



# **Aerobiological Information Systems and allergic respiratory disease management AIS LIFE (AIS LIFE LIFE13 ENV/IT/001107)**

## **Annual meeting**

**Vienna \_ Austria  
19<sup>th</sup> - 20<sup>th</sup> of june 2015**



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

**DISPAA**  
DIPARTIMENTO DI SCIENZE DELLE  
PRODUZIONEI AGROALIMENTARI  
E DELL'AMBIENTE



DIPARTIMENTO DI BIOLOGIA  
UNIVERSITÀ DI PISA



ISTITUTO DI FISILOGIA CLINICA  
CONSIGLIO NAZIONALE DELLE RICERCHE



MEDICAL  
UNIVERSITY  
OF VIENNA



Instituts  
thématiques

**Inserm**

Institut national  
de la santé et de la recherche médicale

# UNIFI Activity report

Franco Ruggiero and Gianni Bedini



# Participation in project activities

## A. Preparatory actions

**ACTION A.1:** Set up of an Integrated Information System (IIS) in 3 countries (France, Italy, Austria). Responsible for implementation: UNIFI; includes RNSA, MUW, Unifi.  
Month 1:15 3 months setup + 12 months continuous monitoring

## B. Implementation actions

**ACTION B.1:** Implementation of IIS and PPI in three countries (enrolment, randomization, educational intervention). Responsible IFC-CNR.

**ACTION B.2:** Health assessment of Allergy Patients. Responsible IFC-CNR.

## Common to all partners

**ACTION C.1:** Monitoring of the long-term implementation of Aerobiological Information Systems.

**ACTION C.2:** Validation and comparison of the effectiveness of the two Aerobiological Information Systems.

**ACTION D.3:** Stakeholder Involvement Activities.

**ACTION D.4:** Target Audience / General Public Awareness Raising.

**ACTION E.1:** Overall project operation.

**ACTION E.2:** Networking with other projects.

**ACTION E.3:** After-LIFE Communication Plan.



# Planned activities

	Timetable															
	2014				2015				2016				2017			
Equipment installation																
Data sampling																
Data analysis																
Data processing																
Implementation of IIS																



## **Expected results:**

- Installation of systems for conventional and non conventional chemical data monitoring in 3 European areas (Pisa, Vienna, Paris)
- Installation of the aerobiological station in 3 European areas (Pisa, Vienna, Paris) to monitor (continuously, 24 h per day), the real day concentrations of major allergenic airborne pollen and fungal spores.
- Description of first year cycles of pollination - sporulation in areas which have not previously been monitored, thus laying the basis for the production of the pollen and spores calendar (see Action B1).
- Description of first year of non conventional and conventional air pollutants, thus to describe their concentrations in atmosphere also in according with the meteorological data from weather stations and weather forecast of the WRF - ARF ECM, WRF - ARF GFS models

## **Deliverables:**

- A1.1 - Report on completion of Action A1 in 3 areas (detailed description of activities undertaken / data gathered) - A 1 - 31/08/2015

## **Milestones:**

- Weather and conventional air pollutants monitoring set up and working in Pisa, Vienna and Paris - A 1 - 31/08/2014 – in progress
- Completion of the detailed report for IIS implementation - A 1 - 31/08/2015 – in progress
- Non conventional air pollutants (ultrafine particles) monitoring set up and working in the three countries - A 1 - 31/08/2014 – **unresolved issue**

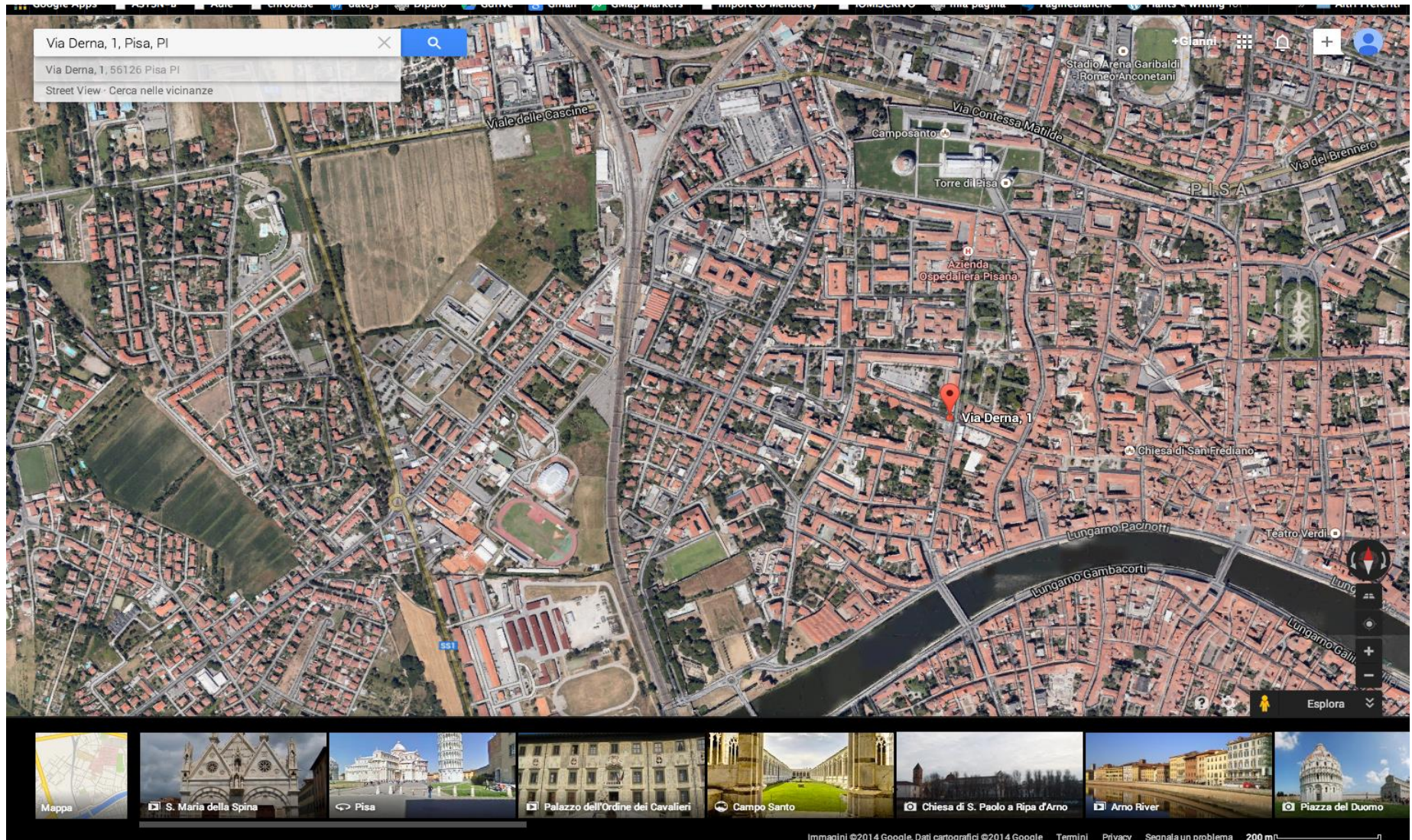


# Non conventional air pollutants (ultrafine particles) monitoring set up and working in the three countries - A 1 - 31/08/2014 – **unresolved issue**

- Following the last meeting of the steering committee, the P-trak instrument will be used to collect UFP concentration outdoors, but:
  - 1. Who can use the instrument?**
  - 2. How will the operation expensive be paid?**



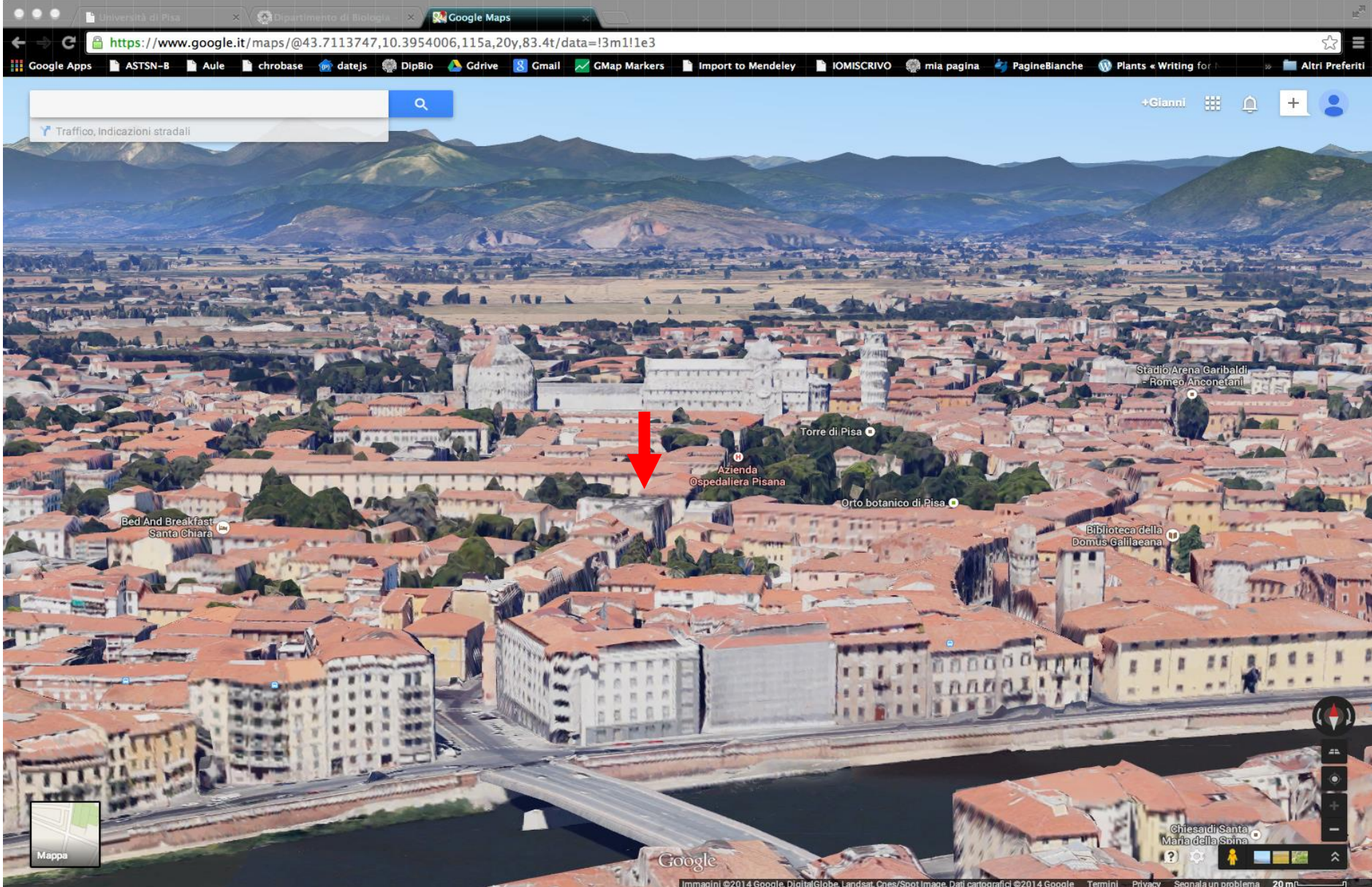
# Equipment installation: location



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# Equipment installation: location



Flat roof, with wireframe railing. The building is managed by the Department of Biology. Access to roof is easy but allowed to authorized staff only and the building is guarded. Both pollen trap and weather station have been installed.



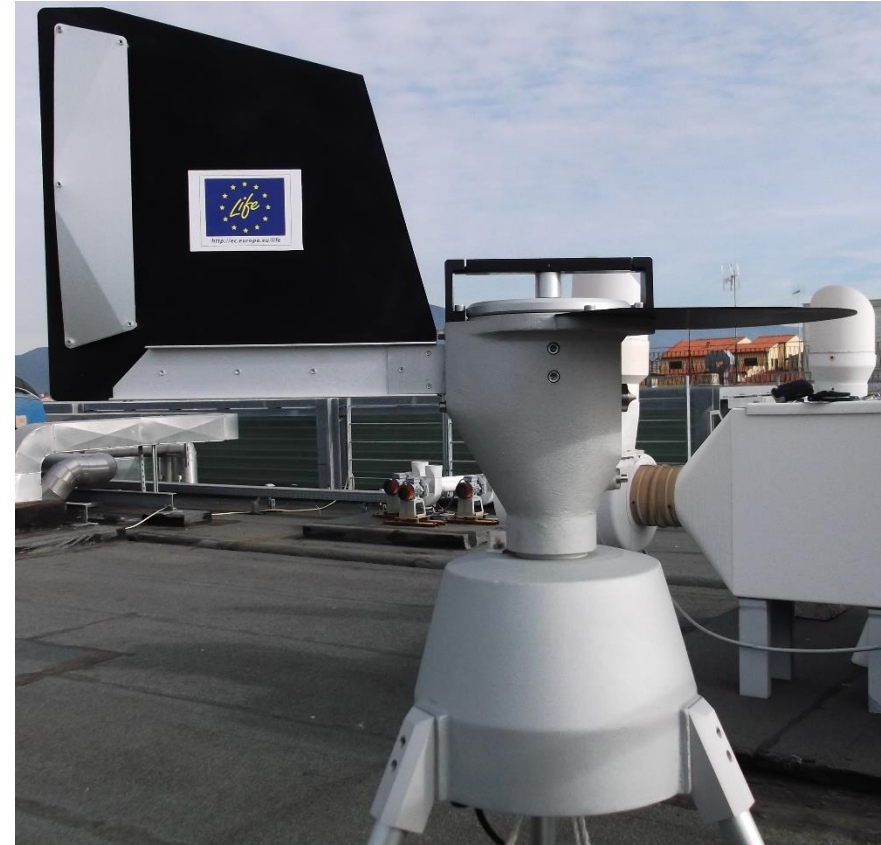
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# Equipment installation: pollen trap

- VPPS 2000 Lanzoni
- Urban area
- 15-20 m above ground (to avoid “canyoning” effect)
- Clear visual all around
- Continuous sampling of pollen grains and spores



# Equipment installation: weather station

## Davis Vantage Pro2 weather station



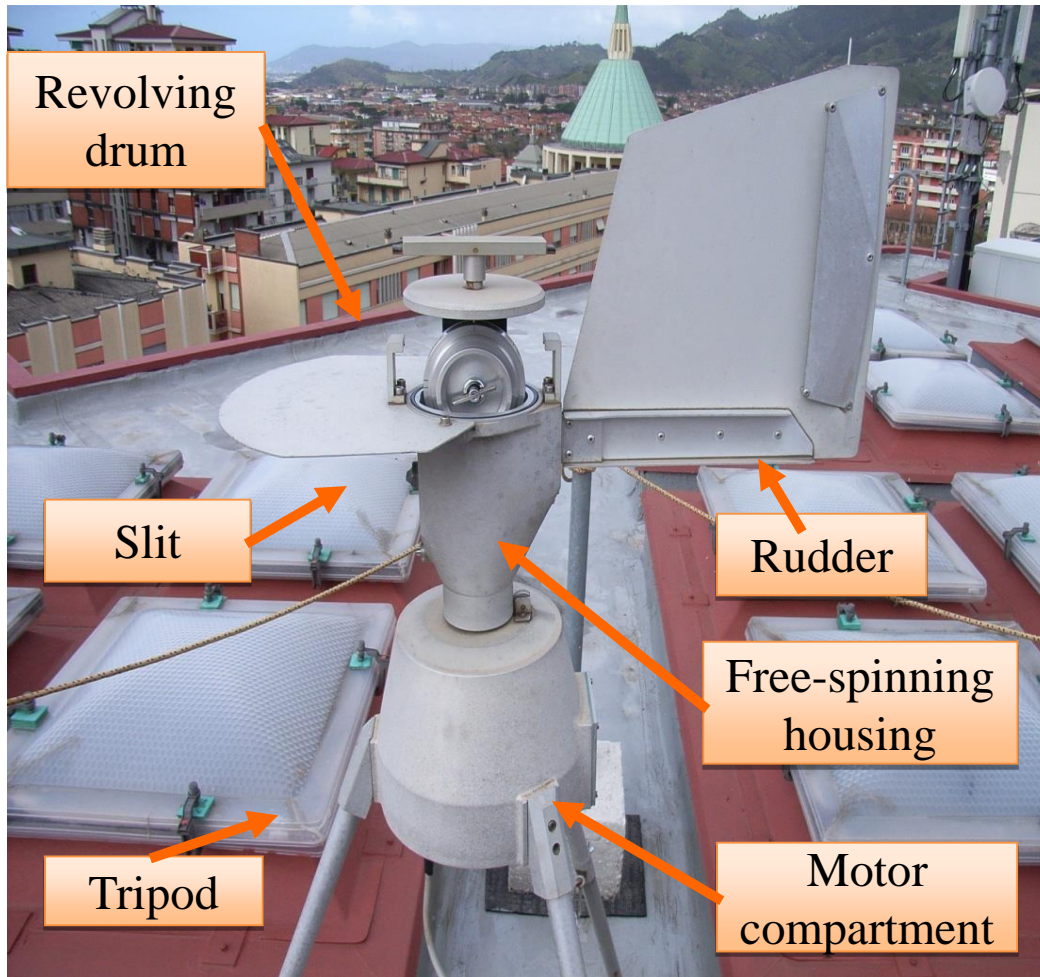
- Temperature
- Wind (speed and direction)
- Relative humidity
- Rainfall
- Atmospheric pressure
- Solar radiation

Data is stored in an internal temporary memory and then sent to a server via wireless connection for permanent storage.

Data are sampled every 5 minutes.



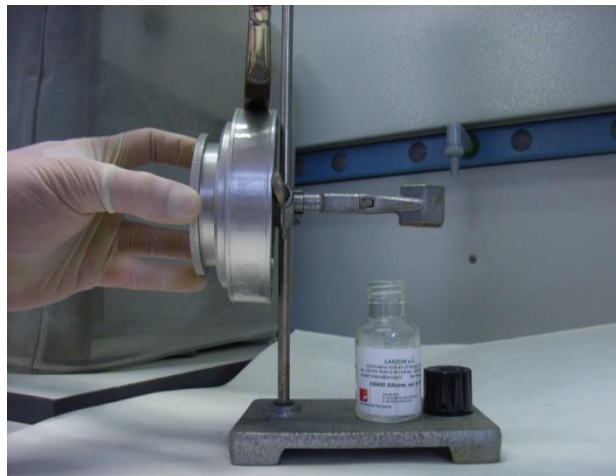
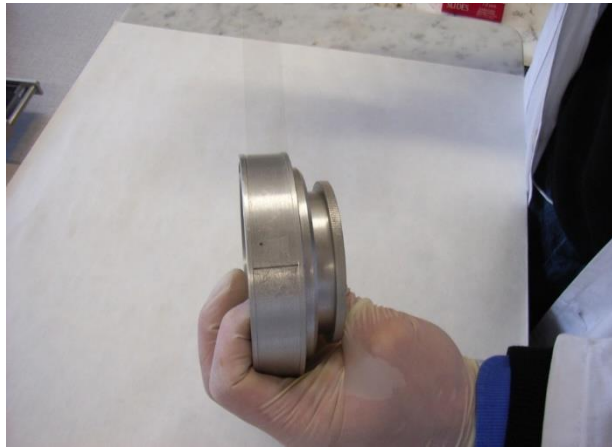
# Data sampling: pollen grains and spores



Suction pump ensures a constant air flow matching the respiratory flow, of 10 l/min (14,4 m<sup>3</sup> in 24 h). The trap has a range of 10 km, allowing a full coverage of the urban area.

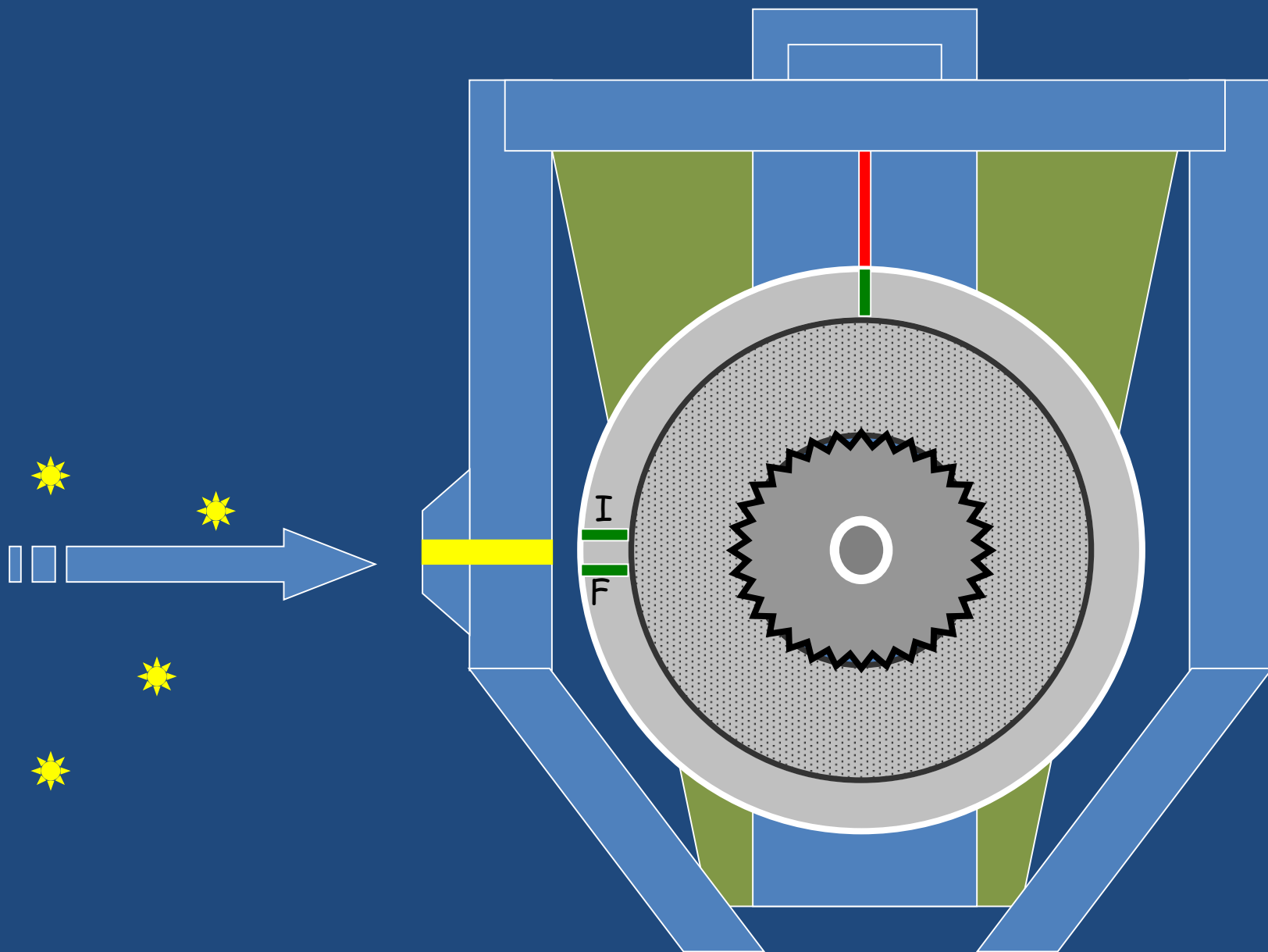


# Data sampling: preparation of sampling film

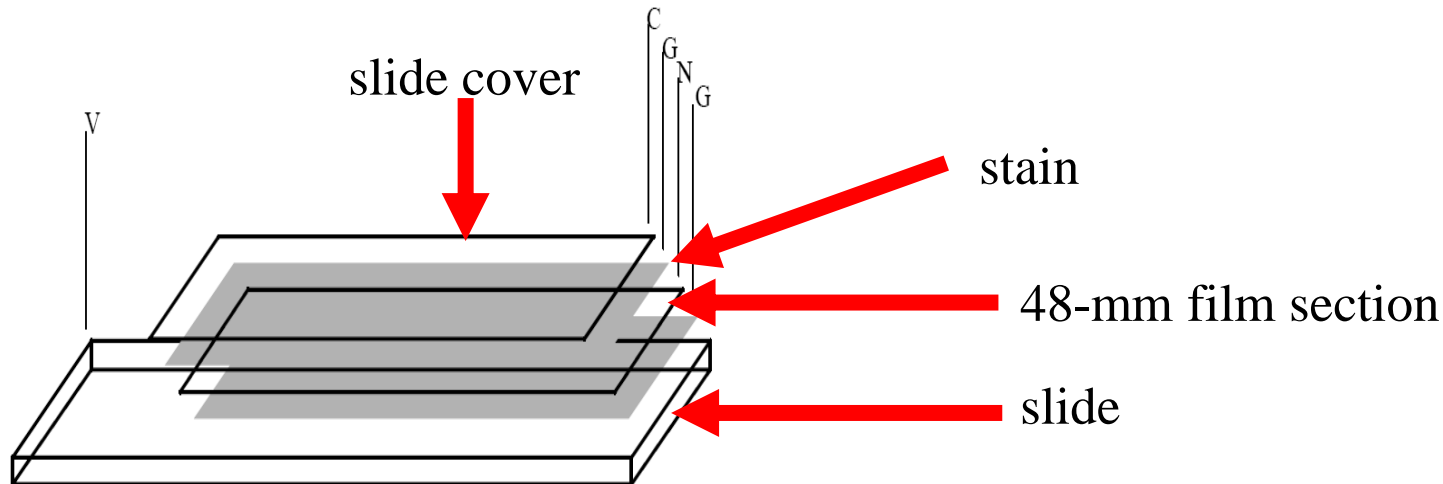


A 336 mm transparent Melinex® film strip is wound around a 107 mm diameter drum. The film is covered with a thin layer of 3% silicon fluid in carbon tetrachloride. The drum rotates by 2 mm/hr., allowing to sample without interruption up to 7 consecutive days without changing the sampling strip.





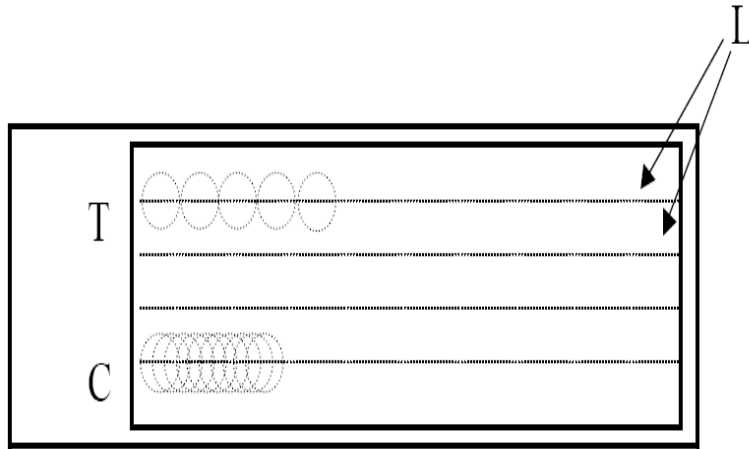
# Data sampling: preparation of slides



The film strip is removed from the drum, cut into 7 sections, each 48-mm long; then each section is glued to a slide, stained with basic fuchsin gel, covered with a standard slide cover, put on a thermostatic plate at 50° C for one hour.



# Data analysis: count of pollen grains



Following **UNI11104 protocol**, each slide is read at **400x** along horizontal lines, spaced by 2 mm from one another.

Each pollen grain observed in the microscope field is then identified to family or genus level.

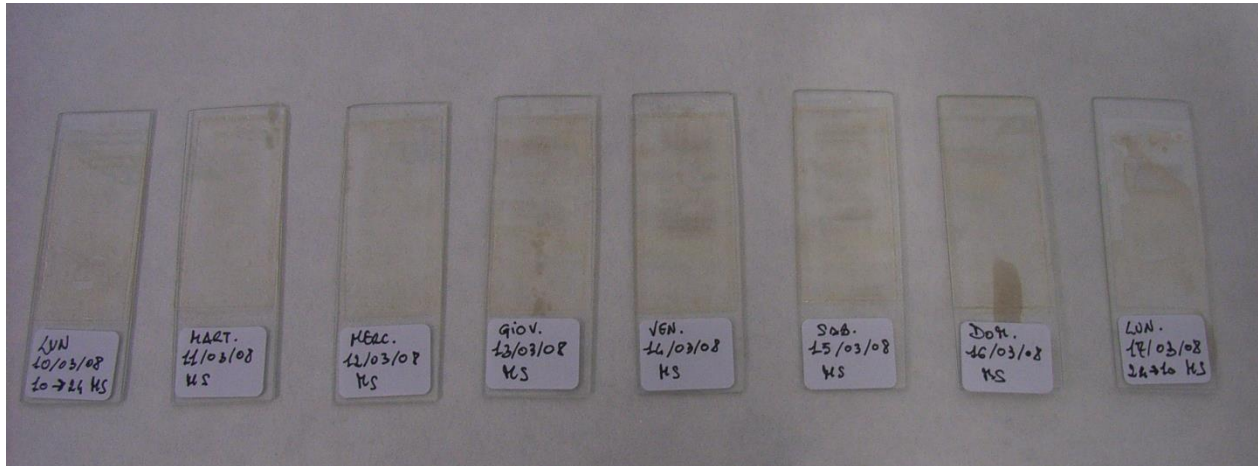
A separate count is recorded for each family / genus, and final counts are filed on a count sheet.

The concentration of pollen grains per cubic meter **P** is then calculated as follows:

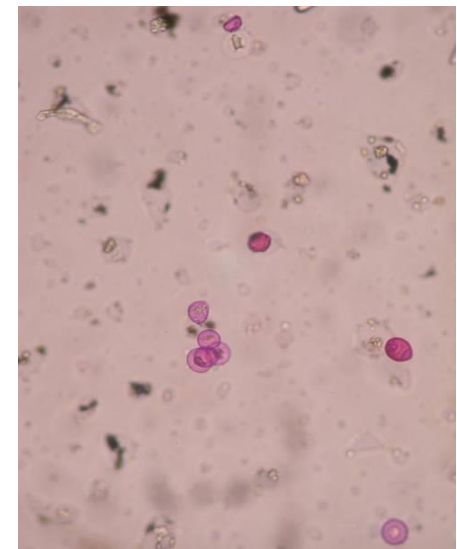
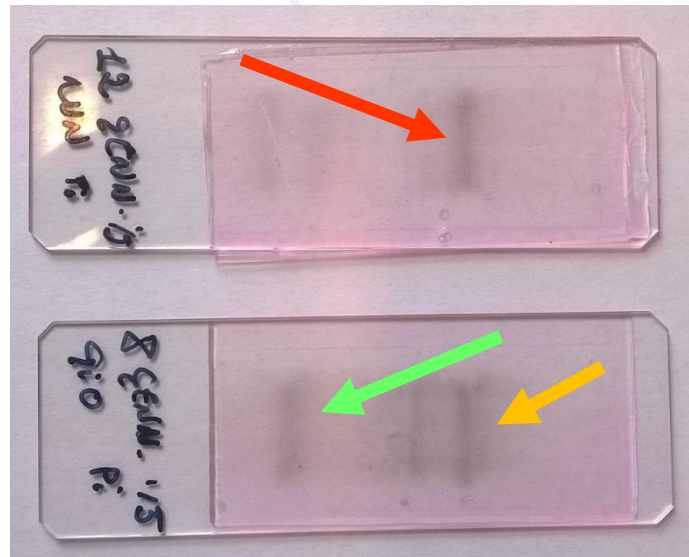
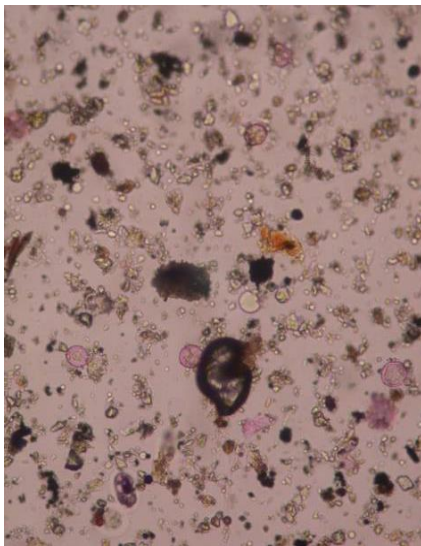
$$P = \text{pollen count} * 2,43 / \text{read lines}$$



# Data sampling: slides ready for analysis / storage

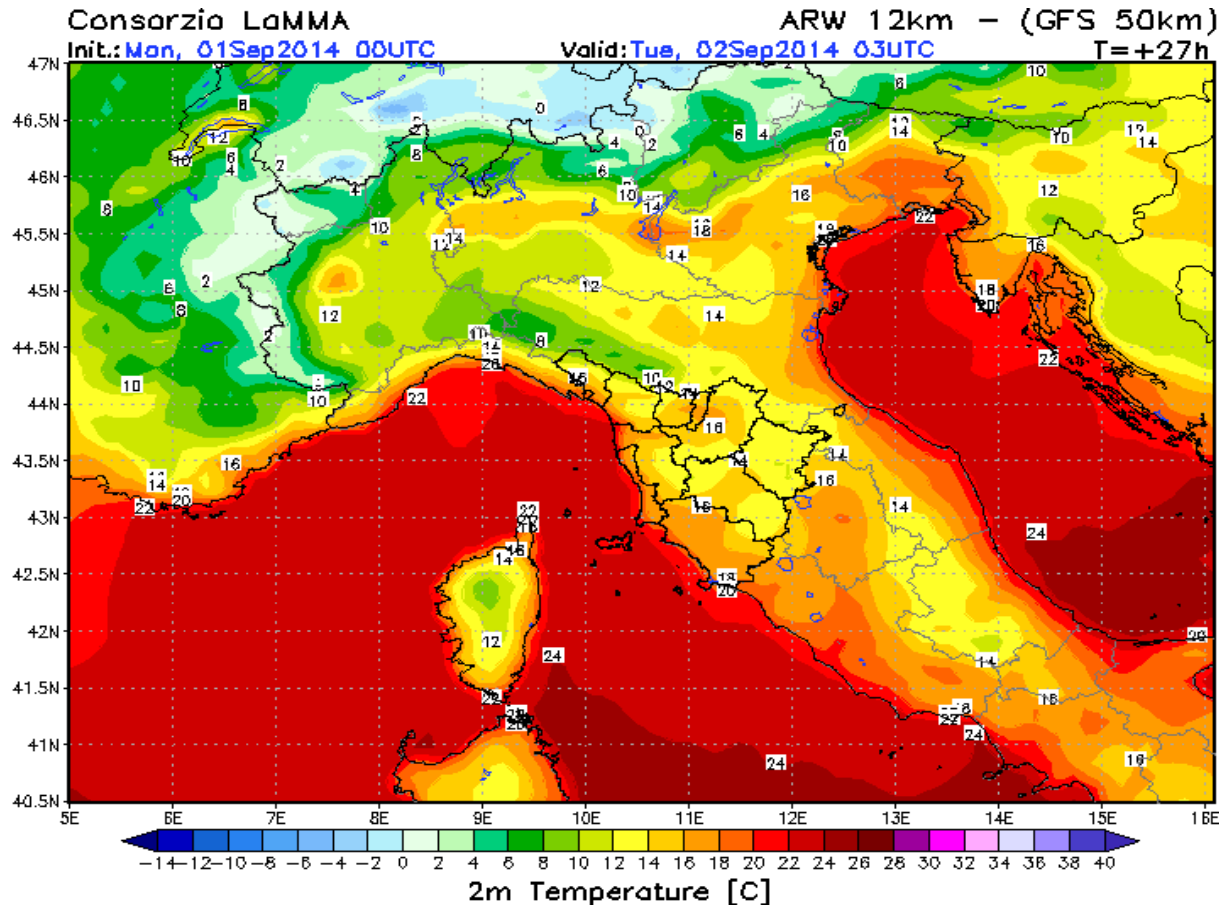


A week-worth of samples ready for analysis / storage



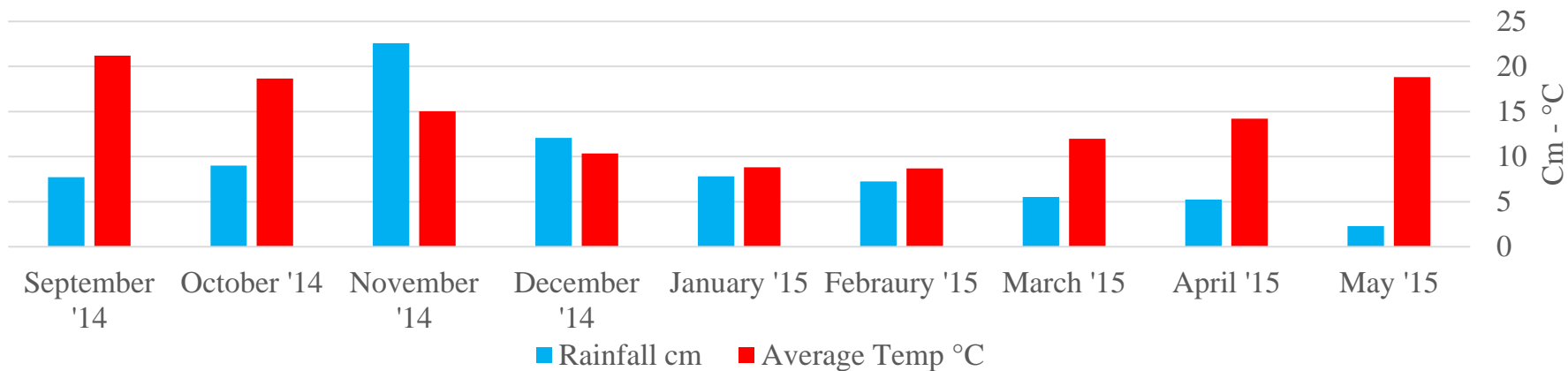
# Data sampling: weather data

Local data are integrated in models covering a wider area, provided by Lamma Consortium (forecast model WRF-ARW GFS or WRF-ARW ECM) for Tuscany.

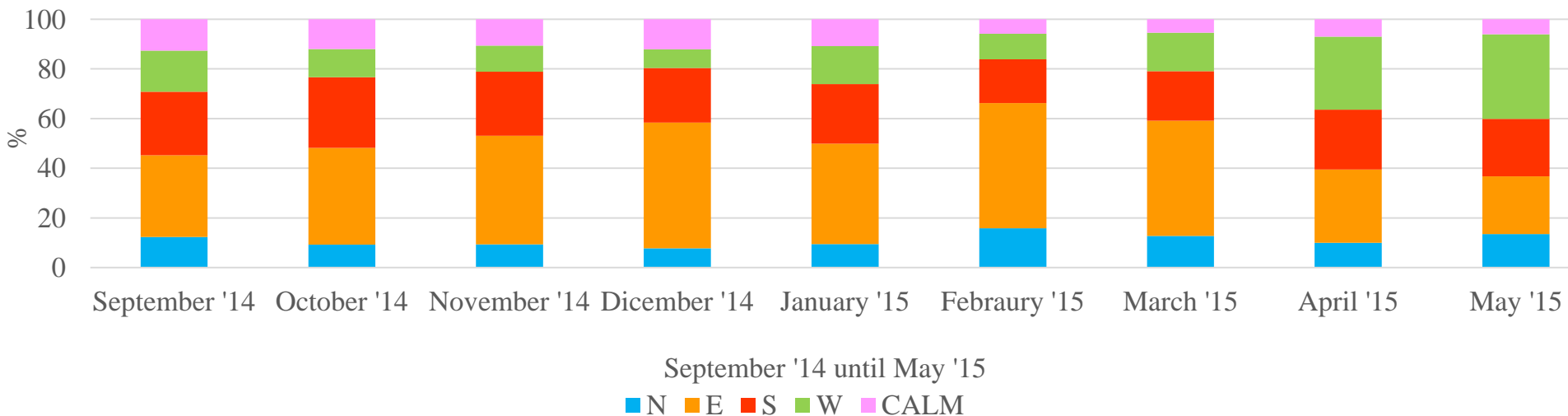


# Weather data analysis

Average monthly temperatures - total monthly rainfall

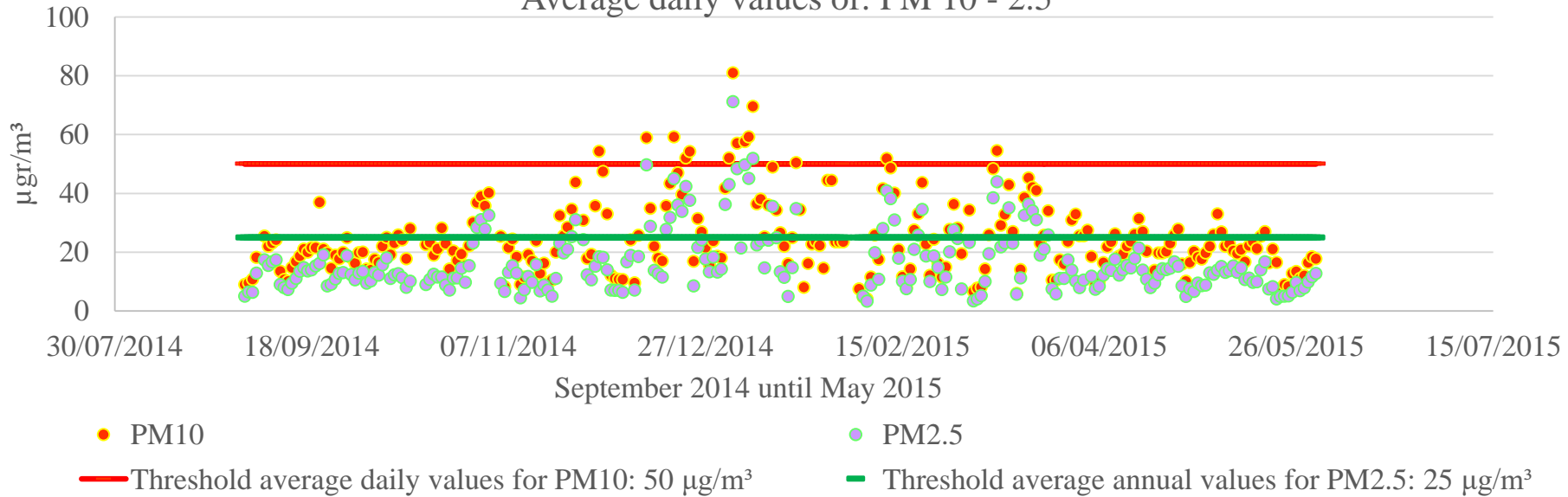


Prevailing wind direction (%)

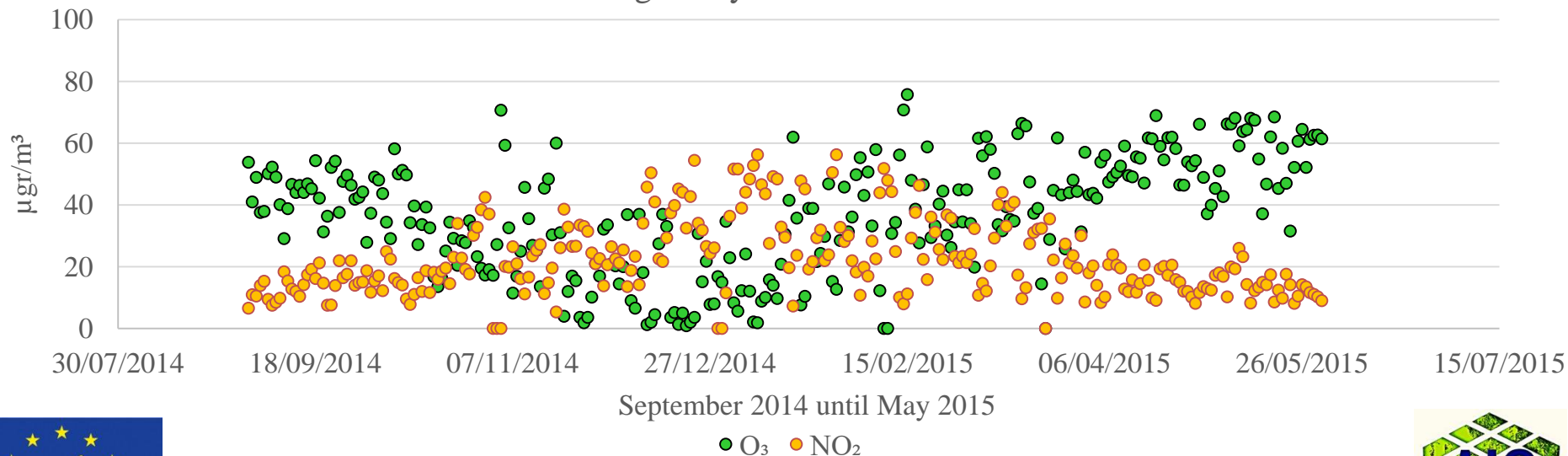


# Airborne chemical pollutants data analysis

Average daily values of: PM 10 - 2.5



Average daily values of: O<sub>3</sub> - NO<sub>2</sub>



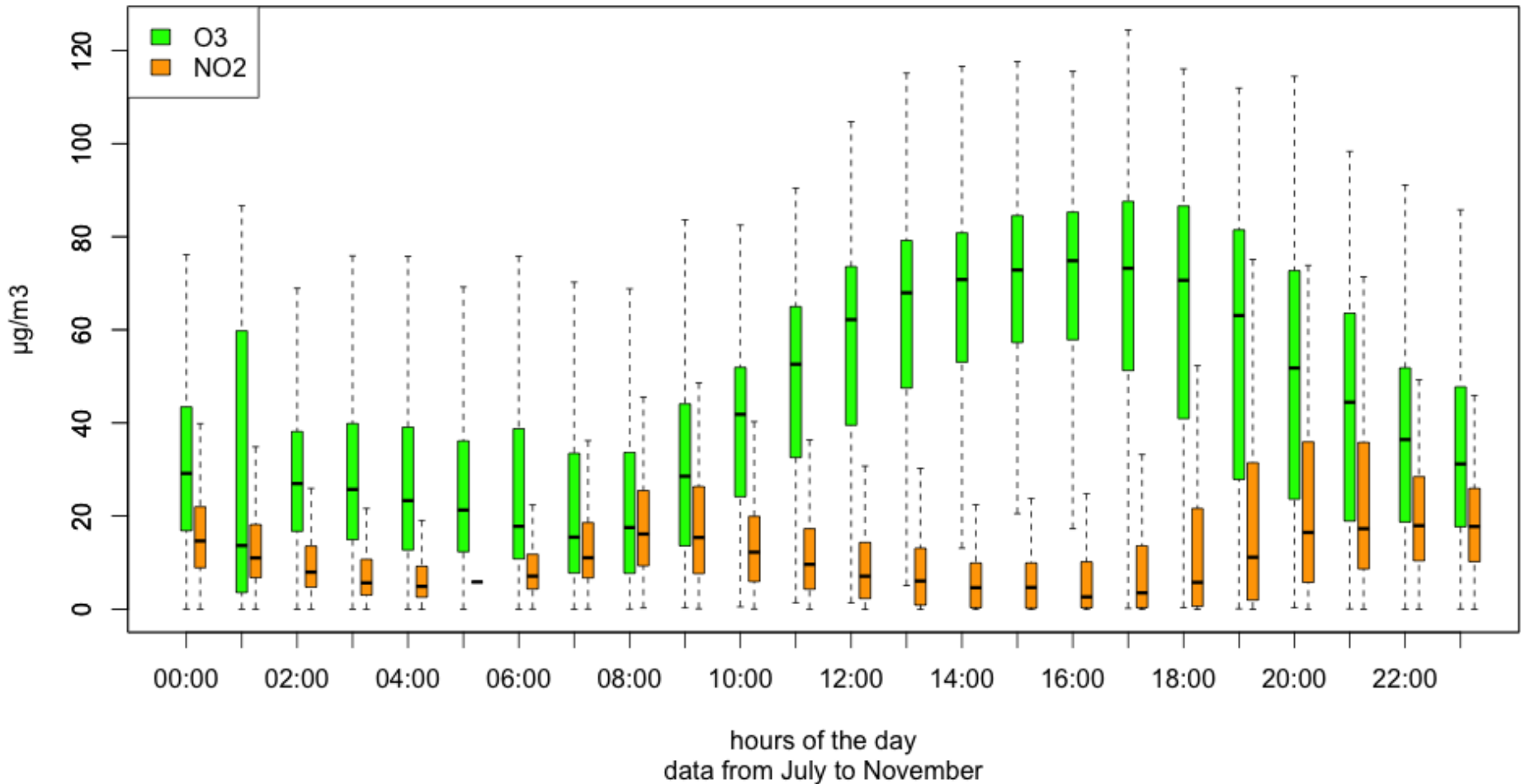
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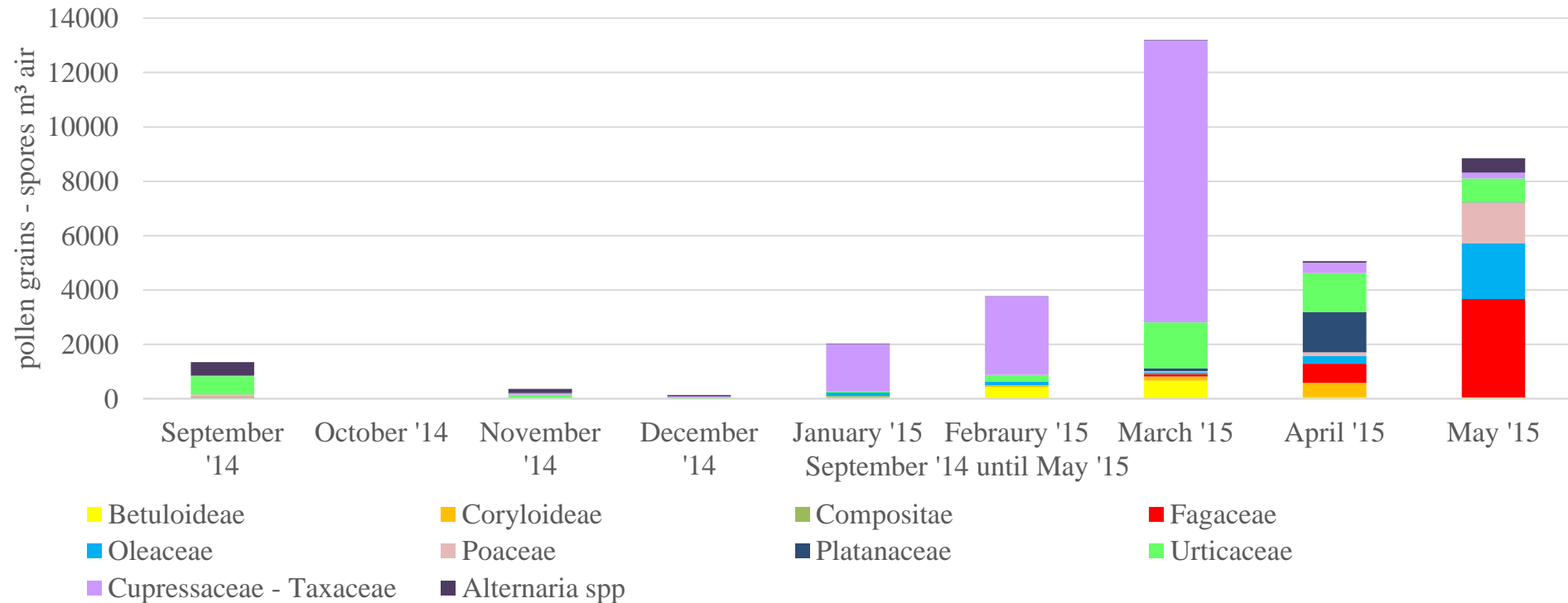
# Airborne chemical pollutants data analysis

O3 and NO2 concentration during the day



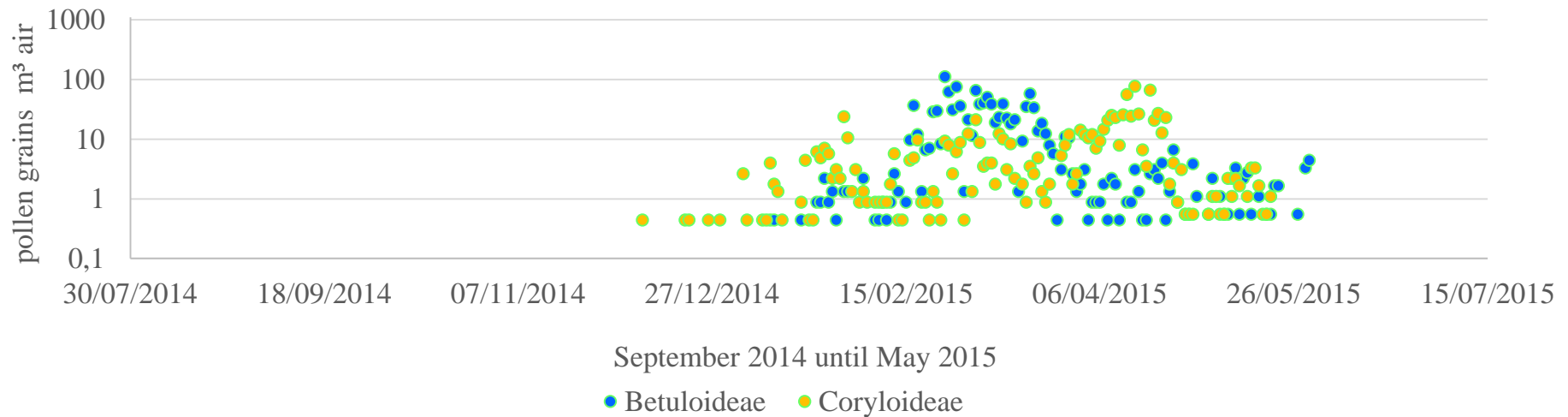
# Airborne pollen grains and spore data analysis

Overview for total monthly pollen grains and spore

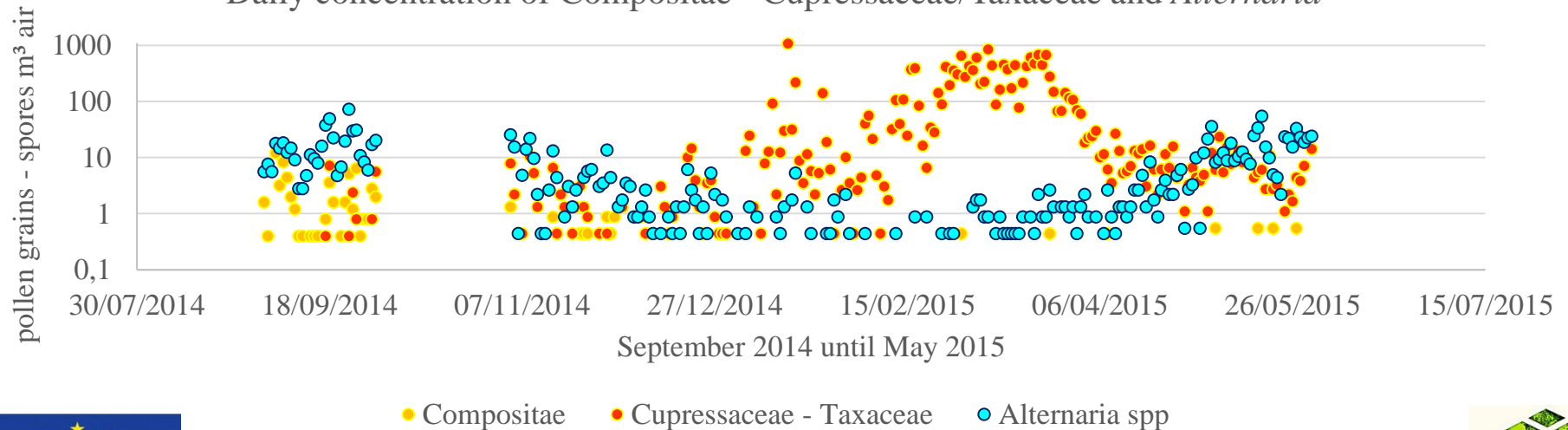


# Airborne pollen grains and spore data analysis

## Daily concentration of Betuloideae and Coryloideae

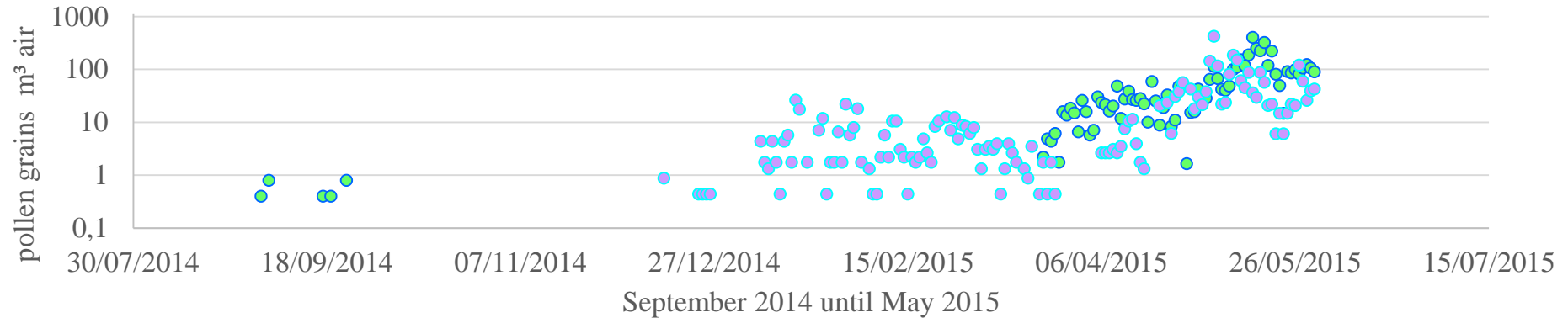


## Daily concentration of Compositae - Cupressaceae/Taxaceae and *Alternaria*

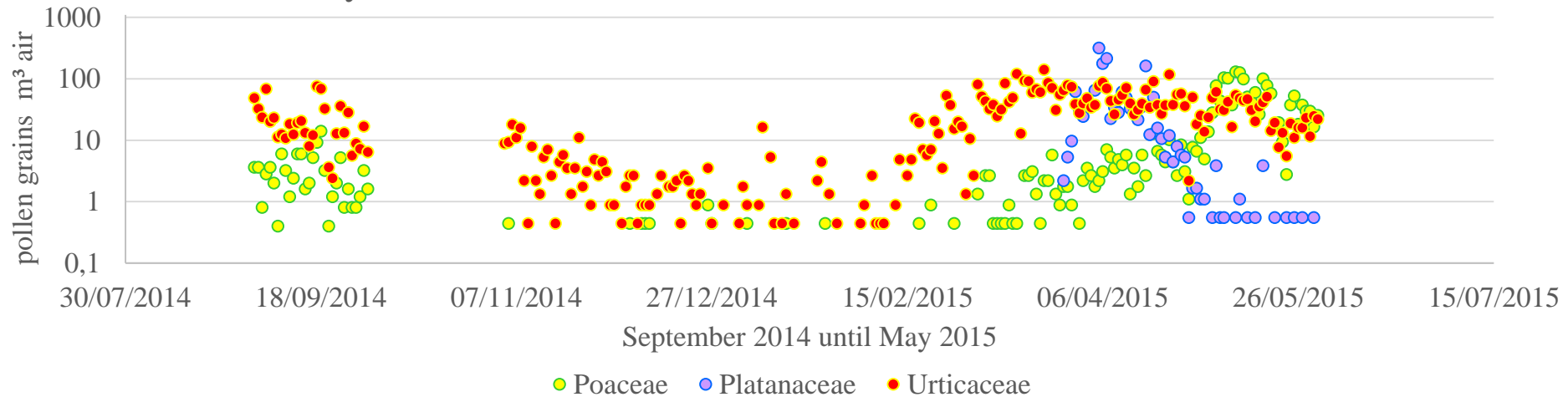


# Airborne pollen grains and spore data analysis

## Daily concentration of Fagaceae and Oleaceae



## Daily concentration of Poaceae - Platanaceae and Urticaceae



# Dissemination action:

- AIS LIFE Project will be presented with a Poster to the 110th Congress of the Italian Botanical Society (International Plant Science Conference) to be held in Pavia from 14 to 18 September 2015 <http://www.societabotanicaitaliana.it/110/eng/detail.asp?idn=1363>

Società Botanica Italiana Onlus

110° Congresso SBI Onlus  
Pavia 14/18 September 2015

Home | Introduction | Topics | Deadlines | Registration | Grants | Abstract Submission | ITA | reserved area

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## Introduction

Dear Members,

we are pleased to invite you to the 110th Congress of the Italian Botanical Society (International Plant Science Conference) to be held in Pavia from 14 to 18 September 2015 in the historic center of the city.

The Congress, to which 12 renowned international speakers have been invited, will take place in the historic buildings of the University of Pavia (<http://www.unipv.eu/site/en/home.html>); the Botanic Garden, the main university (Aula Magna, Room of the '400, Drawing Room) and Palazzo San Tommaso. The social dinner will be held in Pavia in a site of historical importance.

The speakers will provide an overview of recent developments and approaches in their field of research and will share with the audience their thoughts and ideas for the future development of their research. We hope that this conference will attract not only established scientists, but also PhD students, postdocs and young scientists interested in listening to the presentations or in presenting.

### General information

Info for attending  
Registration Fees  
Accommodation  
Pavia in video

### Abstract and Poster

### Programme

### Symposia

### Schedule

### Expo photogallery

5 = AIS LIFE – Aerobiological Information System and allergic respiratory disease management - LIFE13ENV/IT/001107

FRANCO RUGGIERO<sup>1</sup>, SIMONE ORLANDINI<sup>2</sup>, FRANCESCA NATALI<sup>2</sup>, LORENZO CECCHI<sup>2</sup>, SANDRA BALDACCI<sup>3</sup>, SARA MAIO<sup>4</sup>, GIUSEPPE SARNO<sup>5</sup>, SONIA CERRAI<sup>1</sup>, PATRIZIA SILVI<sup>1</sup>, UWE BERGER<sup>4</sup>, MARIA PRENTOVIC<sup>4</sup>, ISABELLA ANNESI MAESANO<sup>5</sup>, AMIR MOUSTAFA<sup>5</sup>, MICHEL THIBAUDON<sup>6</sup>, SAMUEL MONNIER<sup>6</sup>, GILLES OLIVER<sup>6</sup>, GIANNI BEDINI<sup>1</sup>.

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The most important biological component of ambient air is pollen, and its allergens are the main cause of airborne allergic respiratory diseases (1). In Europe, emissions of some air pollutants have decreased over past decades (2). Nevertheless, this does not always produce a corresponding drop in atmospheric concentrations, especially for particulate matter and ozone, which have significant impact on human health (2). Chemical air pollutants and anthropogenic aerosols can alter the impact of allergenic pollen, while pollen production rises in higher atmospheric CO<sub>2</sub> concentrations (3, 4). Changes in plant flowering season due to climate change will probably result in an increase in the duration and severity of the pollen season, alongside a higher frequency of episodes of urban air pollution (1). Therefore, exacerbations of allergic respiratory diseases will have a more pronounced effect in coming decades (5). In this context, AIS LIFE project (<http://www.ais-life.eu>) aims to develop an information base, to enable policy-makers dealing with environment and health issues to better manage pollen-related allergic respiratory diseases, improve the quality of life of patients suffering from them, reduce health system costs, and increase awareness among sufferers of pollen-related allergic respiratory diseases. **Expected results:** Establishment and consolidation of a multidisciplinary, transnational network of experts, with particular attention to pollen-related allergic respiratory health; implementation and dissemination of an Integrated Information System (IIS) and an enhanced Personalised Information Systems (PPI) in Italy, France and Austria; the widening of the Tuscan monitoring network for aerobiological components, by activating a sampling station in Pisa (Italy); educational campaigns (Italy, France and Austria) on the use of the Aerobiological Information System (AIS), promotion of improved lifestyles, and prevention of respiratory allergic diseases; raised awareness concerning the effects of interactions between pollens and chemicals on allergic symptoms across Europe, to guide environmental and health policy decisions. The aerobiological monitoring is in function since 1<sup>st</sup> June 2014 in Italy, France and Austria, with the continuous collecting of the data on the most important allergenic botanical families and fungal spores: Asteraceae, Betulaceae, Corylaceae, Cupressaceae - Taxaceae, Fagaceae, Oleaceae, Platanaceae, Poaceae, Urticaceae and Alternaria. **Acknowledgements:** ARPAT and Consorzio LaMMA (Italy); ZAMG and MA22 (Austria); RNSA, Air Rhône-Alpes, Air Parif, Météo France and Infoclimat (France) are gratefully acknowledged for providing chemical, aerobiological, and climate modelling data.



Fig. 1 Pollen Trap – VPPS 2000

- 1) D'Amato G., Cecchi L., D'Amato M., Annesi-Maesano L. (2014) Climate change and respiratory diseases. Eur Respir Rev June 1, 2014 vol. 23 no. 152 161-169
- 2) <http://ec.europa.eu>
- 3) D'Amato G., Bagna-Cagnani CE, Cecchi L. et al. Climate change, air pollution and extreme events leading to increasing prevalence of allergic respiratory diseases. Multidiscip Respir Med 2013; 8: 12
- 4) Ziska LH, Beggs PJ. Anthropogenic climate change and allergen exposure: the role of plant biology. J Allergy Clin Immunol 2012; 129: 27-32.
- 5) D'Amato G., Cecchi L. Effects of climate change on environmental factors in respiratory allergic diseases. Clin Exp Allergy 2008; 38: 1264-1274.



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# Data processing

- Pollen counts are grouped by botanical family and recorded on aerobiological bulletins showing pollen grain concentrations (n/m<sup>3</sup>) for every day of the week.
- Local meteorological data are integrated in forecast models to provide a local weather forecast.
- Aerobiological forecasts are developed based on the reference pollen counts from the previous year, previous week and current weather forecasts.
- The forecast of conventional chemical pollutants (SO<sub>x</sub>, NO<sub>x</sub>, O<sub>3</sub>) are made based on local weather forecast.



Aerobiological data

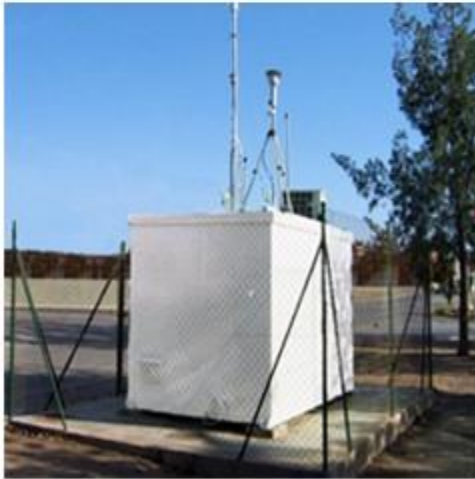


Forecast weather



AirPOLL – IIS  
(Intergrated Information System)

Air pollution data



Multidisciplinary  
recommendations



Improvement of  
respiratory allergic  
diseases management

Thank you for your attention!!!

