documented more and more frequently over the last two decades. The Inter-Governmental Panel of Climate Change (IPCC)