Consiglio Nazionale delle Ricerche

The role of Green Infrastructure on air quality in urban areas

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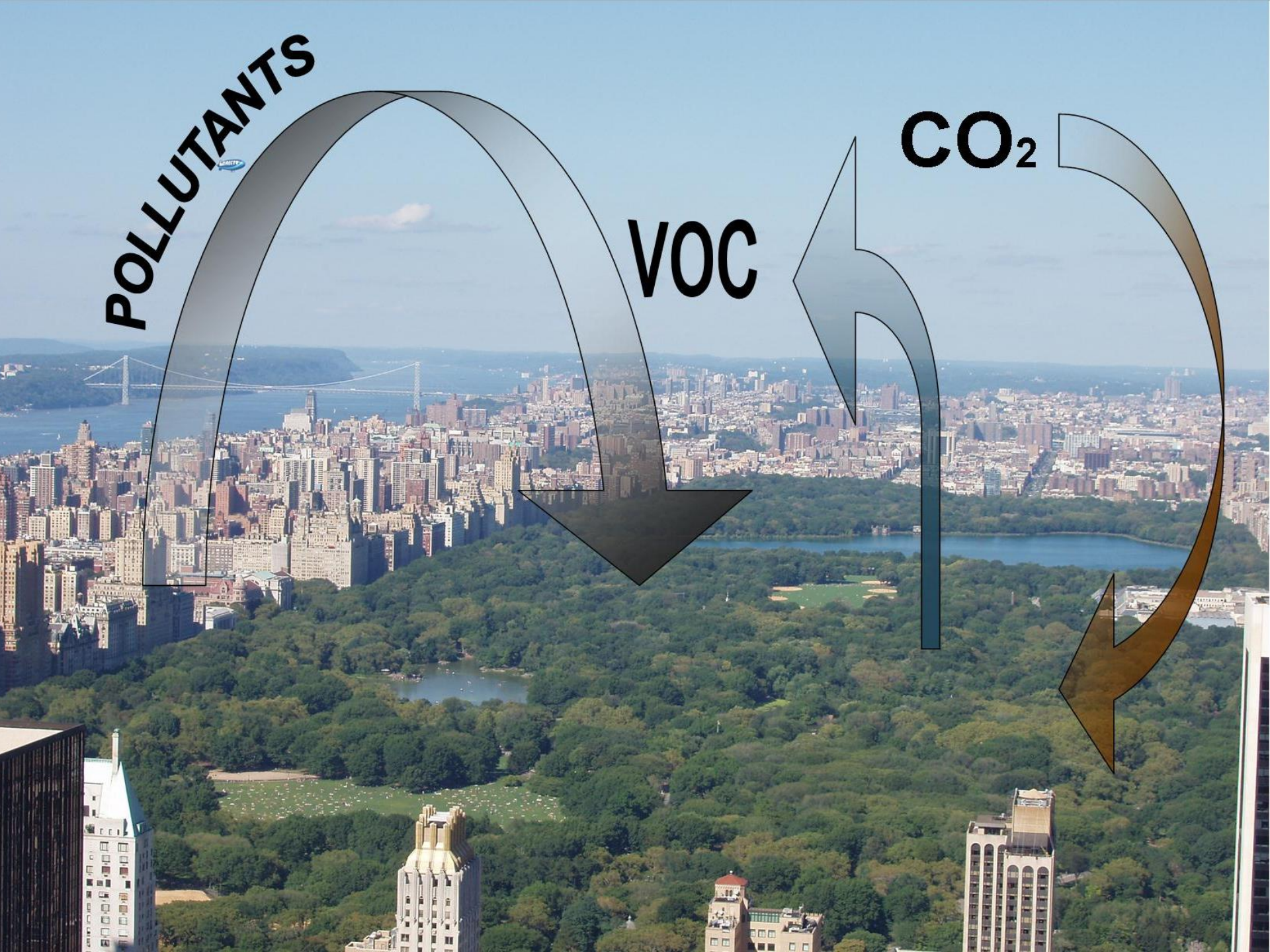
POLLUTANTS
VOC
CO_2

INCREASED ATTENTION TOWARDS CO_2 REDUCTION THROUGH URBAN FORESTRY

- *2008* - The *European Commission* launched the Covenant of Mayors to oblige European cities to establish an *Action Plan* to reduce their CO_2 emissions by over 20% through activities and practices including the addition of *more plants* in urban areas and the sustainable *management* of the *green spaces*

- *2015* - Even stronger Focus on Carbon mitigation potential at urban level after COP21 in Paris

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Opinion

CellPress

Urban plant physiology: adaptation-mitigation strategies under permanent stress

Carlo Calfapietra[1,2], Josep Peñuelas[3,4], and Ülo Niinemets[5,6]

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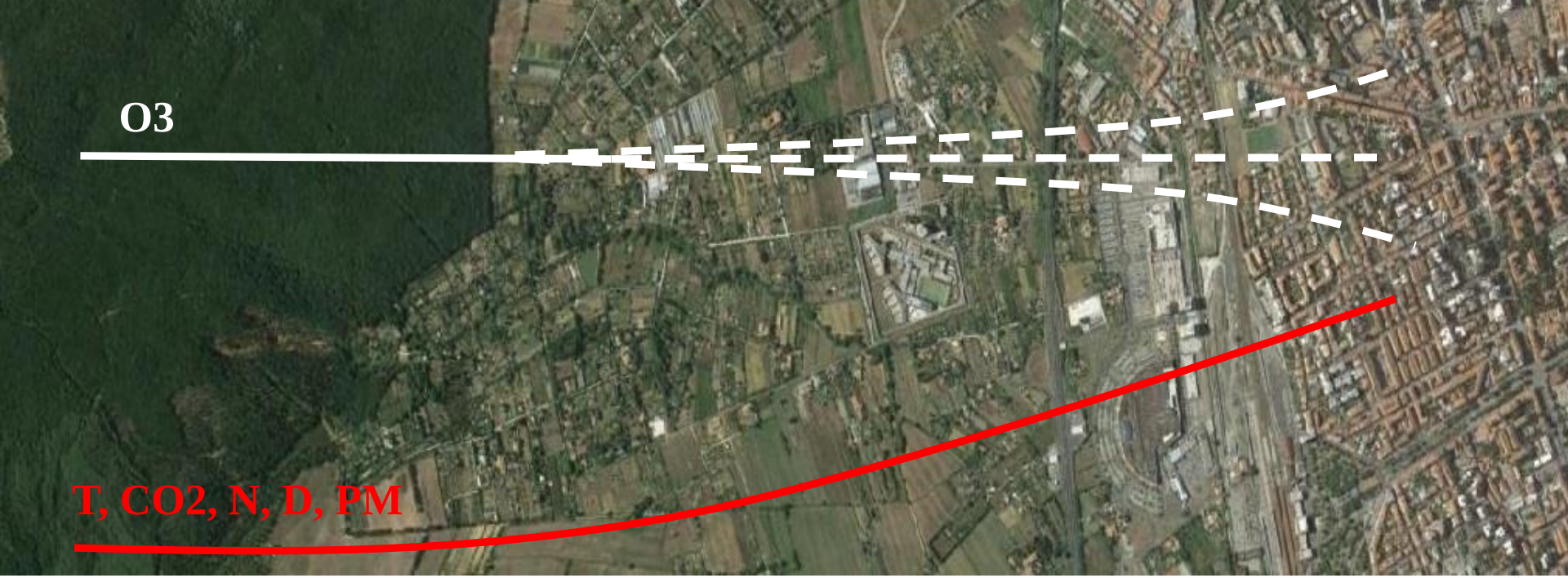
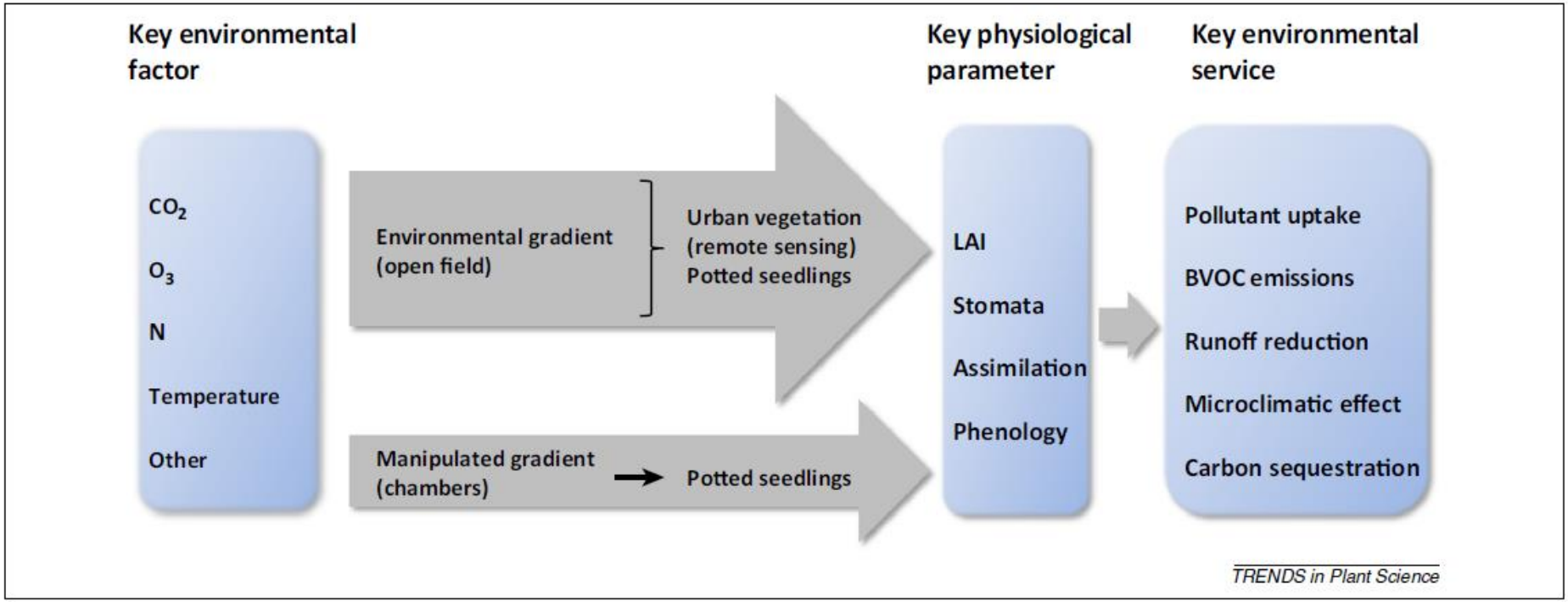
[6] Estonian Academy of Sciences, Kohtu 6, 10130 Tallinn, Estonia

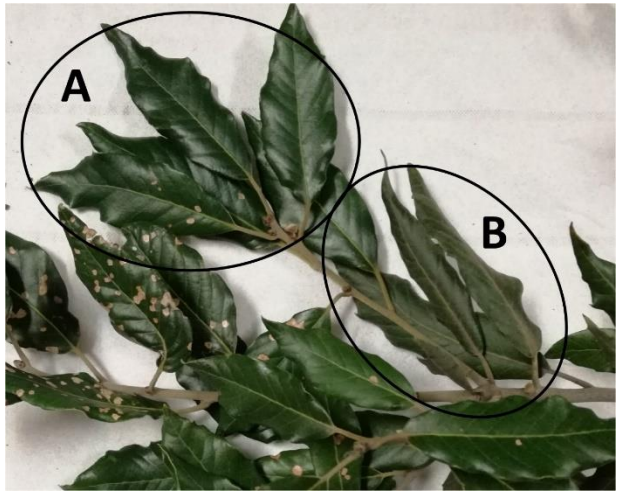

O3
T, CO2, N, D, PM

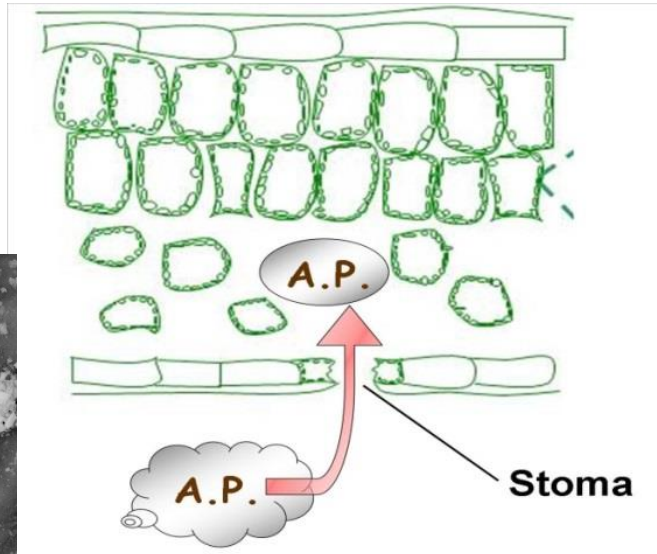

Key environmental factor
Key physiological parameter
Key environmental service
CO_2
O_3
N
Temperature
Other
Environmental gradient (open field)
Urban vegetation (remote sensing)
Potted seedlings
Manipulated gradient (chambers)
Potted seedlings
LAI
Stomata
Assimilation
Phenology
Pollutant uptake
BVOC emissions
Runoff reduction
Microclimatic effect
Carbon sequestration
TRENDS in Plant Science

Urban Vegetation: ACTIVE and PASSIVE natural AIR FILTERS

Atmospheric **Pollutants *Mitigation***:

- *Stomatal uptake* (NOx; SO_2; O_3; CO)
- *Capture* - dry deposition (PM)

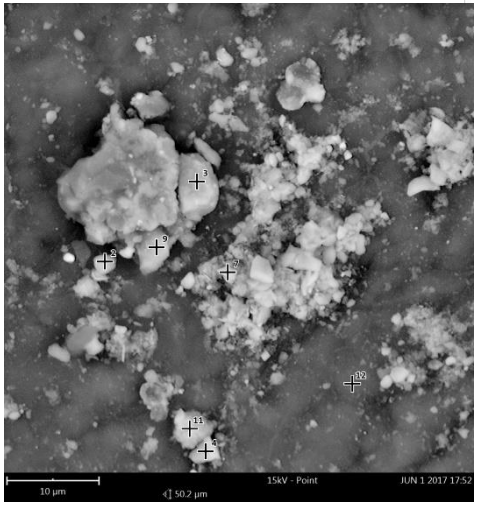




Particulate Matter (PM10; PM2.5)

- ***Diffused*** *Airborne particles* - dimensions lower than 10 *μm* and 2.5 *μm*

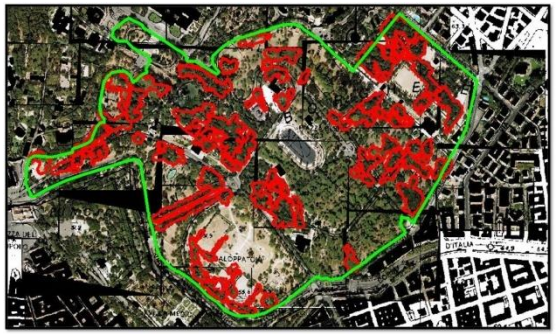
- Highly **diffused and dangerous**



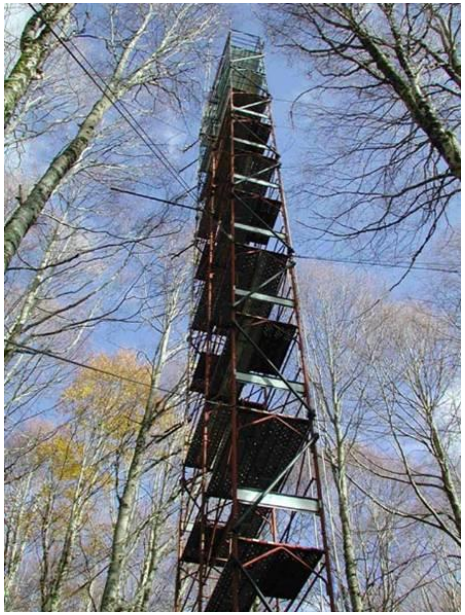
Assessing *interactions* between air pollutants *uptake* (O_3, NO_x and PM) by Green Infrastructure and possible *role of BVOCs*

Big cuvette measurements of leaf gas exchange

Application and validation of models

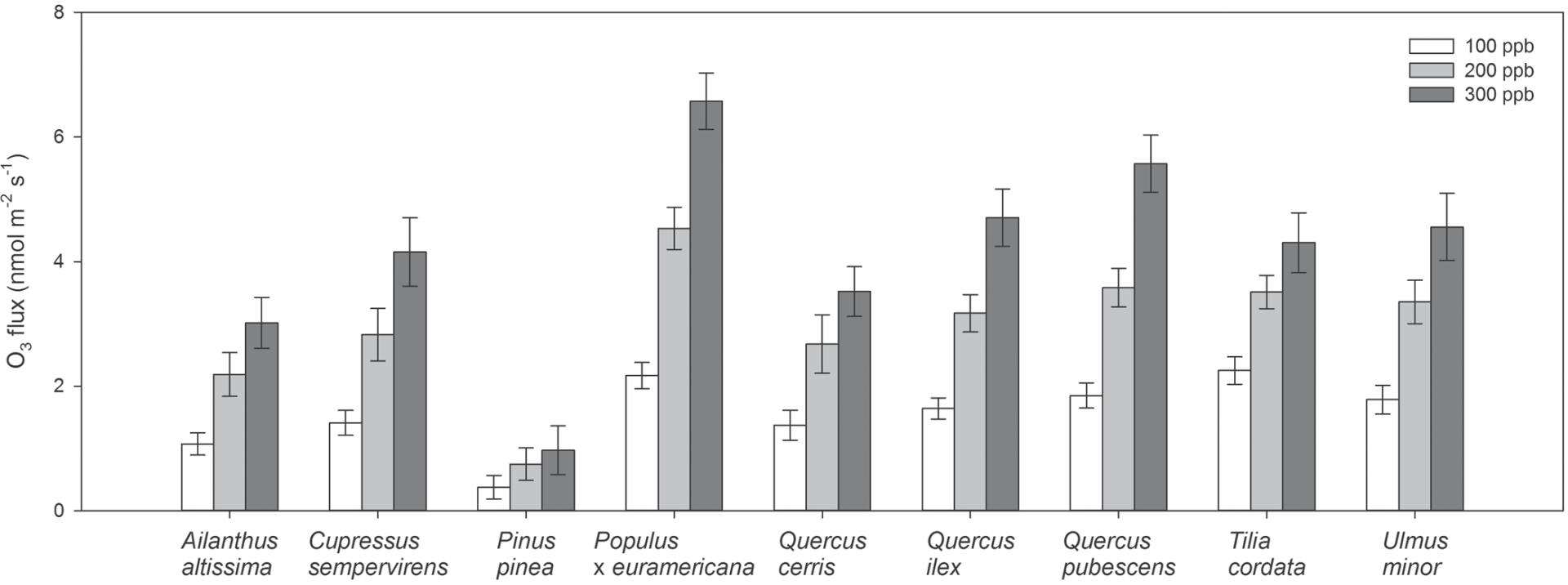


campaign using eddy covariance technique



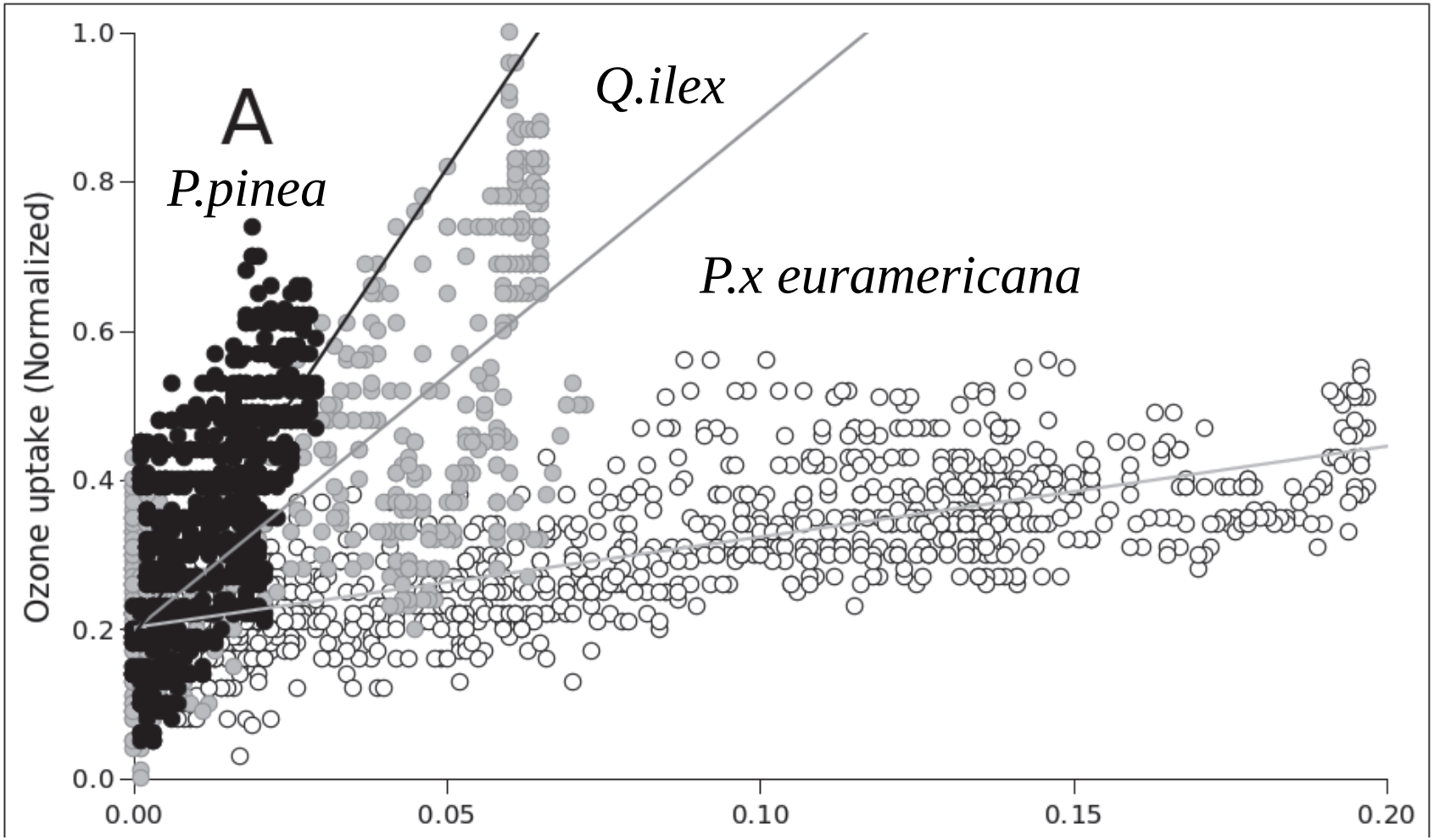
Laboratory → GIS+Modelling → Field

Laboratory cuvette results



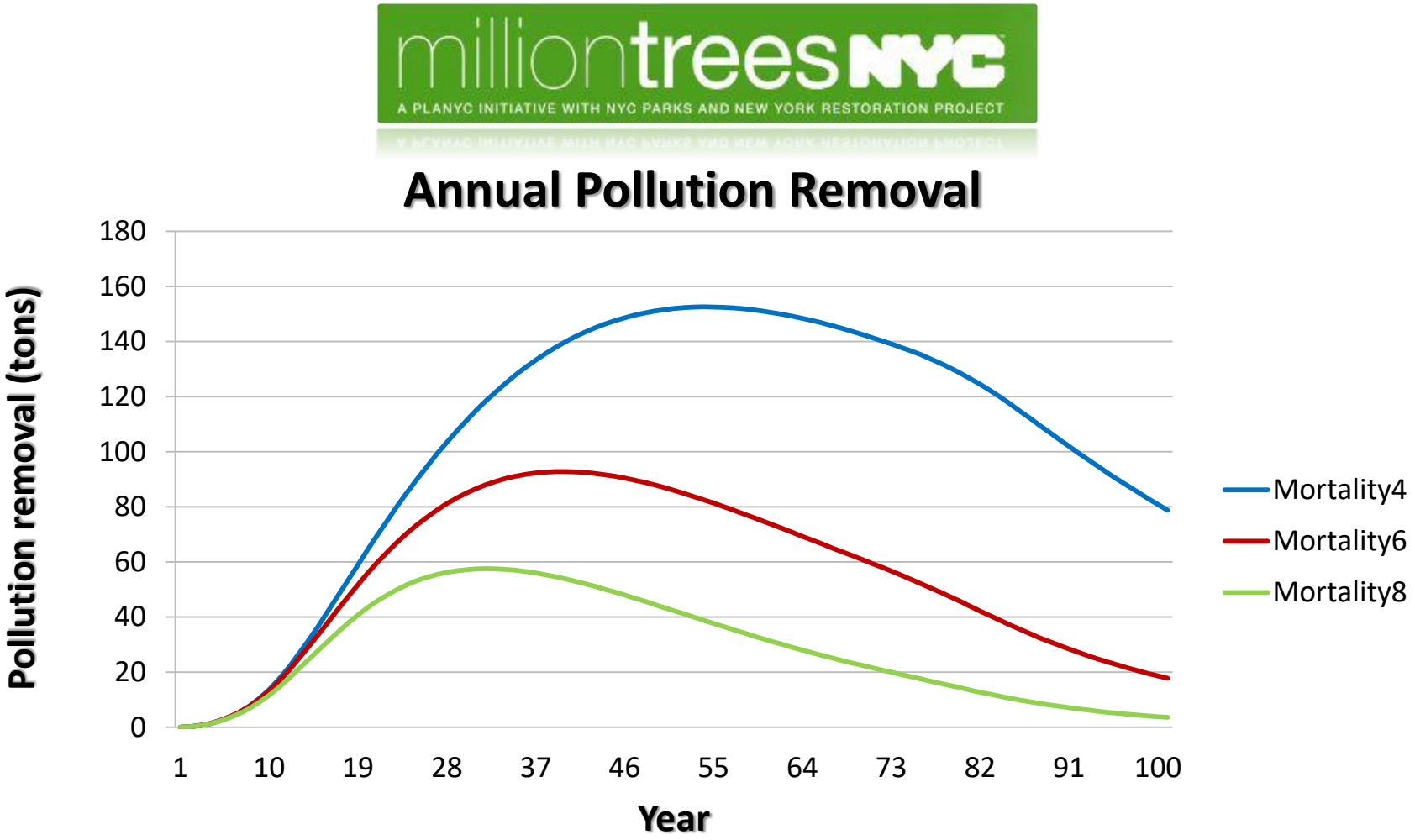
Calfapietra et al. 2016

Laboratory cuvette results



Calfapietra et al. 2016

Applying **i-Tree** Population Projector in New York



Peak values : 152.6, 92.8, 57.5 (tons/year)

Morani et al. 2011

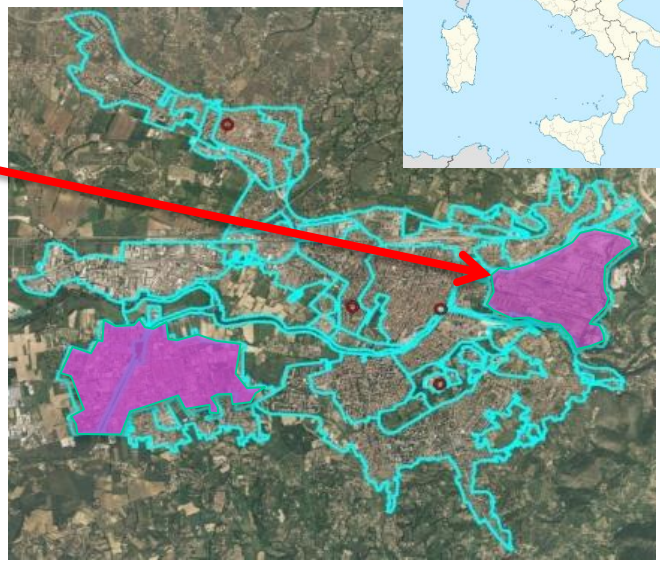
Particulate Matter deposition: city of Terni case study

- **Industrial** city: Steel/Chemical factories

ThyssenKrupp

- Factories ***into urban environment***

- **Morphological** characteristics



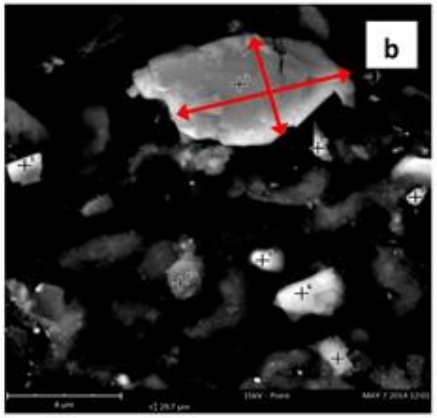
Flat plain valley surrounded by mountains

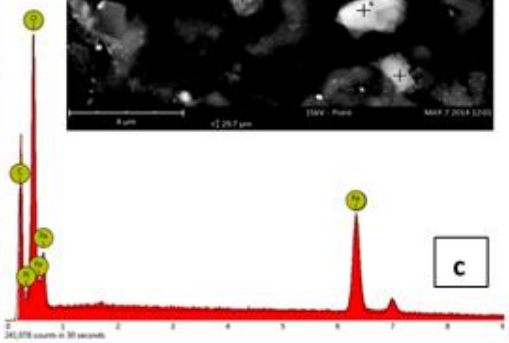
HIGH ATMOSPHERIC POLLUTANTS CONCENTRATIONS

PM deposition on leaves
Quercus ilex (holm oak)

– ***EU limits for PM10: 50 µg/m³ for maximum 35 days in one year –***
2012: 68 overlay recorded

Particulate Matter deposition: city of Terni case study



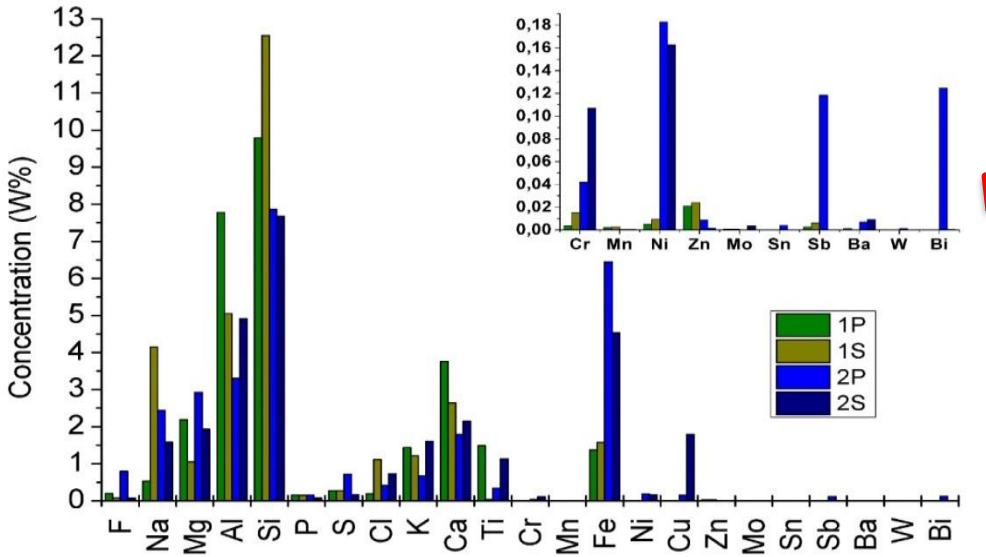


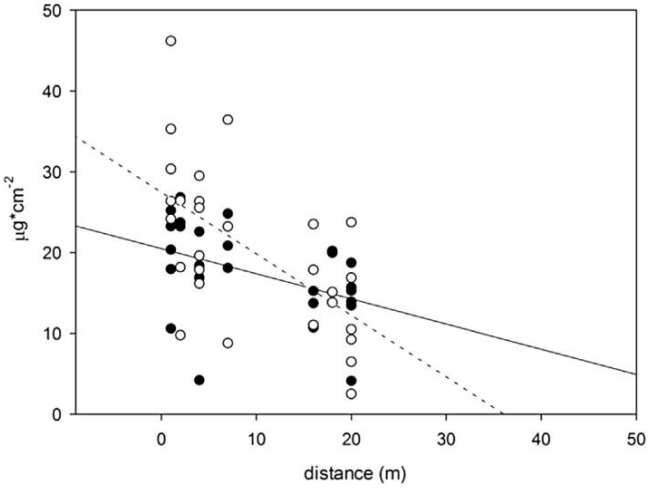
SEM (scanning electron microscopy) with EDX

Quali-quantitative *analysis*:

- Effect of *industrial area*
  (elemental composition)

- Effect of *streets*
  (quantities)





Sgrigna et al. 2015; 2016

Strong focus on **air quality mitigation capacity** of ***urban vegetation*** by media (particularly for PM)

la Repubblica.it
Il mondo in diretta 24 ore su 24

3 Nov 2016

Così gli alberi salveranno le città

Rai 2

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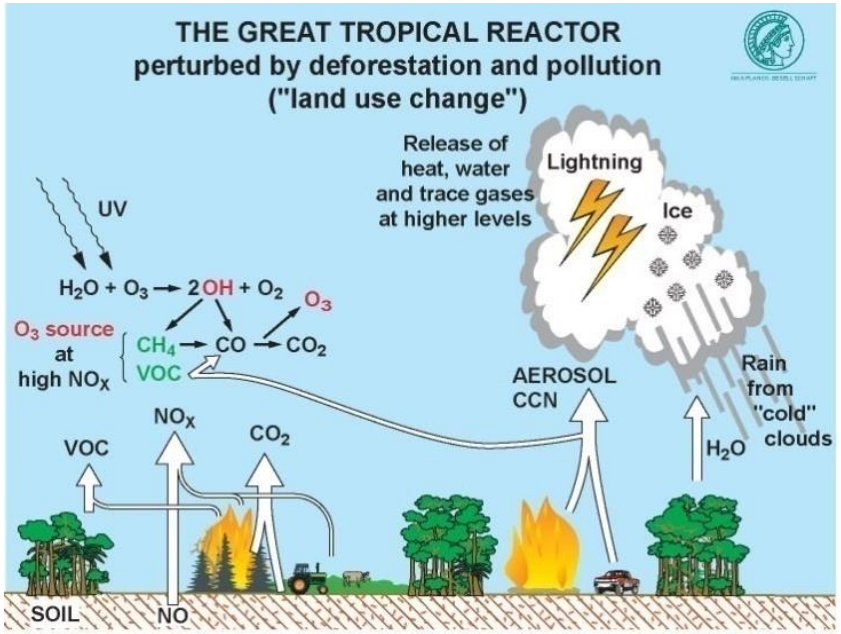
Gli alberi salveranno le città

Un'analisi globale del ruolo degli alberi urbani per affrontare l'inquinamento e il caldo estremo. Se piantati nel posto giusto, possono contribuire a rendere l'aria più sana e le nostre città più verdi e vivibili.

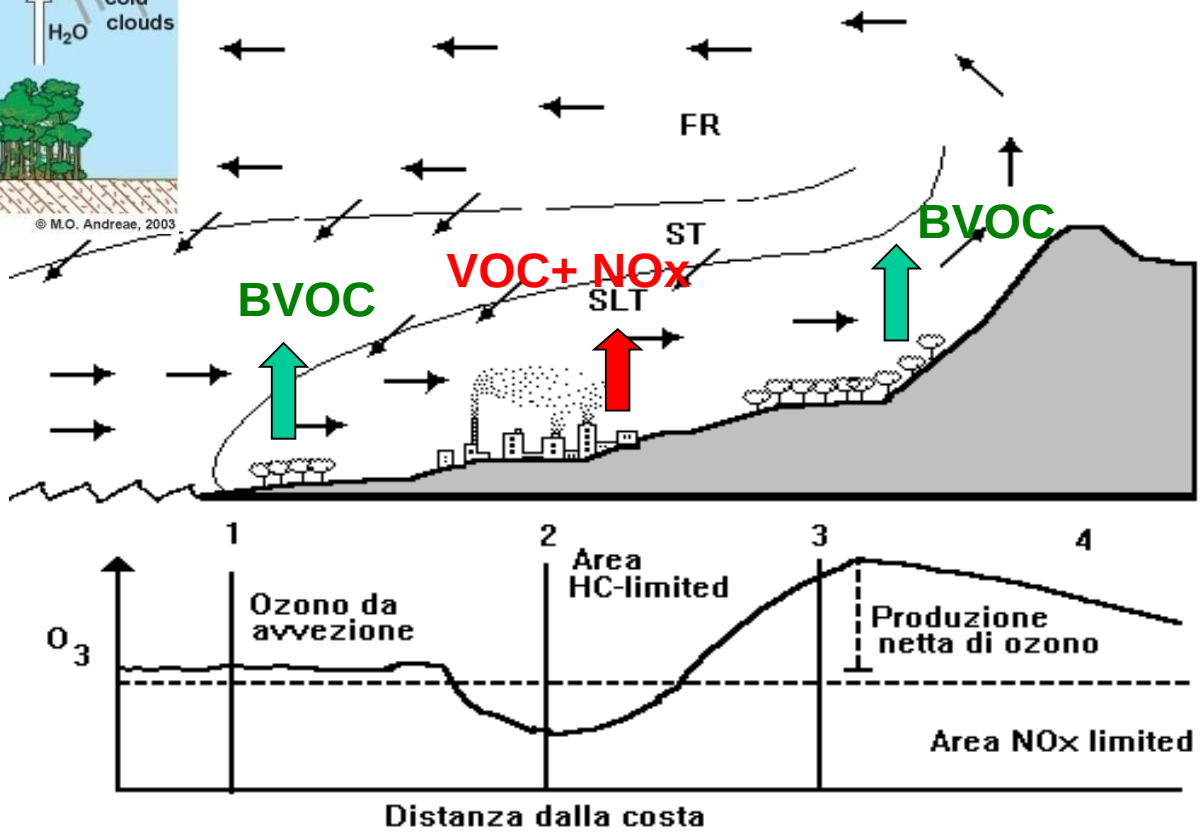
a cura di PAOLA CIPRIANI

The **BVOCs** Case and Ozone: *photochemical air pollution*

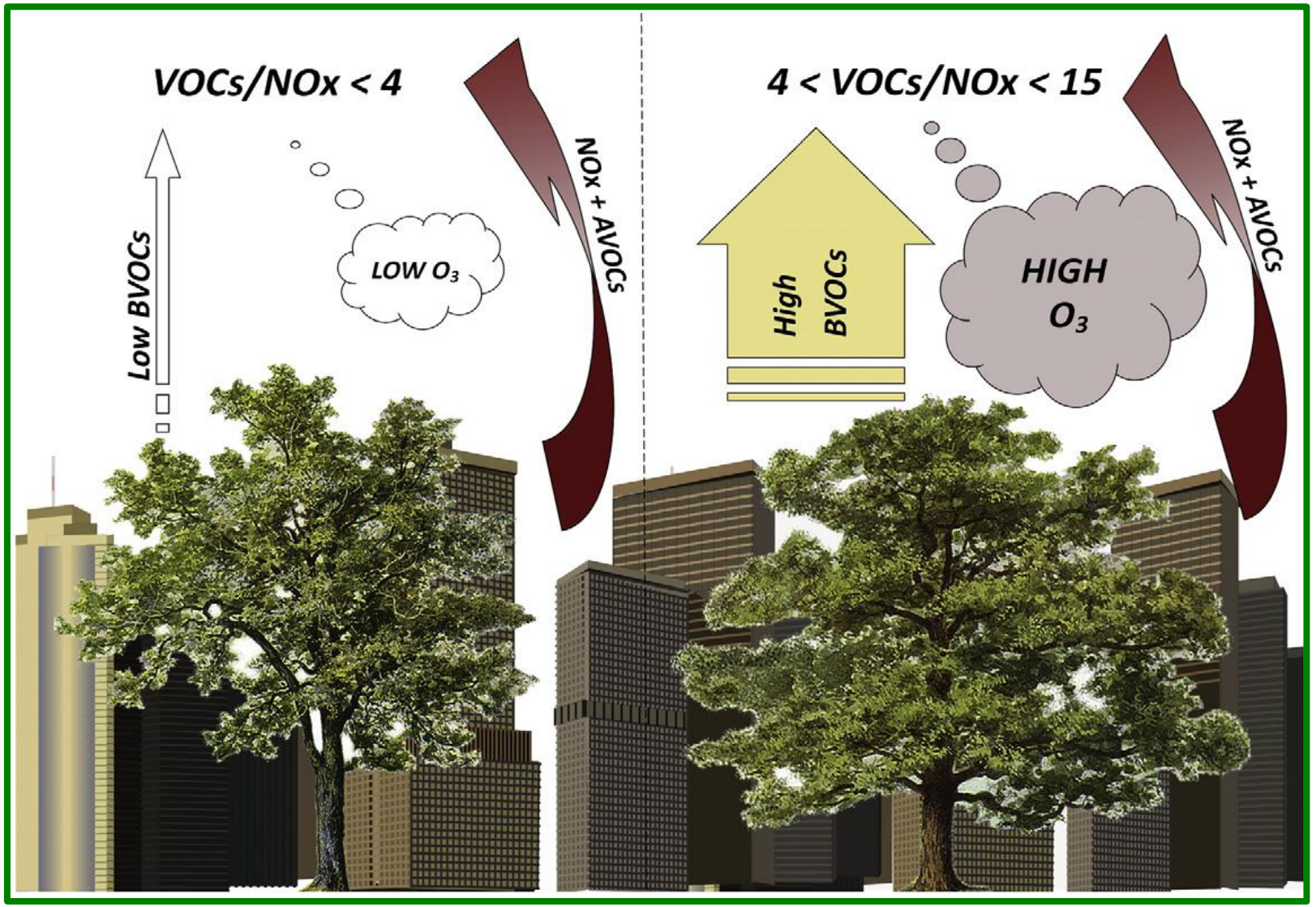


why the Mediterranean is a “hot spot” for VOC and photochemical pollution……

….along the coasts



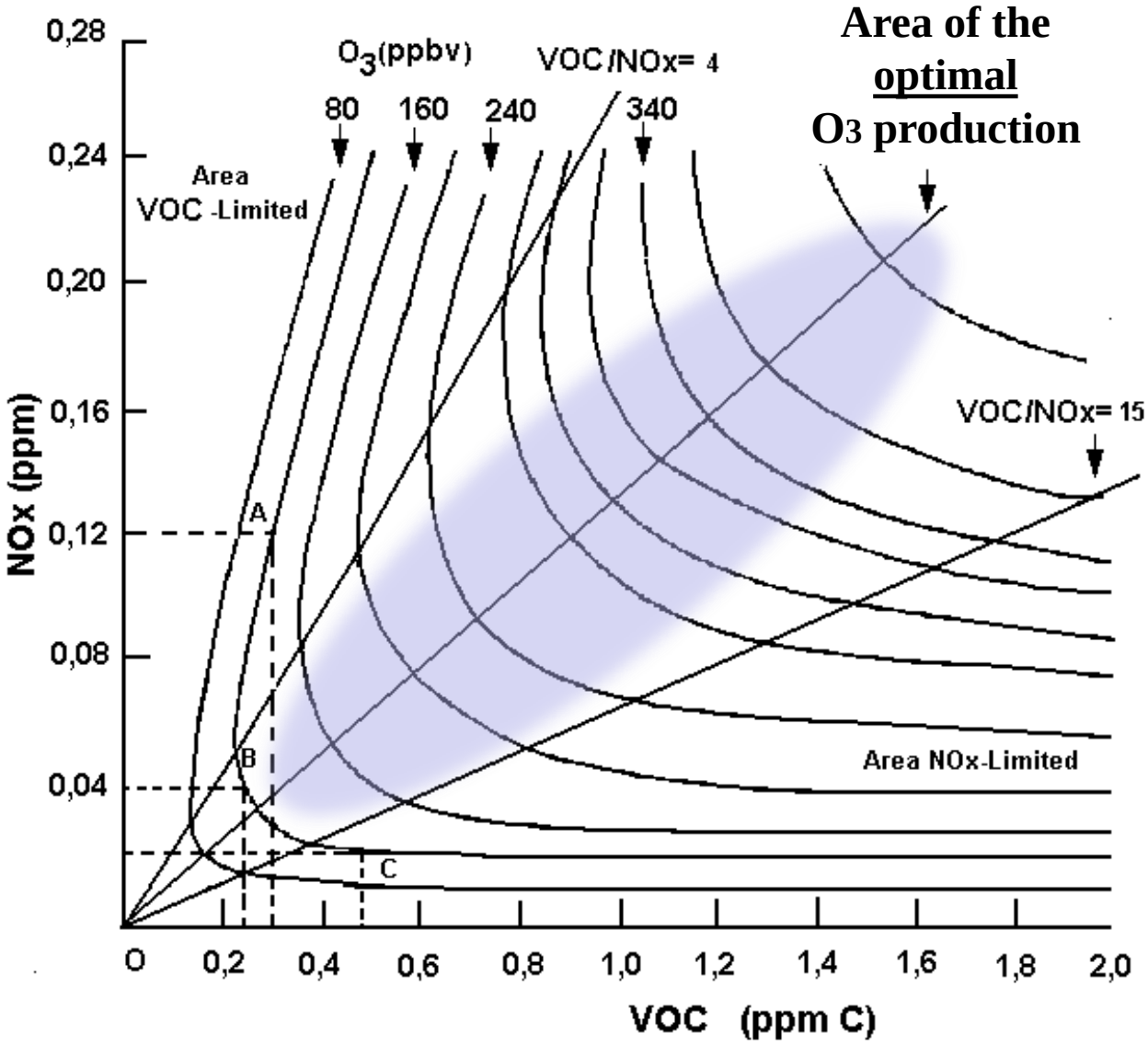
Low BVOC emitting species
in *urban environment* **<u>are recommended</u>**



(Calfapietra et al. 2013)

HOW MUCH?

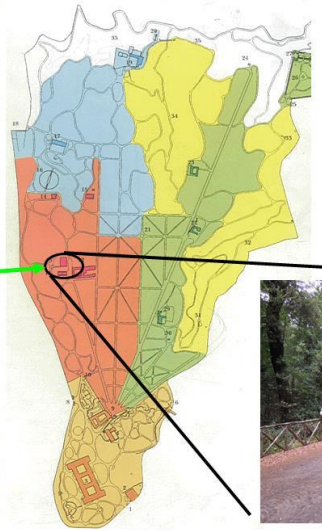
Specific **VOCs** and **NOx** quantities: Optimal ozone production



Capodimonte Park eddy covariance station, Naples

PON-Infrastruttura Amica

Sito di Napoli – Urbano – Parco di Capodimonte



More than 130 hectare
Inside the city of Naples
Dominated by *Quercus ilex*

EDDY COVARIANCE TOWER

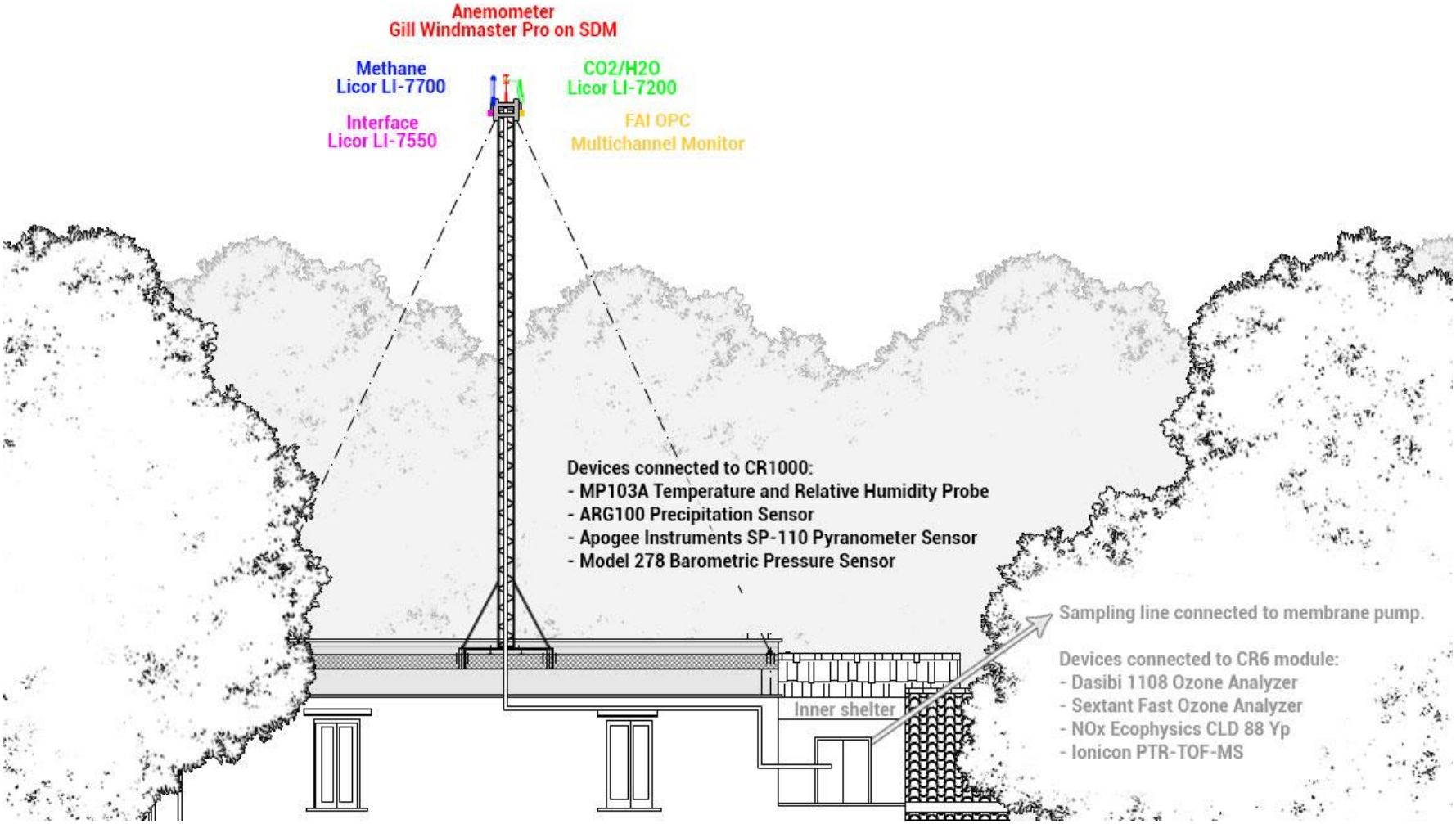
- **CO_2 / H_2O** — Li-COR LI-7200
- **Methane** — Li-COR LI-7700
- **Particulate matter** — FAI OPC Multichannel Monitor
- **NO_x** — Ecophysics CLD 88 Yp NO_x analyzer
- **N_2O** — N_2O analyzer Thermo 46i
- **Ozone** — Dasibi 1108 slow analyzer; Sextant fast ozone analyzer

- **PTR-TOF-MS 8000** — Acetaldehyde, benzene, toluene, monoterpenes, isoprene, methanol, many others

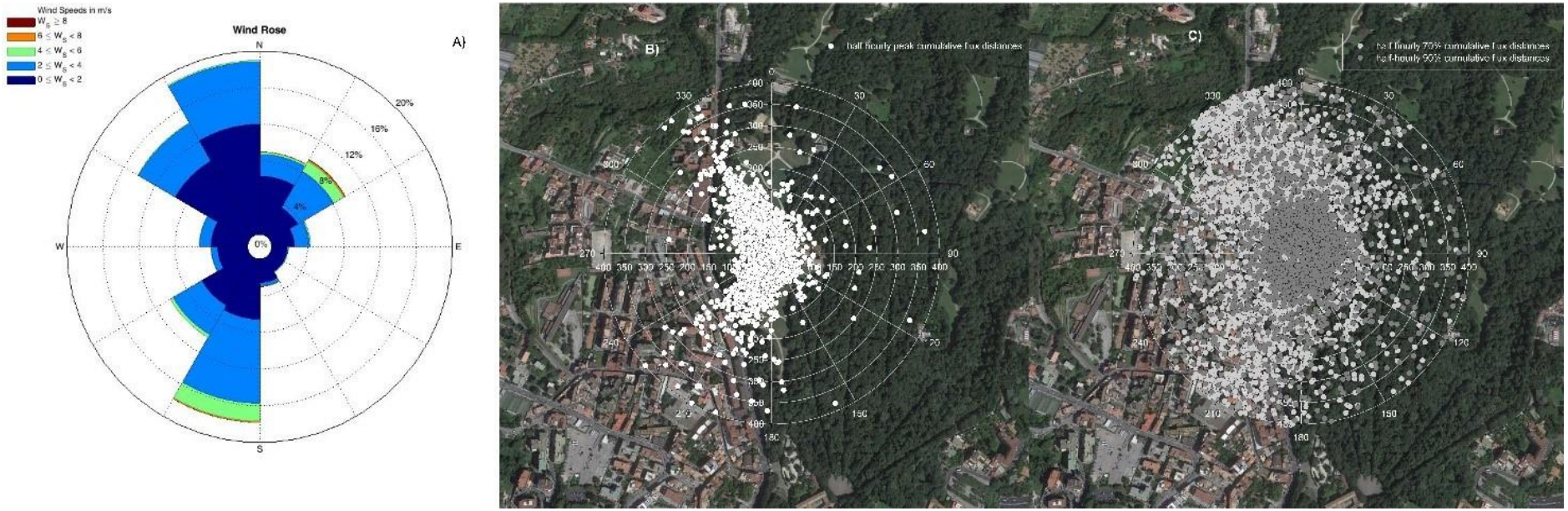
- **Gill Windmaster Pro Anemometer**
  - ARG100 Precipitation Sensor
  - Apogee Instruments SP-110 Pyranometer Sensor
  - Model 278 Barometric Pressure Sensor
  - MP103A Temperature and Relative humidity Probe

1M € TOTAL INVESTMENT

Capodimonte Park eddy covariance station, Naples – the structure



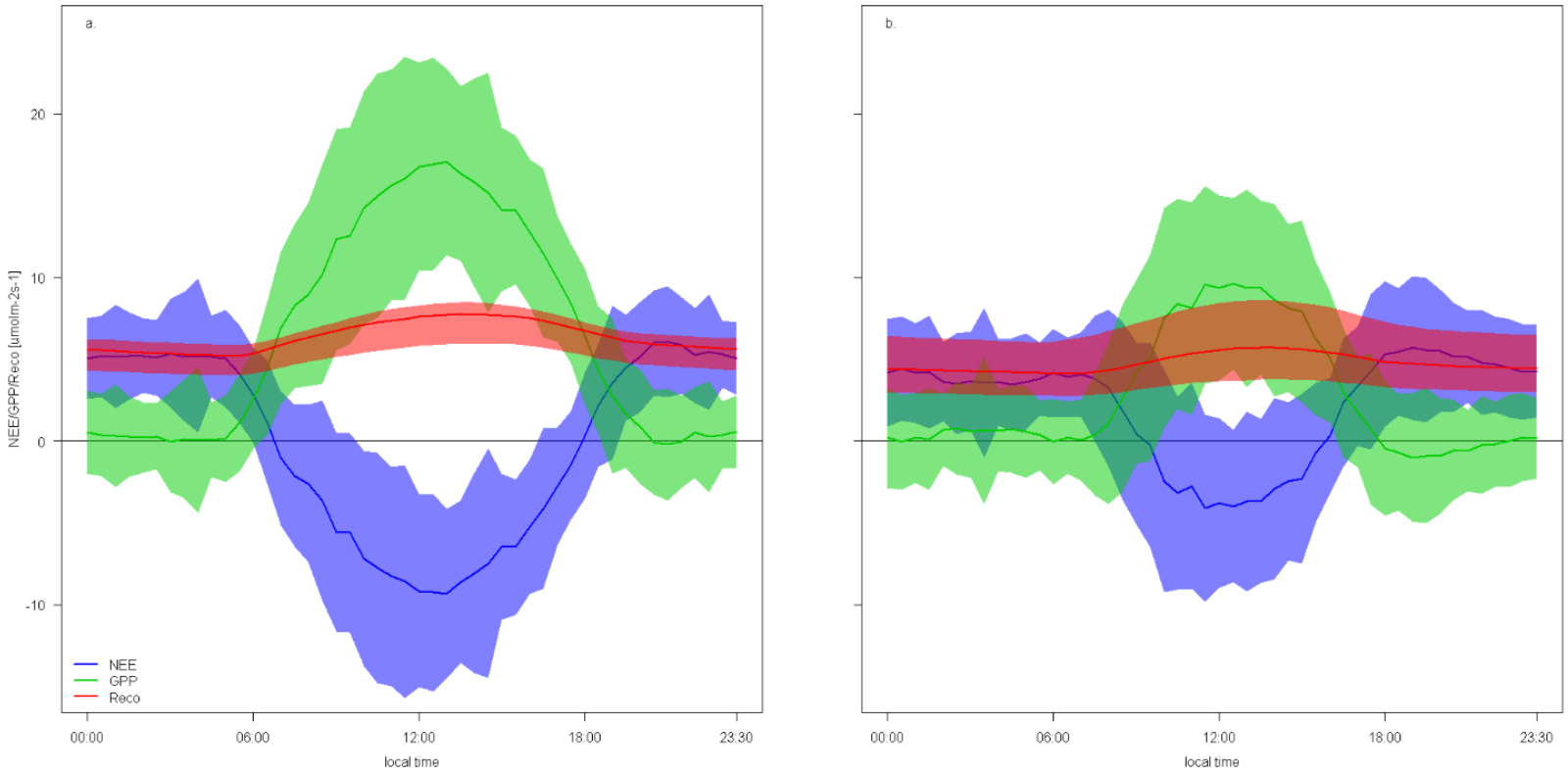
Capodimonte Park eddy covariance station, Naples – first results



Wind distribution for the period March 2015 – April 2016 (panel a). Half hourly cumulative fluxes distances representing the peak (white circles) (panel b), 70% (dark grey circles) and 90% (light grey circles) (panel c) for the period March 2015 – April 2016. Cumulative fluxes distances were calculated using the footprint model of Kljun et al. (2004).

Guidolotti et al. 2017

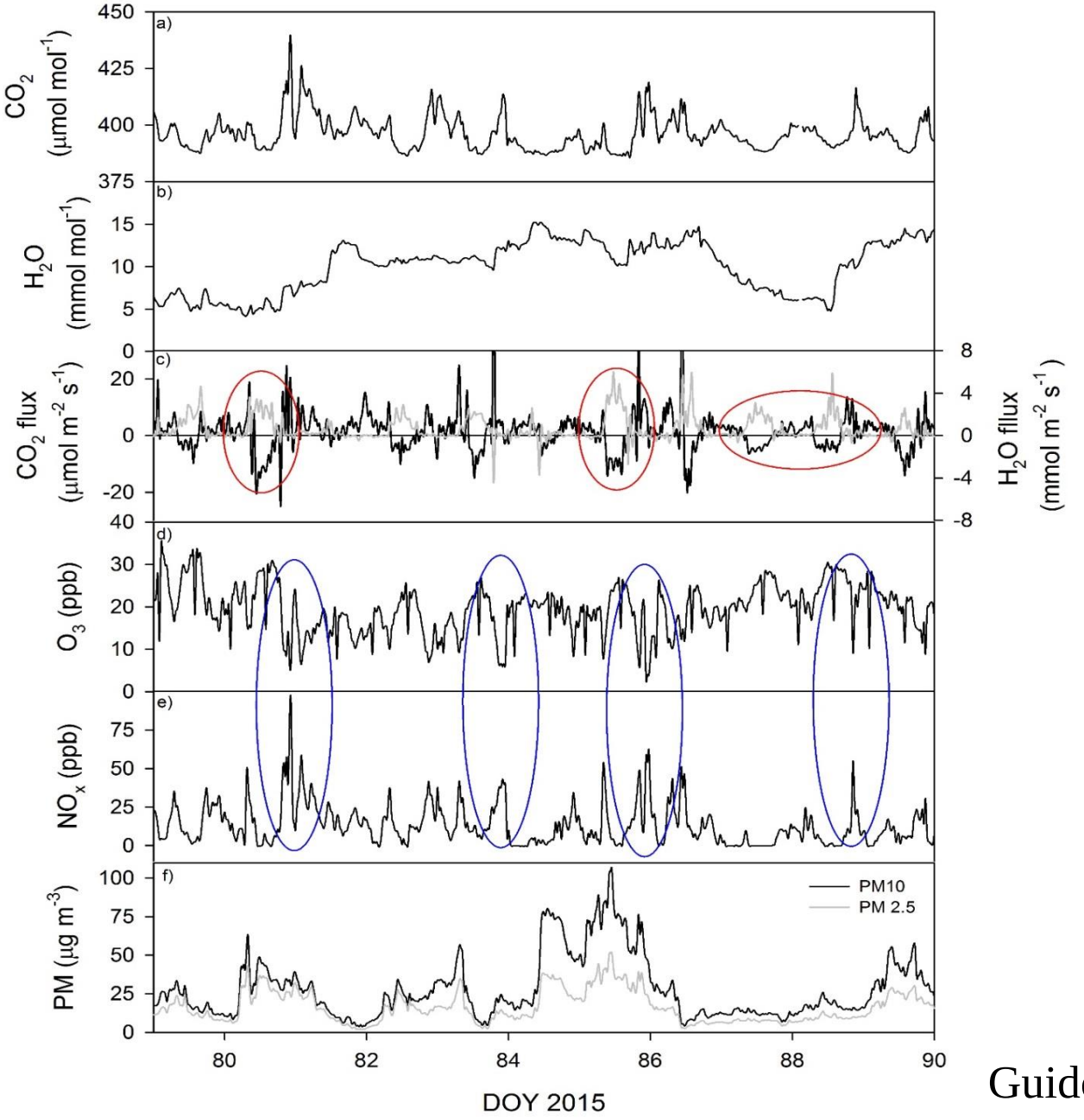
Capodimonte Park eddy covariance station, Naples – first results



Diurnal patterns of NEE (blue), GPP (green) and RECO (red) for the summer period (panel a, April-September) and the winter period (panel b, October-March). The solid lines and shaded bands represent the average and standard deviation of the half-hour flux, respectively.

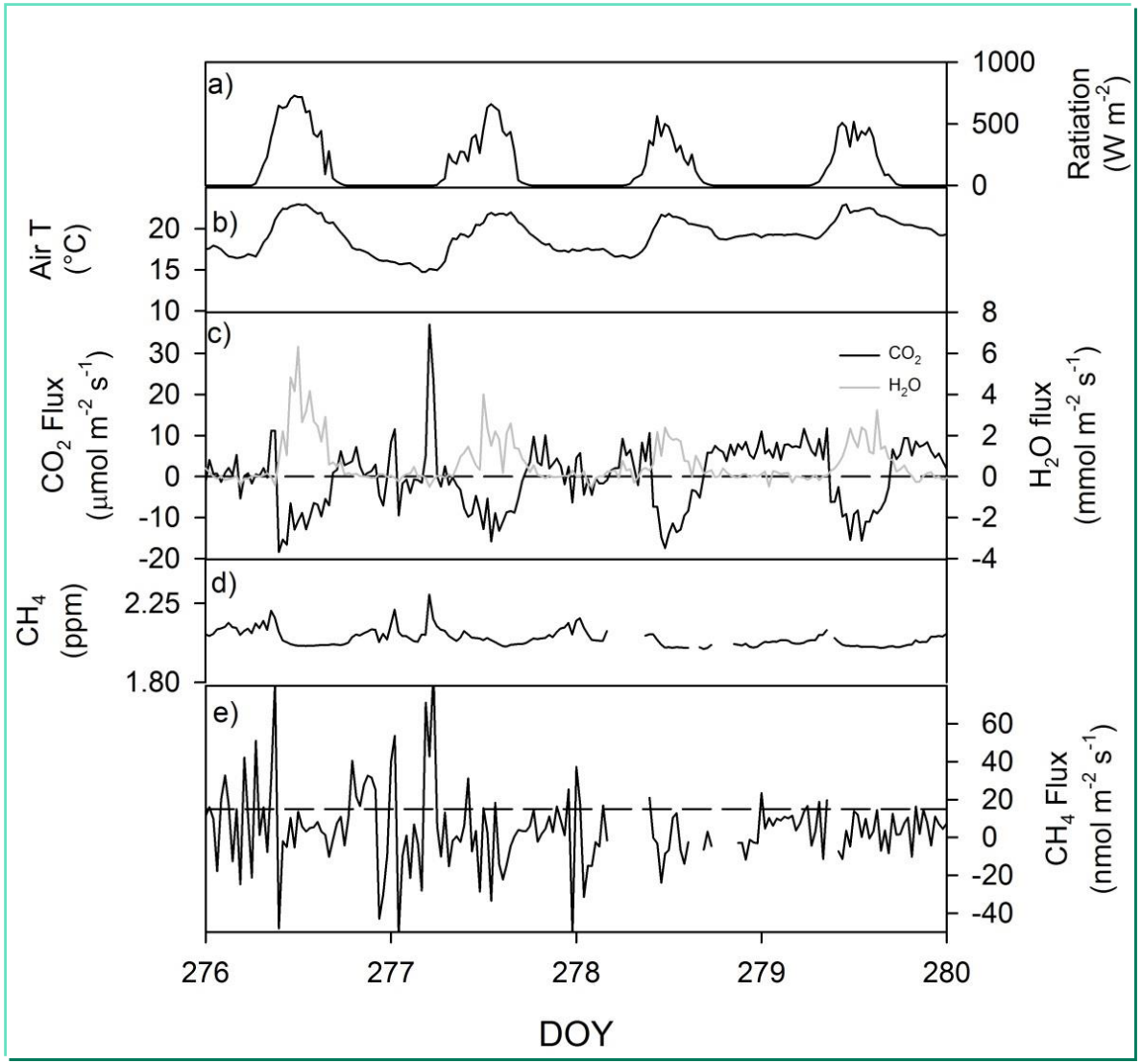
Guidolotti et al. 2017

Eddy Covariance: ***Concentrations and fluxes*** (March 2015)



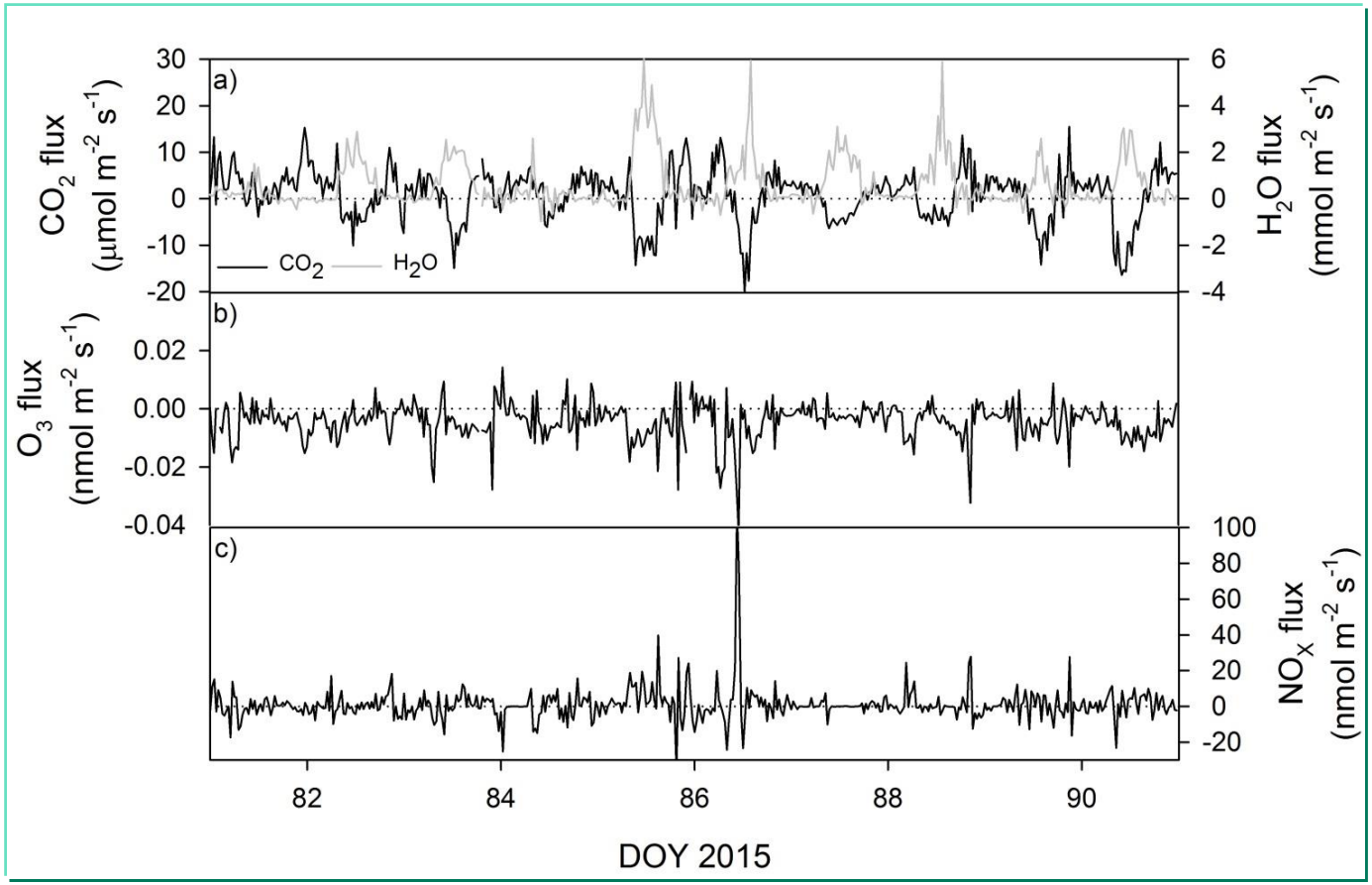
Guidolotti et al. 2017

Eddy Covariance:
GHG concentrations and fluxes (summer 2015)



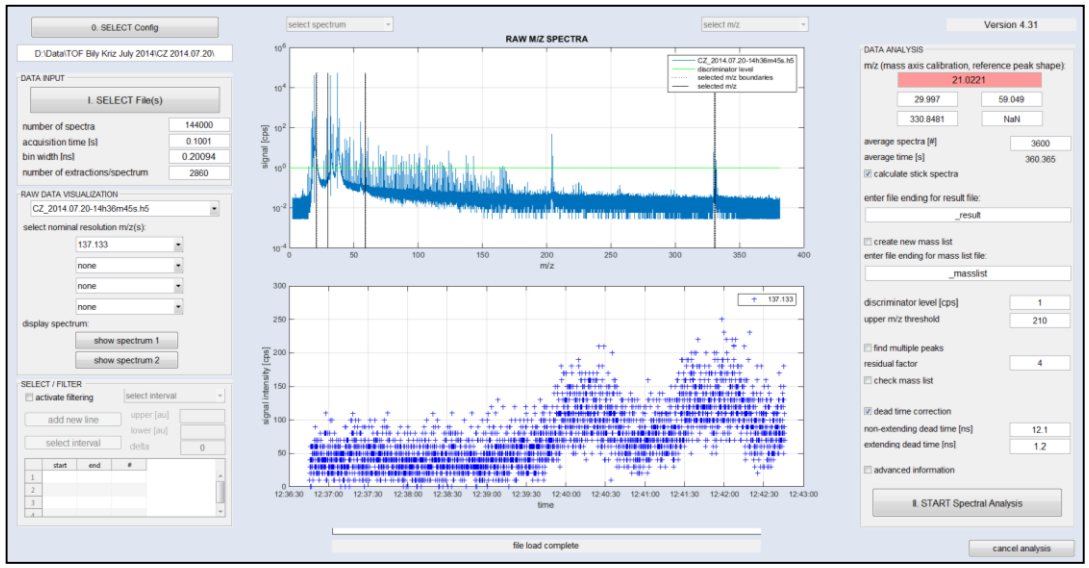
Guidolotti et al. 2017

Eddy Covariance: Fluxes at the end of the summer 2015



Guidolotti et al. 2017

PTR-TOF Mass Spectrometer coupled with Fast-GC



Agricultural and Forest Meteorology 216 (2016) 232–240

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Short communication

Does the novel fast-GC coupled with PTR-TOF-MS allow a significant advancement in detecting VOC emissions from plants?

Emanuele Pallozzi[a,*], Gabriele Guidolotti[a], Paolo Ciccioli[b], Federico Brilli[c], Stefan Feil[d], Carlo Calfapietra[a,e]

[a] Institute of Agro-Environmental & Forest Biology (IBAF), National Research Council (CNR), Viale Marconi 2, 05010 Porano, TR, Italy
[b] Institute of Chemical Methodologies (IMC), National Research Council (CNR), Via Salaria km 29,300, 00015 Monterotondo Scalo, RM, Italy
[c] Institute of Agro-Environmental & Forest Biology (IBAF), National Research Council (CNR), Via Salaria Km 29,300, 00015 Monterotondo Scalo, RM, Italy
[d] IONICON Analytik GmbH., Eduard-Bodem-Gasse 3, 6020 Innsbruck, Austria
[e] Global Change Research Centre, Academy of Sciences of the Czech Republic, v. v. i., Bělidla 986/4a, 603 00 Brno, Czech Republic

*Integration and comunication**: we need a net!***

Need of establishing a net of such innovative urban park sites because of:

- Interest in accounting C sink capacity of urban forests to be accounted in carbon credits strategy
- Interest in understanding interactions between anthropogenic and biogenic compounds in urban environments
- Interest in understanding pollutant mitigation potential by urban forests

COST FP1204
GreenInUrbs

www.greeninurbs.com

Green Infrastructure approach: linking environmental with social aspects in studying and managing urban forests (GreenInUrbs) 2013-2017

Chair: Carlo Calfapietra

GreenInUrbs structure and responsible people

- **Chair**: Carlo Calfapietra, IT; **Vice-Chair**: David Pearlmutter, IL
- **WG1** *Environmental services* of GI and UF and implications of climate change (R. Samson, B)
- **WG2** *Social/cultural services* of GI and UF (Liz O' Brien, UK)
- **WG3** *Governance* of UF in a GI approach (S. Krajter Ostoic, HR)
- **WG4** Task Force on *Integration and Dissemination* to stakeholders (G. Sanesi, IT)
- **STSM Coordinator**: Rocio Alonso, ES (funded more than 40 STSMs)

OBJECTIVES

- To ***collate*** recent (qualitative and quantitative) ***findings*** from national or international programmes about the **ecosystem services** provided by **GI** and **UF**.
- To ***compare*** different approaches and conditions (climatic, socio-cultural, economic and urban planning) in the countries involved, in order to ***develop*** best practice guidelines for GI managers and decision makers to assist in the maximization of benefits from GI and UF.
- To ***define*** environmental and social indicators and thresholds in order to improve the environmental quality of our cities, and consequently the quality of life of European citizens.
- To provide scientific evidence in order to implement those best practice into legislation both at local, national and European level
- To identify the main priorities and challenges in terms of future research on GI and UF

Workshops

CHAIRS AND SPEAKERS

Carlo Calfapietra is a researcher at the Italian National Research Council (CNR), Institute of Agro-Environmental & Forest Biology (IBAF) and Lecturer in Urban Forestry at University of Tuscia. His main interests are the biosphere-atmosphere interactions and the effects of global change and air pollutants on these with a particular focus on the biogenic VOC emission both in urban and rural environments. Dr. Calfapietra has published about 70 research papers on international journals books on these topics (H-index: 36). He is Member of the Editorial Board of some journals, Member of the Scientific Committee "Life, Environmental and Geosciences" of Science Europe, Chair of the COST Action FP1204 "GreenInUrbs" and member of the Centre of Excellence Czechglobe for the study of climate change (www.carlocalfapietra.com)

David Pearlmutter associate professor of architecture and urban planning at the Blaustein Institutes for Desert Research of Ben-Gurion University of the Negev in Israel. His research, which addresses problems related to energy, climate and sustainable development in the built environment, has resulted in the publication over 100 books and scientific articles on these topics as well as a number of "Best Paper" awards at international scientific conferences. These citations were given in recognition of his innovative approach to the modeling of micro-climatic processes in the urban environment, and his findings regarding the impact of urban design on pedestrian thermal stress – a long-running line of research, which has focused on the efficient use of trees and green infrastructure for climatic mediation. Editor of Urban Climate News; The Quarterly Newsletter of the International Association for Urban Climate and vice-chair of the COST Action FP1204 "GreenInUrbs"

Christos Fragakis is Deputy Head in the Unit of Sustainable management of natural resources which is responsible for innovating with nature and cultural heritage for environmental, social and economic sustainability and resilience as part of the societal challenge 5 on Climate action, environment, resource efficiency and raw materials Project and policy Officer in the Directorate General of Research and Innovation of the European Commission since 1997. He has been responsible for the RTD policy in a variety of sectors, such a Marine Science and Technology, Coastal engineering and protection, Integrated Coastal Zone Management, Water resources management and freshwater ecosystems and Nature-based solutions and Cultural Heritage for economic, social and environmental resilience. He did his undergraduate studies in Marine Engineering in the University of Newcastle upon Tyne (UK) and his graduate studies in Ocean Engineering at Massachusetts Institute of Technology (MIT), U.S.A.

Yongliang Liu elected Fellow of TWAS (The World Academy of Sciences); past President of Scientific Committee on Problems of the Environment (SCOPE); Science Advisor, International Union for Conservation of Nature (IUCN); Member of UNEP International Resource Panel; former member, ICSU (International Council for Science e) Committee on Scientific Planning and Review, Vice President, Ecological Society of China; Chair, Committee on Ecology and Environmental Sciences, Chinese Society for Sustainable Development. He has published more than 250 papers in peer reviewed journals and authored or co-authored 16 books. He is the founding Editor-in-Chief of Ecosystem Health and Sustainability jointly appointed by the Ecological Societies of America and China, Associate Editor of Science Advances, the Founder and Associate Editor of Environmental Development; Trans-disciplinary Journal of SCOPE. He has obtained various award such honors

Howard Neukrug (howardjpn@gmail.com) is a Senior Fellow at the US Water Alliance (USWA), an Advisor to the US Environmental Protection Agency and the US Forest Service, and an adjunct professor at the University of Pennsylvania where he teaches classes on "Water, Science and Politics", "Sustainable Cities" and "Future Trends in the Water Industry". He most recently retired as CEO of Philadelphia Water, a $1 Billion (USD) integrated drinking water, wastewater, stormwater and water resource public utility serving over 2 million persons in a city located between New York City and Washington, DC. The defining initiative in Howard's tenure as CEO is his 'Green Cities, Clean Waters' program that places an unprecedented reliance on innovative green infrastructure to managing urban runoff – in other words, plants instead of pipes. Mr. Neukrug is a Professional Engineer, Board Certified Environmental Engineer and an honorary Diplomat of the American Academy of Water Resources Engineers.

Anna Sheldon is running Dr. Steidle Consult – a consulting firm for the Management of Urban Green Areas in Cities. Educated as landscape architect she studied additional business-administration and published a Thesis about the Management of the Maintenance of Urban Green Areas well known in the German Speaking Countries, as well as several publications and presentations of applied research. She is working as a researcher for Policy and Administration of Urban Greening, and took part at several EU Cost Actions. She taught Economics of Parks at Technical University Munich, University of Applied Science Weihenstephan and is currently teaching at ZHAW Zürich/CH. She is Chair of the Europe Region of World Urban Parks, Member of the Board of World Urban Parks and Member of the Working Group for Applied Research of World Urban Parks.

Josep Acebillo is currently a Professor at the Accademia di Architettura di Mendrisio, in which he was Dean of the Faculty during two consecutive mandates and where since 2004 he directs the Institute for the Contemporary Urban Project. From 2000 to 2011 he was directing the USUM – Urban Systems and Urban Models research project that forms part of the SCPA (Swiss Cooperation Program in Architecture in collaboration with Federal Institute of Technology in Zurich (ETH) and in Lausanne (EPF). Since 2010 he has been directed the five Doctoral Thesis in different research lines of Urban Studies. He also taught in several architecture schools. In 2010 he was one of the founder of Barcelona Institute of Architecture, whereunit 2012 he directed the Chair of Urban Design and was the member of Academic Board. In 2014 he was nominated as Honorific Professor in Kean State University of Architecture and Engineering. He has received world wide recognition for the positioning of the city in the International architecture scene

Clive Davies is an international consultant on urban forestry and green infrastructure. He is a EU Expert on Green infrastructure, Director of technopreneurial SME, MDZ Consulting Ltd, and a Research Fellow at Newcastle University, UK. He has at various times, advised, worked for or presented to UN FAO, European Commission, numerous local municipalities, CAEE and ENSOs. He has also contributed to books, organised conferences, written academic papers and given key note speeches. His experience dates back to the the early 1990s when he first encountered urban forestry via urban conservation. 35 years on he now sees his main mission as passing on his Da experience to the next generation, as well as earning enough to fund his passion for Jazz music!

Rostand Samson obtained his PhD on measuring and modelling forest evapotranspiration (2001, Ghent University, Belgium). In 2009 he was appointed (2009) at the University of Antwerp, where he heads the Department of Bioscience Engineering. His Laboratory on Environmental and Urban Ecology deals with (1) urban ecophysiology and plant-atmosphere interactions, (2) plant-based biomonitoring of urban air pollution and (3) urban ecology; all approached from an experimental and modelling perspective. Moreover, he has major experience in citizen science projects on air quality. Air pollution monitoring focuses on particulate matter, mainly assessed via an environmental magnetic approach. He is author of about 90 peer reviewed articles, 15 defended PhDs and several national and international projects. He is actively involved in the COST-action FP1204 GreenInUrbs, leading WG1 on environmental services of urban green and forestry and implications of climate change.

Natalie Gerstel is an Assistant Professor at the University of Copenhagen, Department of Geosciences and Natural Resource Management, Section for Landscape Architecture and Planning. Her research focuses on exploring the connections between competitive urban governance, urban sustainability and the role of urban green spaces in green infrastructure policy. Natalie has a PhD from the University of Copenhagen in urban green space governance and a Master in Public Administration from the University of Washington Evans School of Public Policy and Governance with a focus on urban sustainability

Claudia Cenedi currently holds the established chair of «Political Economy of Sustainable Tourism» at the Faculty of Economics, SAPIENZA University of Rome. He is Director of the Research Centre on European, International and Development Studies (EuroSapienza). He is also faculty member of the Departmento of Economics and Law

Alice Aureli PhD in Hydrogeology, works in the UNESCO Water Sciences Division since 1989. Chief of the Groundwater Systems and Settlements Section of UNESCO's International Hydrological Programme. Responsible for the International Shared Aquifers Resources Management (ISARM) program. This role has led her to supervise the work of the international expert group that advised the UN International Law Commission to prepare the Draft Articles on the Law of Transboundary Aquifers. An important aspect of her work has been on scientific and policy-related issues surrounding groundwater governance and groundwater management in rural and urban areas. Author of a large number of publications she has also served as editor of various international journals. Collaboration and research interests: water security, ground water governance and so on

Anna Pratt is Head of Large scale Urban Projects for the City of Torino (2011) and Director of the Associazione Torino Internazionale (2012). She assisted Mayor Piero Fassino's administration and all key local stakeholders in developing the "Torino Metropoli 2025" strategic plan, and is currently managing the implementation process. Anna was project manager at Finpiemonte Spa, the investment arm of the Piedmont Region. Previously, she was a Principal Associate at Locum Consulting (London), supporting business in resorts and mixed-use developments. Anna also freelanced in Torino on a variety of urban and real estate projects. At the beginning of her career, Anna worked as an economic planner for De Anup & partners (London) and as a project manager at Ecosfera spa (Rome). She was a University lecturer in Italy for three years on tourism destination planning. She holds a degree in Architecture and a Master in Urban and Regional Planning from the London School of Economics. She is a chartered architect and urban planner.

Maura Barosso PhD, architect, is an Associate Professor in the School of Architecture and Design at RMIT University, where he is the Deputy Dean of International. He is a member of the School executive committee, and Q Lab-Centre of Design Practice Research through which he leads consulting projects in partnership with industry and government bodies. He is a director of Barosso + Wright Architects. His research explores states of integration between open and built spaces, and valued and absent environments, spanning from large territorial urban to small site scales. Maura's projects and writings have been widely published in books and journals (Domus, Abitare, Casabella, Au), Transition, Architecture Australia among others), exhibited and awarded nationally and internationally and presented at conferences and symposia.

Francesco Rutelli is an Italian politician, today co-President of the European Democratic Party (member of the EP 1999-2004); he was serving as Deputy Prime Minister and Minister for Culture and Tourism (2006-2008). Six times elected to the Italian Parliament (1983-2013), he was the first Mayor of Rome directly elected by the citizens (1993-2001), setting the record for the highest popular vote in the history of the Italian capital city (990.000 votes). In 1999 he founded the Centro per un Futuro Sostenibile - Center for a Sustainable Future – which nowadays brings prominent Italian economists, scientists and multi-partisan politicians together promoting initiatives on global environment and Climate change. Among his environmental achievements, he was a promotor of the Montimal Treaty Ratification Bill in the Italian Parliament. He contributed to the establishment of the Valle Averto (Venice Lagoon) and the Valli di Comacchio natural reserves and to the approval of a new Rome City Plan, dedicating over 50% of land to green and agricultural areas, and creating dozens of new public Parks. He enacted a new national Landscape Code; his Law n. 113 of 1992, mandates to plant a tree for every child born, (during his tenure as a Mayor, 120.000 trees were planted only in the City of Rome). Currently, he co-chairs at SIOI the Master in Sustainable Development, Geopolitics and Arctic Studies.

Franco Zagari, architect and landscape designer, is professor ad AD of the University Sapienza, Rome. He is author of many completed projects in Italy and abroad, awarded and published, such as "Giardino Italiano" in Osaka 1990, "Piazza Montecitorio" in Rome 1998, "Les Abords de la Basilique de Saint-Denis" 2003-2007, "Piazza Mattei" in Catanzaro 2015, "Hortus" with Pan Associati for Expo Milano 2015 during which he was the Artistic Director for Landscape design project, "Parco della Pace" in Vicenza 2015. He is author of studies, films, researches and essays regarding landscape, such as Questo paesaggio. 48 definizioni, Rome 2006, Giardini. Manuale di progettazione, Rome 2009, Sul paesaggio. Lettera aperta, Melfi 2015, Moving Forest. Expo Milano 2015 Landscape, Melfi, 2015, Canzando con Borges. Piazza Mattei a Catanzaro, Melfi, 2015. Chevalier des Arts et Lettres (Ministry of Culture, France), Gubbio European Prize 2008, President of the Jury of the 6th European Landscape Biennial of Barcelona, career award Rom Architettura 2014.

Liz O'Brien has worked for Forest Research, the research agency of the Forestry Commission in Great Britain, since 2000 and is head of the Social and Economic Research Group. Her research experience and interest concerns the cultural ecosystem services and well-being benefits that people gain from engagement with trees, woodlands and green spaces at a variety of different levels of participation from hands on engagement, such as volunteering, to using and being in woodlands. This aspect of her work focuses particularly on health and restoration in terms of physical and mental health, and also on outdoor education and learning particularly through the Forest School approach to learning. Liz focuses on engagement and well-being across the urban and rural continuum. She is interested in how the benefits people gain can potentially lead to wider impacts on individuals lives, and community development and capacity.

Giovanni Sanesi full professor at the University of Bari in Forestry, Urban Forestry and Wild fires prevention, Member of the Directive Board of Italian Society of Silviculture and Forestry Ecology (SISEF), Chair of Working Group on Applied Research of World Urban Parks. He is active in Urban Forestry: Lit. 6.14.00 and 8.01.02 Landscape ecology of the International Union of Forest Research Organizations (IUFRO). Member of the Editorial Board of the Urban Forest and Urban Greening (Elsevier) and Italian Journal of Forest and Mountain Environments. Authors of 170 scientific paper

Célia Siewé Since 2014, she occupies the position of Paris Deputy Mayor of the Environment, Sustainable Development, Climate Plan for Energy, Hydric resources and counselor of Paris. In 2014, she was elected President of the Board of "Eaude Paris", municipal control of production and distribution of water in Paris. She obtained a degree from the Strasbourg Institute of Political Studies in 2003. Member of the Green Party since 2006, she is particularly active in matters such as housing, health, and environment. She has worked for the INPES, the National Institute for Health Prevention and Education, as responsible for national communication campaigns relating to the use of alcohol, and addictions. In 2008, she was elected as counselor of the City of Paris' 14th district; assuming the delegation for green areas and mobile telephony. During her term of office, she worked for the development of community gardening and to help initiating public debate on the conciliation of new technologies with health issues.

Marin Jaakkola is a landscape architect (M.Sc.) with a diverse background in both private and public sectors. She works as the head of the Environmental Office in the City Planning Department of Helsinki, Finland. Leading a team of landscape architectural, architectural preservation and research expertise since 2018, she has developed the discipline of landscape planning as an integral part of city planning, from overall land use strategies to detailed design. Jaakkola is currently working on the second phase of Helsinki Green Areas Strategy, in conjunction with the new Helsinki Master Plan, to define the future of the city's green areas network. She was recently awarded the Loeb fellowship of advanced environmental studies at the Graduate School of Design at Harvard University. Her career as an exhibiting artist has also been noted internationally, as an integral part of her endeavors as a shaper of new cities.

Liora Meron received her architectural and planning degree in 1973 from the School of Architecture and Planning at the Technion – Israel Institute of Technology – and her MA degree in 1994 from the College of Architecture, Planning and Landscape Architecture at the University of Arizona. Her work experience includes various architectural projects as well as town and environmental planning for the public and private sectors in Israel, Madrid - Spain, London, Chicago and NY.
Major projects in the last ten years in Israel include: Master Plan for the Metropolitan Area and the City of Beer Sheva, Urban Renewal Plan of the Central Town of Beer Sheva, and many other sin the last 4 years. Liora has been invited to talk about her projects in Israel and in several universities in the US including U of Colorado-Boulder, UC Davis, UC Berkeley, and U of New Mexico.

Tom Armour is a Director at Arup, and leads the landscape architecture business at Arup (which he founded in 1990). He works with clients and on projects around the world, on regional strategies, masterplanning and the design and delivery of major infrastructure projects, new parks, public realm and public spaces. works with academic institutions on research projects, and is also involved in teaching and examination work. His approach to projects and research work encompasses today's urgent sustainability challenges; creating more liveable cities for people, designing in resilience to climate change and promoting green + blue infrastructure, biodiversity and well-being – this approach is presented in Arup's influential and multi award winning 'Cities Alive' report for which he was the lead author: www.arup.com/Homepage_Cities_Alive.aspx.

COST FP1204
GreenInUrbs

Training Schools

Alnarp (Sweden 2014)
Pieve Tesino (Italy 2015)
Duisburg (Germany 2016)

Focus on practical training

In each school
20 grants 600 € each

Practictioners,
Managers, Students,
Post-doc

Publications

Functional traits of urban trees: air pollution mitigation potential

Rüdiger Grote[1*], Roeland Samson[2], Rocío Alonso[3], Jorge Humberto Amorim[4], Paloma Cariñano
Galina Churkina[5], Silvano Fares[7], Didier Le Thiec[8], Ülo Niinemets[9], Teis Norgaard Mikkelsen[10]
Elena Paoletti[11], Abhishek Tiwary[12], and Carlo Calfapietra[13,14]

In an increasingly urbanized world, air pollution mitigation is considered one of most i
city planning. Urban trees help to improve air quality by facilitating widespread depositi
and particles through the provision of large surface areas as well as through their influenc
and air turbulence. However, many of these trees produce wind-dispersed pollen (a kn
emit a range of gaseous substances that take part in photochemical reactions – all of wh
affect air quality. The degree to which these air-quality impacts are manifested depends
tree properties: that is, their "traits". We summarize and discuss the current knowledge
affect urban air pollution. We also present aggregated traits of some of the most comm
Europe, which can be used as a decision-support tool for city planning and for improvin
models.

Front Ecol Environ 2016; 14(10): 543–550, doi:10.1002/fee.1426

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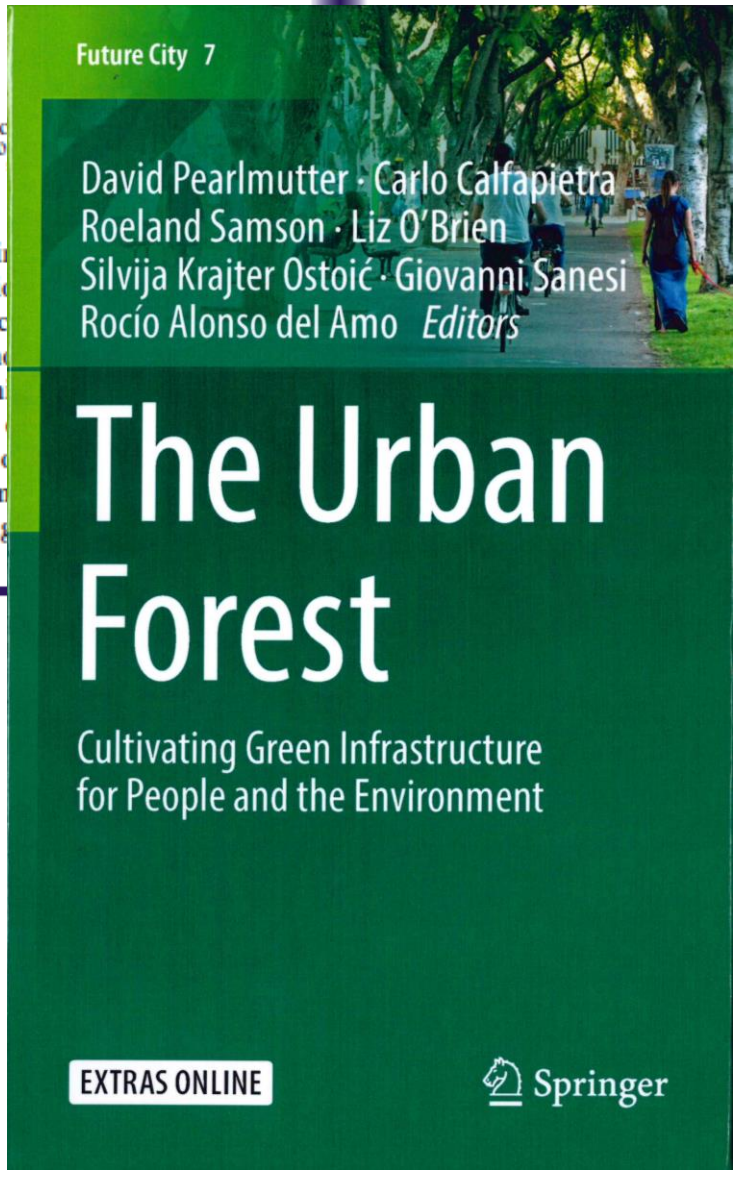
The Urban Forest

Cultivating Green Infrastructure for People and the Environment

Editors: **Pearlmutter**, D., **Calfapietra**, C., **Samson**, R., **O'Brien**, L., **Krajter Ostoić**, S., **Sanesi**, G., **Alonso del Amo**, R. (Eds.)

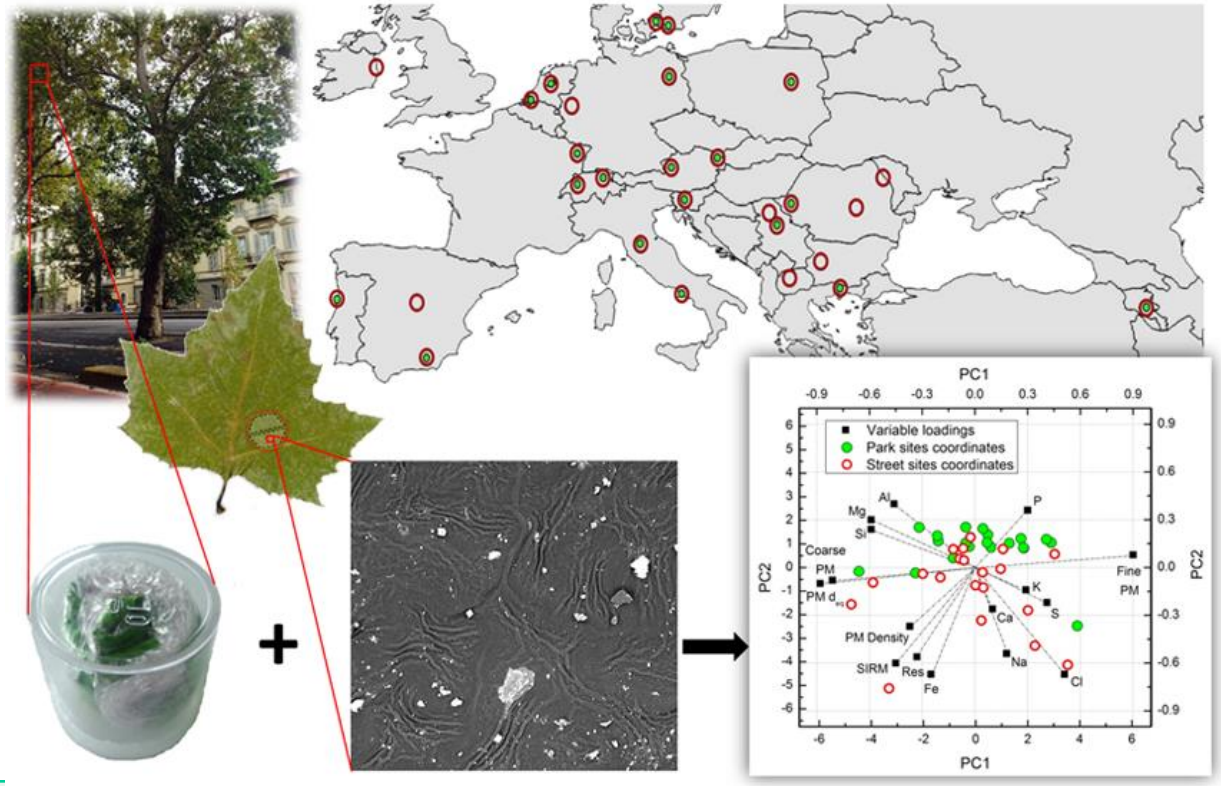
Provides the first comprehensive catalog of tree species that is cross-correlated with the ecosystem services they provide in different regions of Europe

» see more benefits



COST FP1204 GreenInUrbs

Participation to the sampling campaign on PM deposition on plane trees across Europe



SIRM (Saturation isothermal remanent magnetization) + SEM-EDX analysis

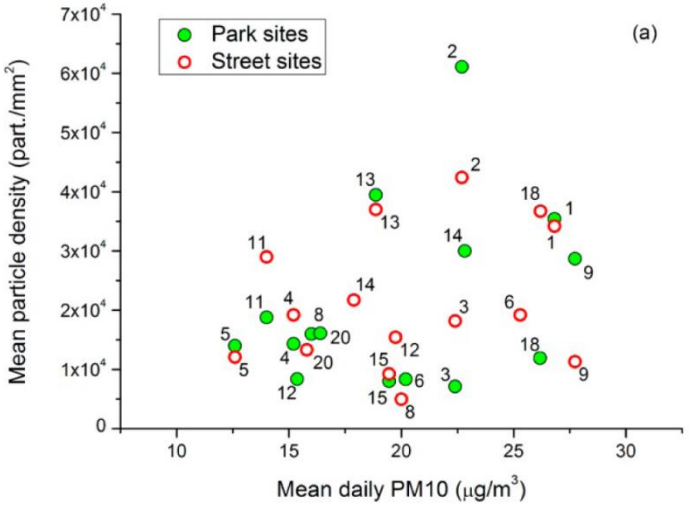
Antwerp (BE)	Copenaghen(DK)	Ljubljana (SI)	Timisoara (RO)
Aveiro (PT)	Den Haag (NL)	Malmo (SE)	Vienna (AT)
Belgrade (RS)	Florence (IT)	Nancy (FR)	Warsaw (PL)
Berlin (DE)	Granada (ES)	Naples (IT)	Yerevan (AR)
Bern (CH)	Kavala (GR)	Salzburg (AT)	Zurich (CH)

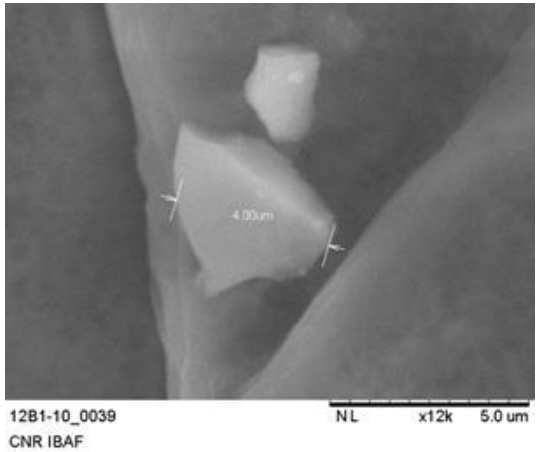
✓ 17 Countries
✓ 20 Cities
✓ 25/08/14 – 15/09/14

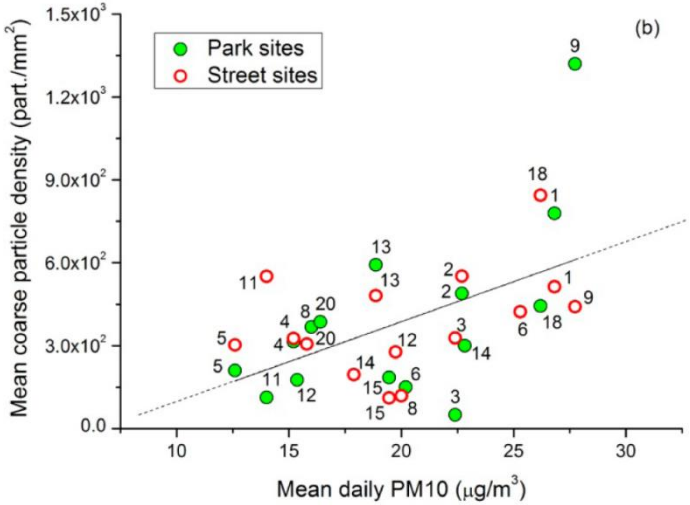
Baldacchini et al, 2017, Environmental Science & Technology

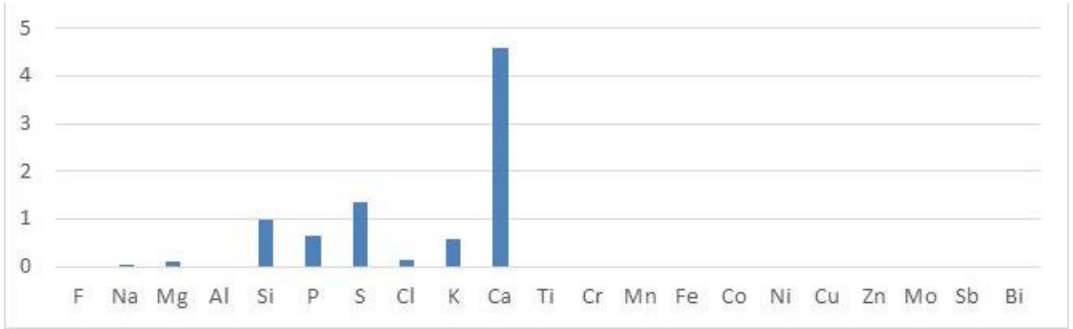
Common European Sampling Campaign

SEM-EDX analyses





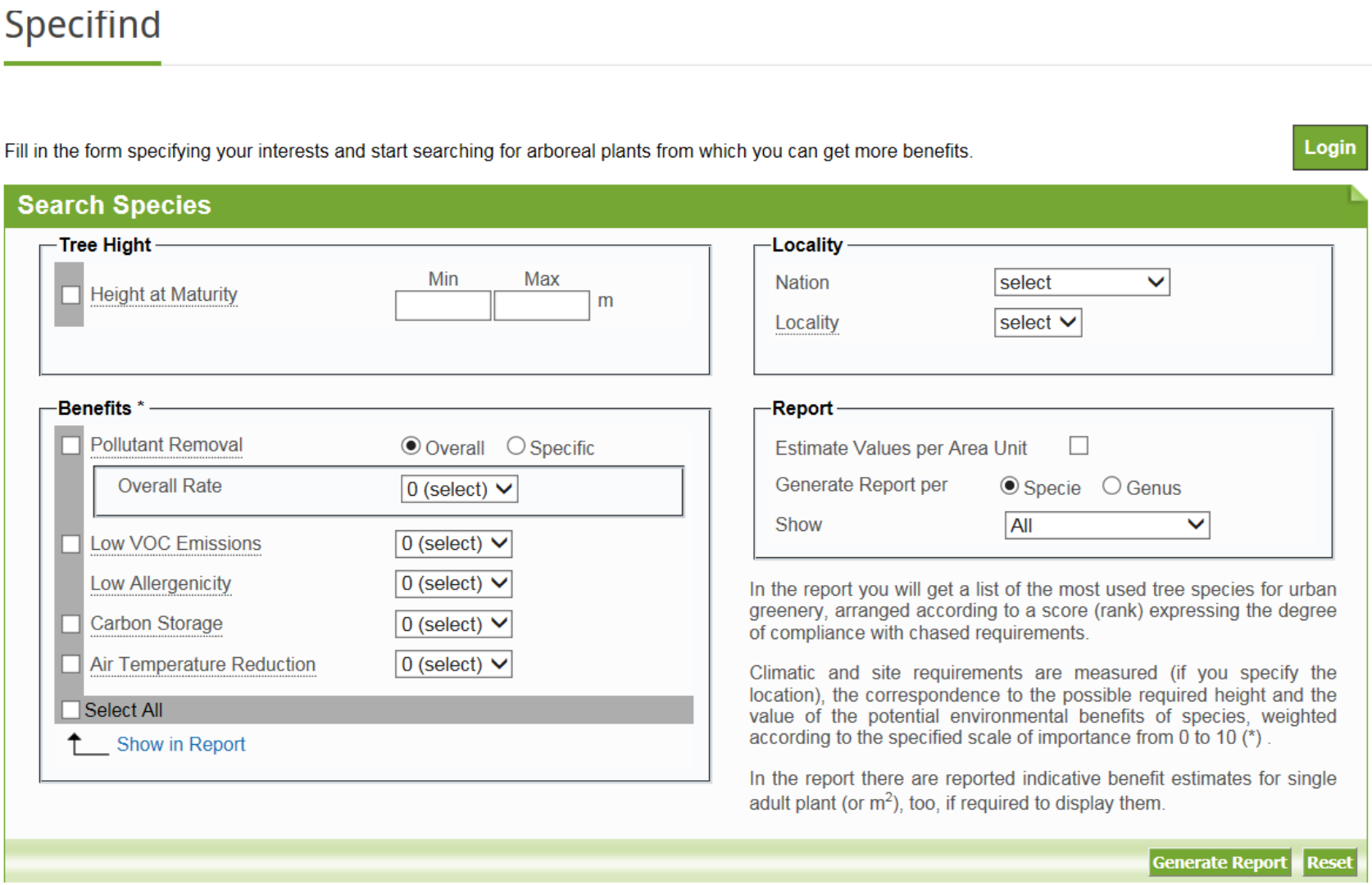




Baldacchini et al, 2017, Environmental Science & Technology

Applications

SPECIFIND: Choose the Best TREE SPECIES for Your City



COST FP1204
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www.greeninurbs.com

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COMUNE DI ORVIETO

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

COST FP1204 GreenInUrbs

GREEN INFRASTRUCTURE: NATURE BASED SOLUTIONS FOR SUSTAINABLE AND RESILIENT CITIES

4-7 APRIL 2017
ORVIETO, ITALY

PALAZZO DEI CONGRESSI (PIAZZA DEL POPOLO)
WWW.GREENINURBS.COM/FINALCONFERENCE

A new orientation of EU R&I policy under H2020 Horizon 2020 Societal Challenge 5

- *From understanding problems to investing in innovation to deliver solutions to societal challenges*
- *Moving **Nature-based Solutions** forward to transform **challenges** into **innovation opportunities** for sustainability, resilience, growth and jobs in:*
  1. ***Smart and Sustainable Cities***
  2. ***Territorial Resilience***
  3. ***Resilient Cultural Landscapes***

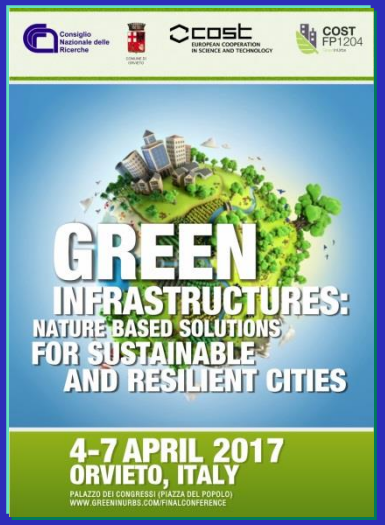
Sessions (Final Conference)

- Implications of GI on air quality
- GI for water and soil management and remediation
- GI for climate regulation and climate change resilience
- Biodiversity and ecological implications of GI
- Health focused GI - enabling healthy and active lives
- Engaging communities and partners to participate in the co-production of GI
- New governance and funding models for GI
- Science-policy implications of GI
- Economic impact of GI for resilient and sustainable cities
- GI in future urban planning
- Assessing and mapping Ecosystem Services generated by urban GI
- Sustainable management of GI

Scientific Committee
Carlo Calfapietra
David Pearlmutter
Roeland Samson
Liz O'Brien
Silvija Krajter
Giovanni Sanesi
Rocio Alonso
Enrico Brugnoli
G.Scarascia Mugnozza

Final Conference: Venue – *Orvieto (Italy)*

Palazzo del Governatore



GreenInUrbs Final Conference

- ***17*** Keynote Speakers
- ***186*** Oral presentations
- ***100*** Posters
- More than ***400*** registered people
- A number of side events
- UFUG Special Issue
- ***4*** awards for best poster and presentations

(Congrats to Beatriz Castiglione!!)

Thanks to all people of Calfapietra Lab

Chiara Baldacchini, Researcher
Lucia Cherubini, Project manager
Giovanni de Simoni, Technician
Raffaela Esposito, phD
Olga Gavrichkova, Researcher
Gabriele Guidolotti, Researcher
Corrado Leone, Technician
Michele Mattioni, engineer
Mauro Medori, phD
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Claudia Tarmati, master student