

Biocities - forests transforming urban living

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ACCADEMIA NAZIONALE DEI LINCEI

International Conference

Global Forest and Tree Restoration

Rome, 11 - 12 October 2022

UNDER THE HIGH PATRONAGE OF



Presidenza della Repubblica Italiana

AND WITH THE PATRONAGE OF

MINISTERO DELLE POLITICHE
AGRICOLE, ALIMENTARI E FORESTALI

MINISTERO DELLA
TRANSIZIONE ECOLOGICA

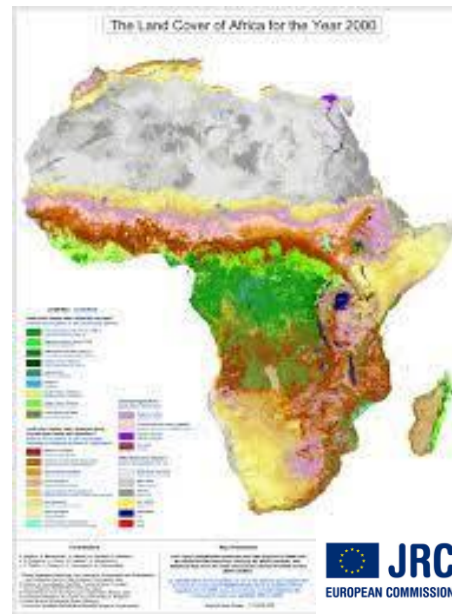
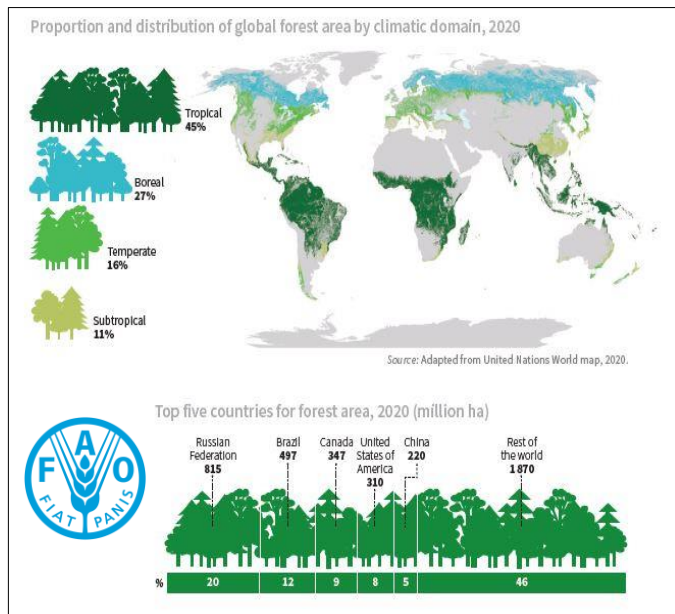
KNOWLEDGE PARTNERS



Cooperation on Global Forest Monitoring, Conservation and Restoration

The role of FAO, UNFCCC, Research institutions, NGOs

Definitions, transparency, open data



In summary, although the quality and quantity of LULUCF data in NGHGs improved considerably in recent years, our database highlights that some **important gaps still remain**, especially in non-Annex I countries.

Carbon fluxes from land 2000-2020: bringing clarity on countries' reporting
G. Grassi *et al.* 2022 *Earth System Science Data*

G20 Chair's Summary

Joint Environment and Climate Ministers' Meeting

2. We will actively promote and increasingly mainstream ecosystem restoration, including land and forest restoration on all types of ecosystems by involving public private partnership, into recovery policies and plans, in line with the UN Decade on Ecosystem Restoration 2021-2030 which encompasses protection, conservation, restoration, and sustainable land management in pursuit of fighting climate change and halting biodiversity loss. G20 members that have endorsed the Glasgow Leaders' Declaration on Forests and Land Use, made at UNFCCC COP26, remain committed to working collectively to reduce and reverse forest loss and land degradation by 2030 while delivering sustainable development and promoting an inclusive rural transformation.
7. We acknowledge the importance of strengthening the G20 support to existing global initiatives for sharing experience and knowledge, enhancing capacity building, coordination, and synergy in tackling desertification, land degradation and drought and its links with all ecosystem loss and degradation, and deforestation, especially of primary forests and other unique ecosystems. Such exchanges between existing initiatives should be further developed for learning and exchanging experiences and best practices, conservation, restoration, and sustainable management, sharing expertise and networking in undertaking and up-scaling restoration.

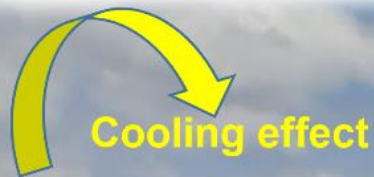
But Climate Change to be tackled also by abating C-emissions in cities

2/3 World energy, 70% greenhouse gas emissions

Source: https://www.main-spitze.de/panorama/aus-aller-welt/hoch-hoher-frankfurt-es-gibt-immer-neue-hochhauser_18571440



A city is a complex ecosystem where climate and environment are influenced by buildings and roads, heating system and cars. Also, they interact with plants, trees and urban forests..... and with human population!!



Photochemistry: Ozone & aerosols formation



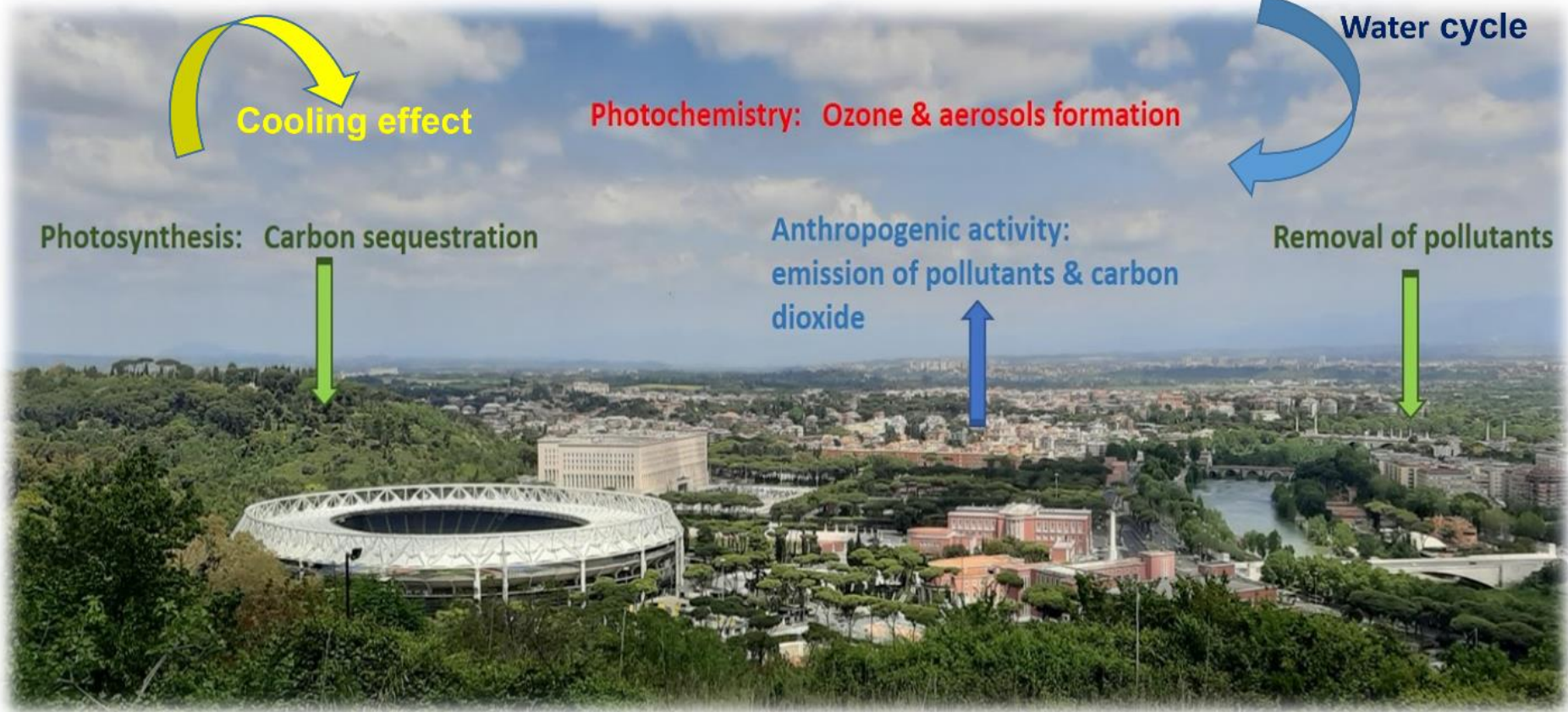
Photosynthesis: Carbon sequestration



Anthropogenic activity: emission of pollutants & carbon dioxide

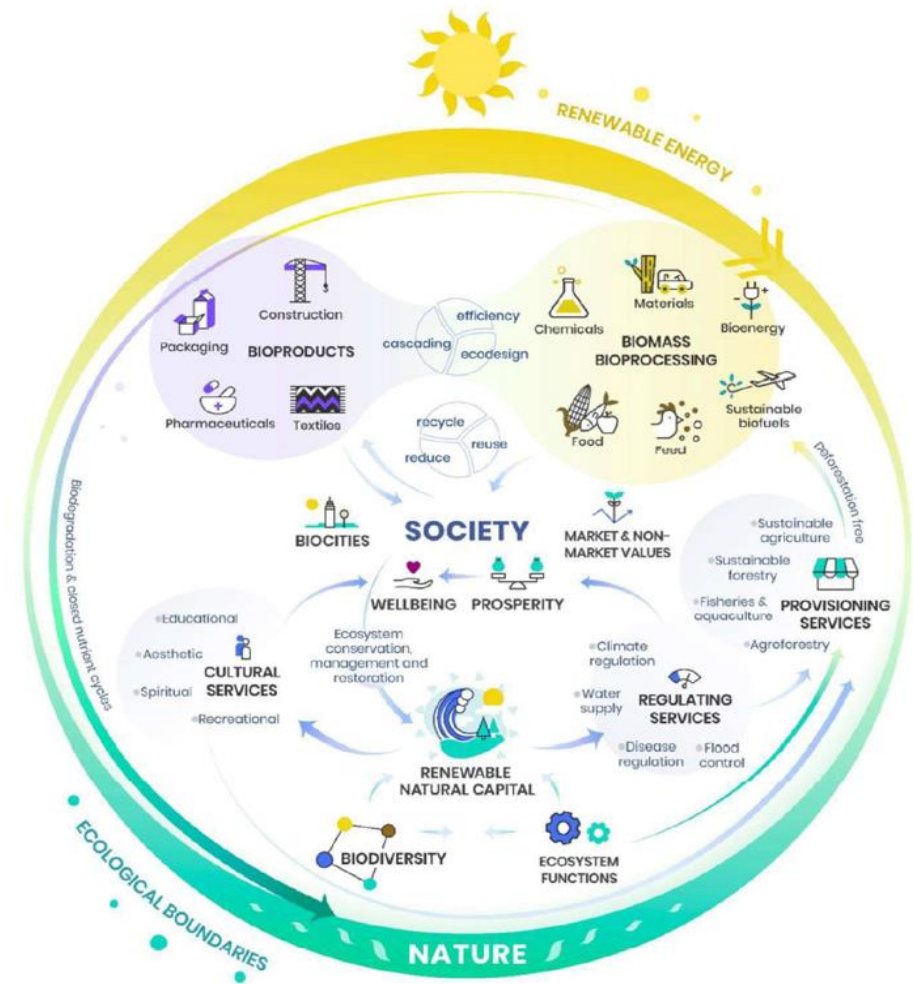


Removal of pollutants



The Concept of BioCities

- Rethinking urban development - a green accord for future Cities
- Cities like natural systems based on renewable matter and energy fluxes
- The City of the future will be an integrated part of the forest
- The need for social-ecological research towards BioCities

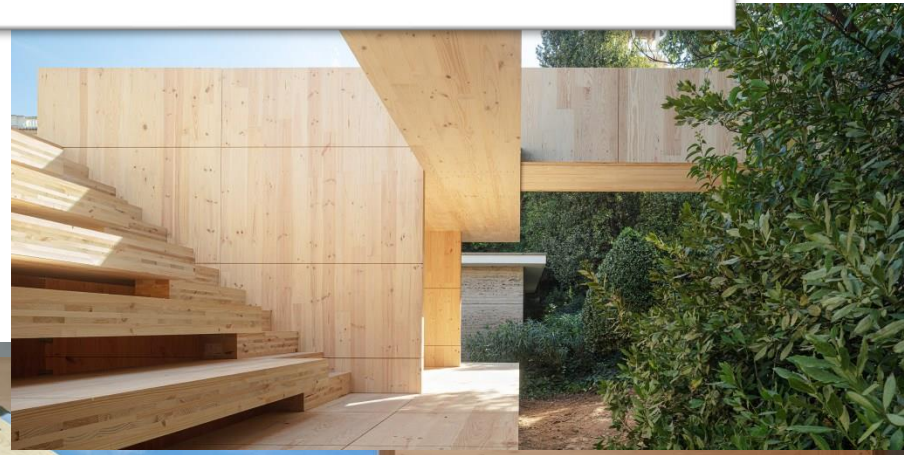




European Forest Institute

Biocities: Placing Nature and People at the Centre of the Urban Environment

New EFI Facility in Rome



Bosco Verticale, Milan

Architecture

Spatial planning

Biodiversity

City planning & design

Construction models

Governance

Urban lifestyle

Economy

and more...

...to BIO-resilient-CITIES!

Source: <https://living.corriere.it/tendenze/architettura/bosco-verticale-milano-10-cose-che-non-sapete/>

***BioCities* not only trees and urban greening but...
cities functioning as forest ecosystems, founded upon
*Nature Based Thinking***



Urban Forestry



Timber Construction



Urban Agriculture



Circular Bioeconomy



Green Public Space



Urban Health

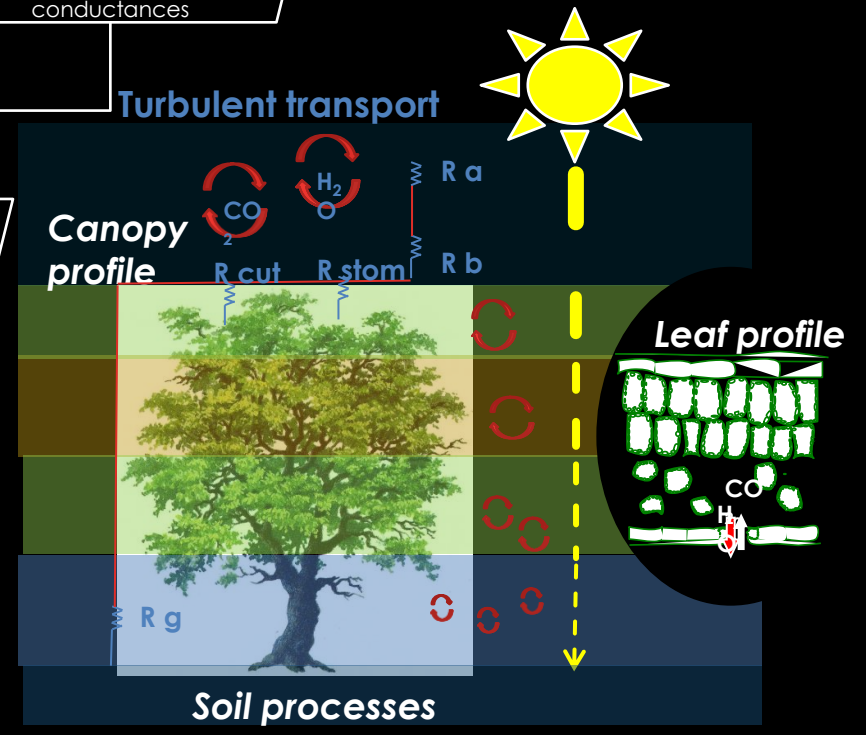
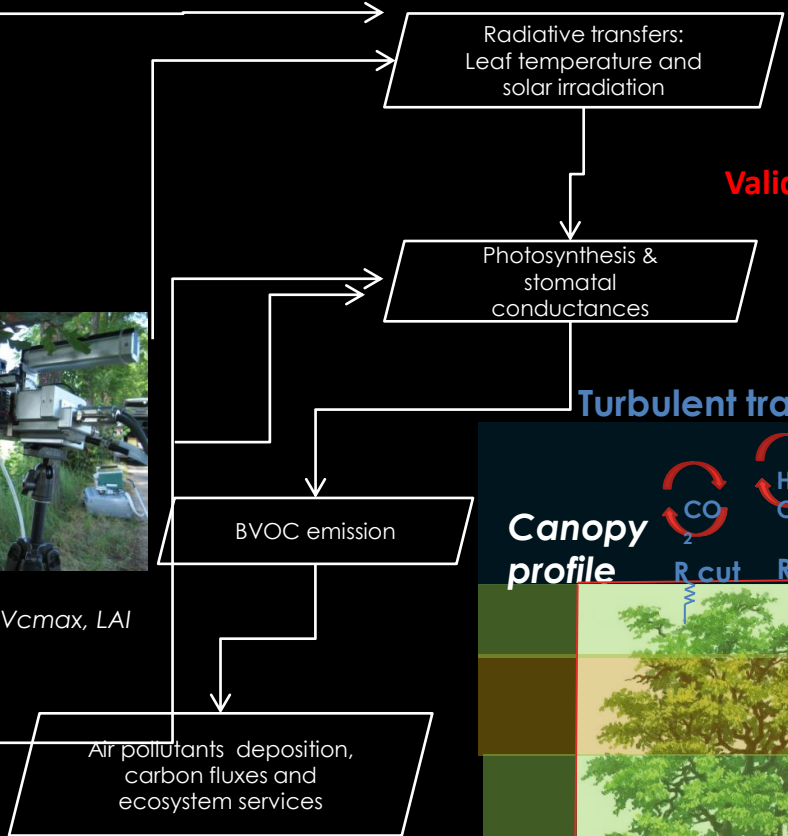
AIRTREE- multi-layer model parameterization with ground-level and proximally sensed data

Ancillary data measured in proximity of study site: *Pollutant concentrations, meteorological parameters, vegetation type*



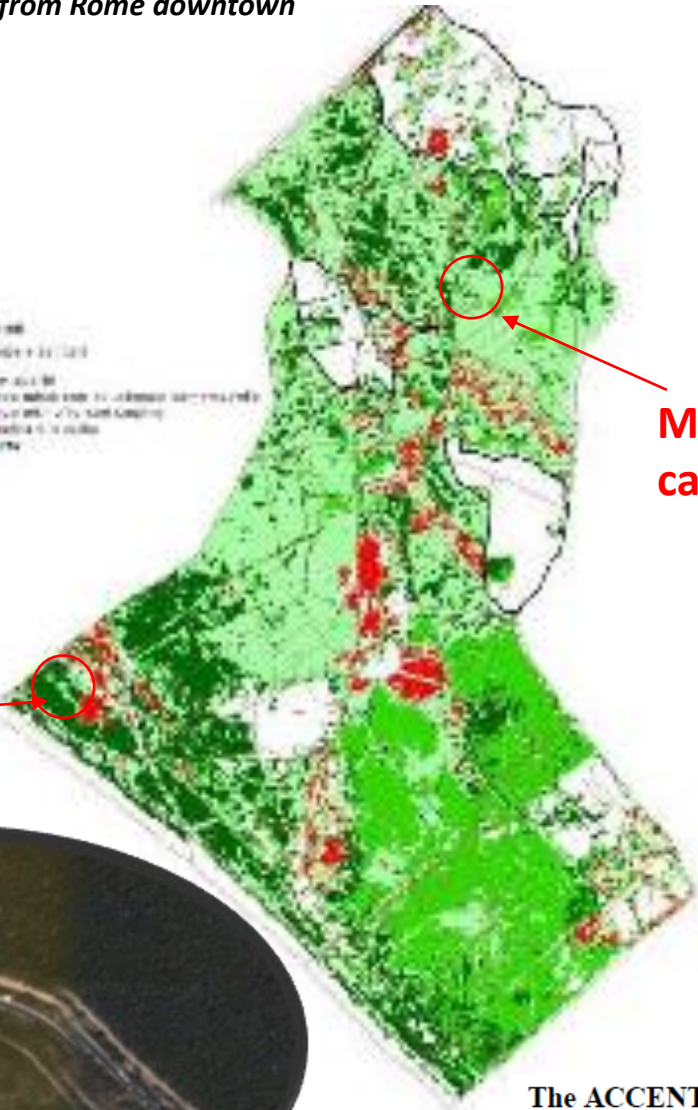
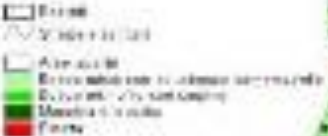
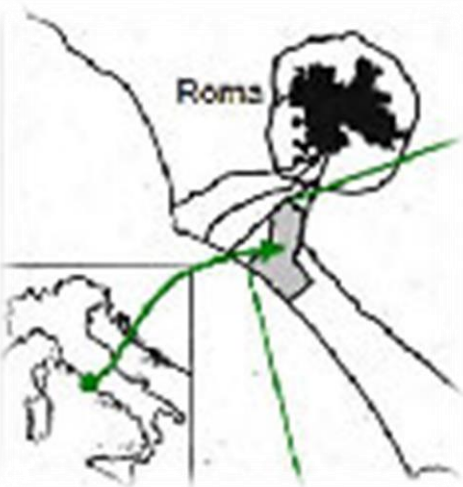
Photosynthetic parameters, V_{cmax} , LAI

Literature



Castelporziano, a urban forest of Rome

~ 6000 ha, 25 km from Rome downtown



Dune coastal site in 2007 field campaign



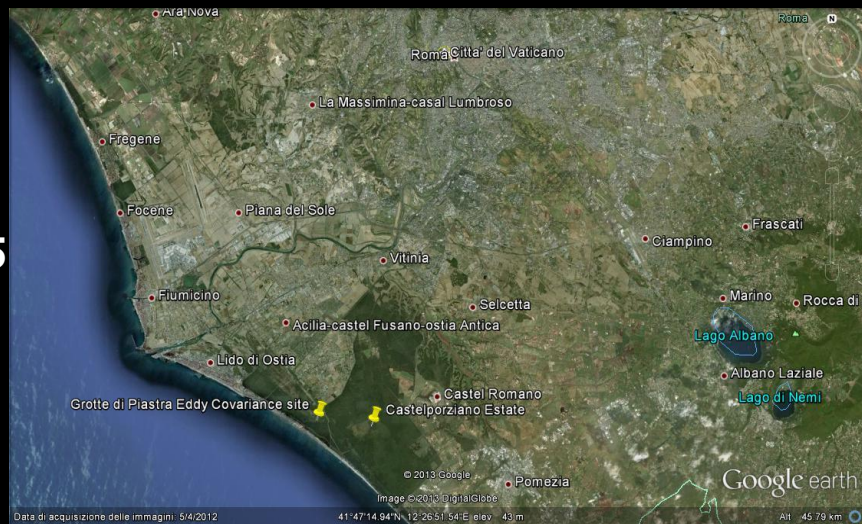
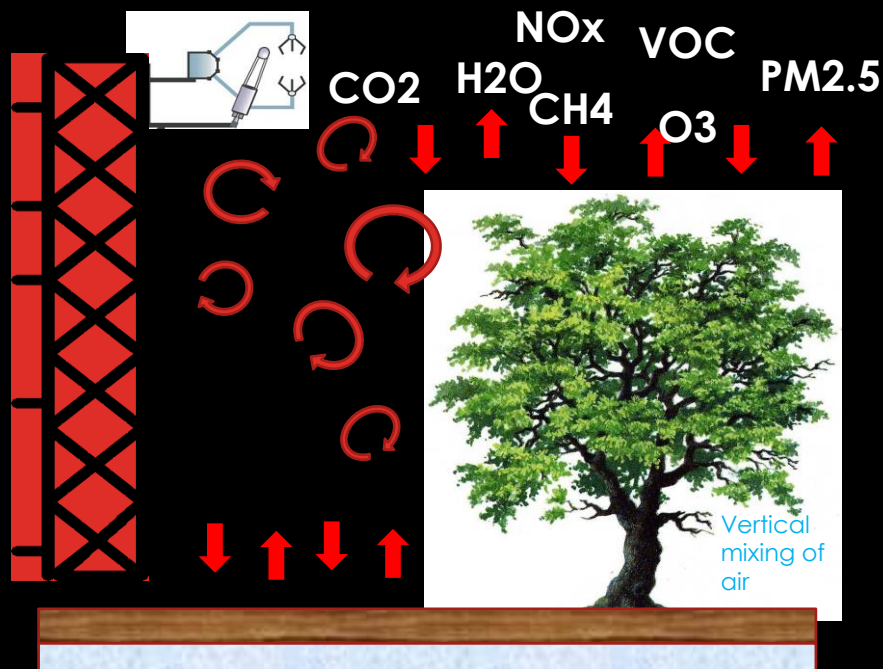
Mixed Oak & pine site in 2011 field campaign



The ACCENT-VOCBAS field campaign on biosphere-atmosphere interactions in a Mediterranean ecosystem of Castelporziano (Rome): site characteristics, climatic and meteorological conditions, and eco-physiology of vegetation

S. Fares^{1,2}, S. Mereu³, G. Scarascia Mugnozza¹, M. Vitale³, F. Manes³, M. Frattoni⁴, P. Ciccioli⁴, G. Gerosa⁵, and F. Loreto¹

Model validation: Continuous Eddy Covariance flux measurements



Fluxes are measured from the eddy covariance (EC) between vertical wind speed and gas concentration (O_3 , VOC, CO_2 , H_2O), with observations 10 times per second

ICOS

INTEGRATED
CARBON
OBSERVATION
SYSTEM

Forest bioeconomy: the advantages of wood construction



- Excellent resistance to earthquake, low damages, lighter than other material
- Rapidity of construction
- Environmental sustainability
(ex. substituting concrete by 1m³ of wood = saves 1 tonne of CO₂)



***Test on vibrating table to simulate KOBE earthquake
2007, Miki (Japan), Progetto SOFIE (Italy)***

(from CNR-BIOECONOMY INST.)

An aerial photograph of a large, historic building complex, likely a university or government building, surrounded by lush greenery and trees. The building has a prominent central tower and multiple wings. The surrounding area is filled with mature trees and well-maintained lawns.

Thank you

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