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Dipartimento di Scienze della Vita

LPP - Laboratorio di Palinologia
e Paleobotanica

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06/08 2021 September · MODENA · Italy

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Gruppo di Palinologia e Paleobotanica della Società Botanica Italiana (GPP-SBI)
Association des Palynologues de Langue Française (L'APLF)
Asociación de Palinólogos de Lengua Española (APLE)

ABSTRACTS BOOK

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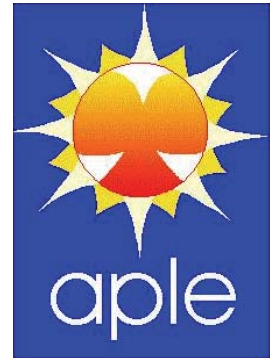
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COMPARATIVE BETWEEN FORECAST METHODS
IN AEROBIOLOGY

Antonio PICORNELL [1], María del Mar TRIGO [1], Rocío RUIZ-MATA [1], Baltasar CABEZUDO [1], Marta RECIO [1]

*[1] Department of Botany and Plant Physiology. University of Malaga (Spain),
picornell@uma.es, martarc@uma.es*

Introduction

Stepwise multiple linear regressions have been traditionally used on aerobiological studies because their results are directly interpretable (Beggs et al. 2017). Nevertheless, this methodology relies in the homoscedasticity and normal distribution of the data, and it is easily affected by covariance between forecast variables. In the last decades, new forecast methods, such as neural nets and random forests, have been implemented on aerobiology, but they are not easily applicable (Navares and Aznarte 2017). The main aim of this study is to compare the performance of these three methods in order to determine which one produces less errors in the pollen and spore predictions.

Materials and Methods

For this study, airborne pollen and spore concentrations from Ronda and Sierra de las Nieves were used (Malaga, southern Spain). Pollen samples were obtained by two Hirst-type volumetric pollen traps, and samples were mounted and counted following the Spanish Aerobiology Network (REA) procedures (Galán et al. 2007). Daily pollen and spore concentrations for the period 2017-2019 were used. Models were trained with 80% of the data available and validated with the remaining 20%. Observed and predicted pollen/spore concentrations were converted into classes, then, rates of success were calculated for each pollen/spore type. Meteorological variables, the pollen/spore concentrations of the previous day, and the average concentrations of the previous 5 days were used as predictor variables.

Results and Discussion

Random forest forecasts obtained a higher average accuracy than the other methods (Figure 1). The accuracy of neural nets was highly conditioned by the pollen/spore type considered. The most relevant variables were the pollen/spore concentrations of the previous days.

Conclusions

Forecast methods based on multiple and non-linear simulations generally obtain the highest accuracy but, in some exceptional cases, less complex methods can reach similar values.