FORECASTING OF AIRBORNE POLLEN CONCENTRATIONS: ONE YEAR OF WEEKLY PUBLISHED FORECASTS

Francesca Tassan Mazzocco - ARPA FVG
francesca.tassan@arpa.fvg.it
Alessandro Felluga - ARPA FVG
alessandro.felluga@arpa.fvg.it
Pierluigi Verardo - ARPA FVG
pierluigi.verardo@arpa.fvg.it

INFORMATION ABOUT POLLEN CONCENTRATIONS IN AMBIENT AIR ARE NECESSARY FOR

- Enable the physicians to set therapeutic strategies for **allergic patients**
- Monitoring the **seasonal trend** of flowering, related to short and medium term climate changes
- Evaluating the spread of **allochthonous plants**
- Monitoring the effects of the action of some plant-specific **parasites** and the consequent ecosystems reaction

In literature, several studies are addressed on forecasting the presence of pollen grains in ambient air; however, they require

- **complex algorithms** based on meteorological parameters which inherit the uncertainty and the short term forecast of them
- **long historical series** of weather data and combined pollen monitoring to produce reliable results

ARPA FVG FORECASTING METHODS

In the year 2015, the team of the Regional Environment Protection Agency of the Friuli Venezia Giulia Region (ARPA FVG) developed 3 different forecasting methods.

Two of them were able to predict the **beginning**, **abundance** and **duration** of the presence of pollen from the **POACEAE** and **URTICACEAE** pollen in the atmosphere of two Allergenic Plant Families monitored in the Friuli Venezia Giulia region, in the North-East of Italy.

ARMA
AUTOREGRESSIVE MOVING AVERAGE

In the year 2016, the **forecasting service** was activated on the ARPA FVG web site , and the application of one of the two forecasting methods developed ARMA was extended to all taxa monitored in the routines as well.

RESULTS

The results of this **first year of forecasting activity** are here presented through the analysis of the data for the Families of **Poaceae** and **Urticaceae**.

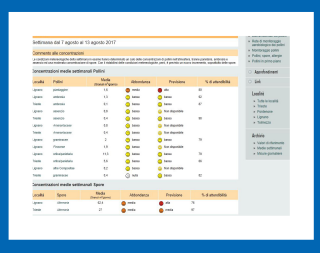
WEEKLY DATA

The forecasting model (ARMA) provides weekly data on the abundance of each monitored taxon; each forecasting rate is associated in the bulletin to a **per cent confidence index** of the forecast itself.

EFFECTIVENESS OF THE FORECASTS

The effectiveness of forecasting ARMA method was checked by **comparing** the forecasts with the observed data.

The three forecasting methods are decribed in a paper published on Aerobiologia (see Bibliography)



The forecasts are weekly published on the ARPA FVG website (http://dati.arpa.fvg.it/245.html)

POACEAE

	code station	expected reliability (%)	observed reliability (%)	significant differences/ not significant differences (Chi-Square test)
Pordenone	PN1	77	81	ns
Trieste	TS1	77	74	ns
Lignano Sabbiadoro	UD1	76	75	ns
Tolmezzo	UD3	83	65	s

The observed reliability does not differ significantly from the one expected, with the exception of Poaceae at Tolmezzo station.

The situation is attributable to a **prolongation** of the period of pollen detection, even if at low levels, occurring in the year 2006 for about **two months** beyond the flowering period forecasted by the model.

URTICACEAE

	code station	expected reliability (%)	observed reliability (%)	significant differences/ not significant differences (Chi-Square test)
Pordenone	PN1	76	79	ns
Trieste	TS1	63	72	ns
Lignano Sabbiadoro	UD1	79	81	ns
Tolmezzo	UD3	72	61	ns

RELIABLE METHOD

After the first year of activity, our forecasting model provided results not statistically different from the observed one, this supported it's reliability in forecasting of the abundance of the concentrations of pollen from Poaceae and Urticaceae families detected at pollen monitoring stations in Friuli Venezia Giulia.

BIBLIOGRAPHY

Tassan-Mazzocco F, Felluga A, Verardo P (2015) Prediction of wind-carried Gramineae and Urticaceae pollen occurrence in the Friuli Venezia Giulia region (Italy). Aerobiologia 31(4):559–574
http://dati.arpa.fvg.it/245.html
http://www.pollnet.it/default_it.asp