



# Carbon and water fluxes in mountain forest and grassland ecosystems from leaf to ecosystem level: effects of climate variability and management

Participants: CNR IBAF, ARPA, UNITUS

Bologna, 22 Maggio 2014



## Objectives :

- To bring together CO<sub>2</sub>, H<sub>2</sub>O and CH<sub>4</sub> eddy fluxes from a number of long-term eddy covariance stations located in Alpine and Apennine forest and grassland ecosystems:
  - consolidation of an on-going network of mountain eddy covariance stations
    - harmonization of the already available data
      - definition of a common protocol
      - performing of new measurements
- To perform new research activities on some aspects of mountain ecosystem functioning under changing climate and anthropic pressure.

**Modeling:** The data could be utilized for validation and tuning of global climate models, mesoscale and weather models, biogeochemical and ecological models, and remote sensing estimates from satellites and aircraft.

## Collelongo

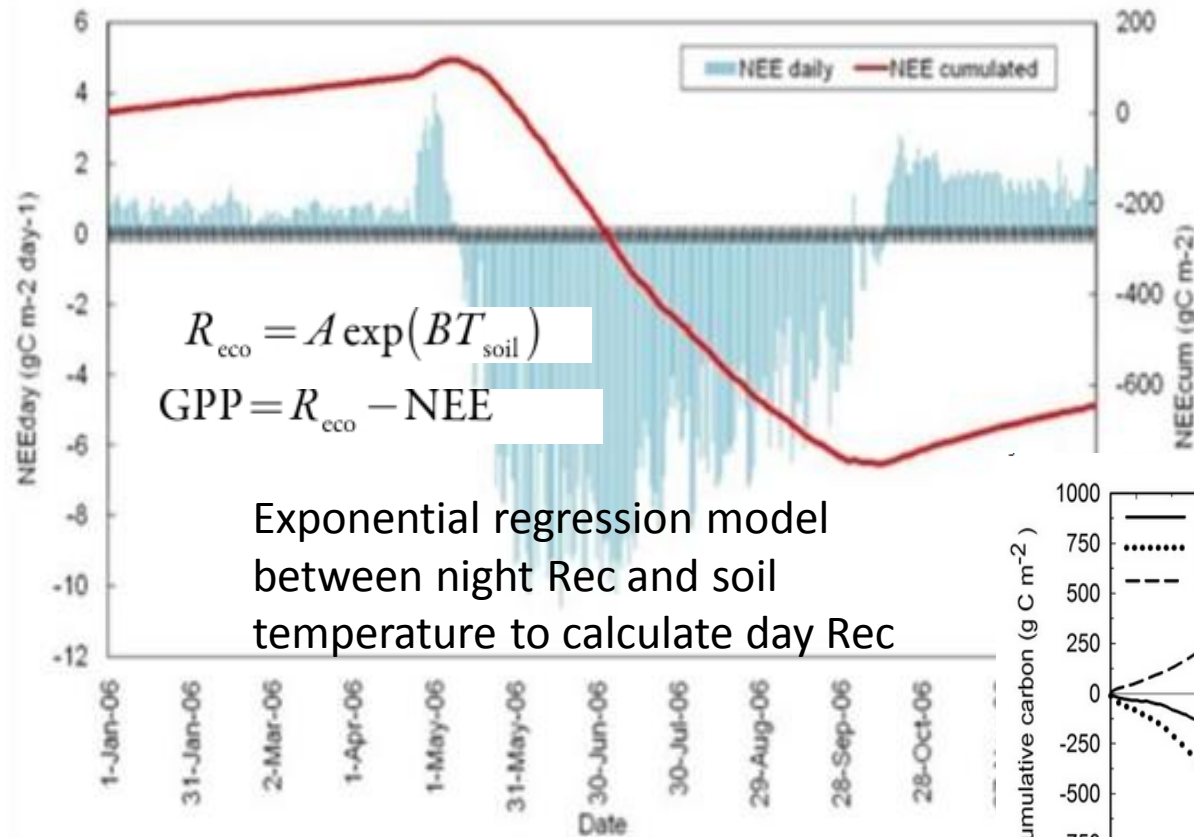
*Fagus sylvatica*

Height 1700m asl Appenine chain

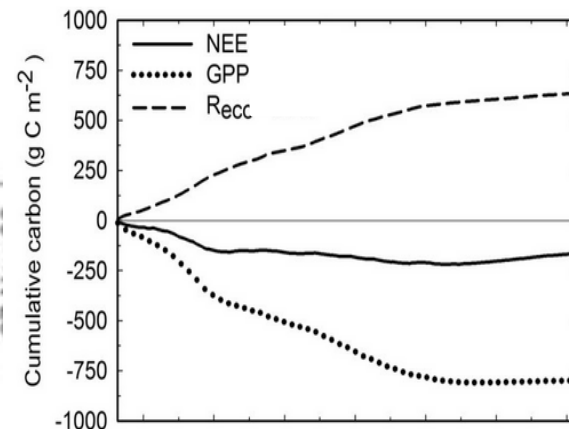
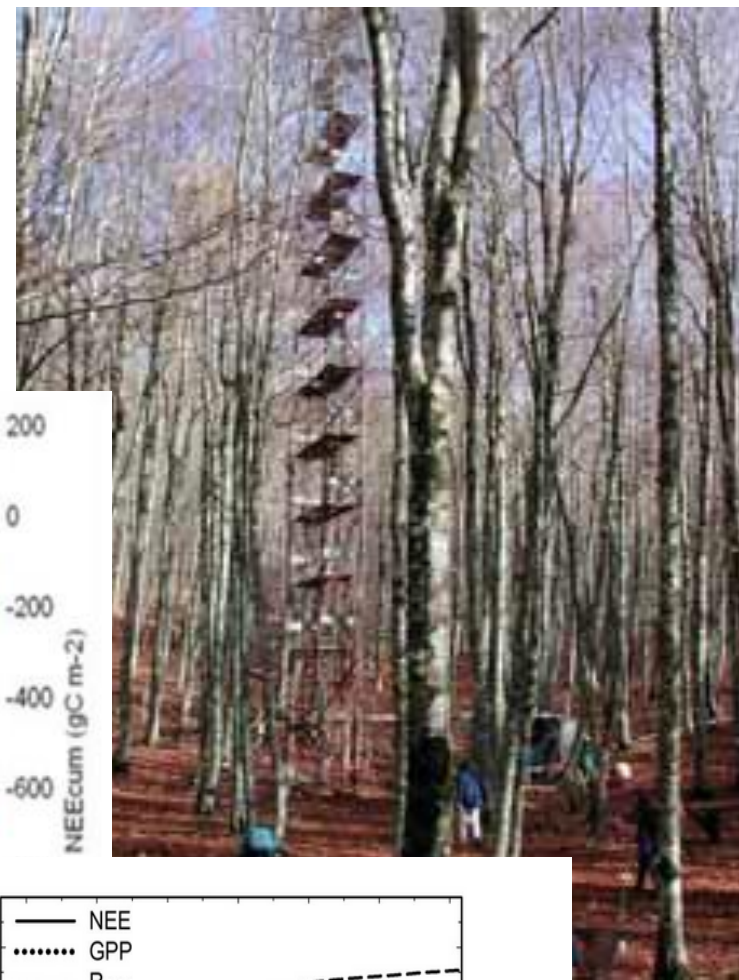
Eddy flux since 1993

Auxiliary measurements

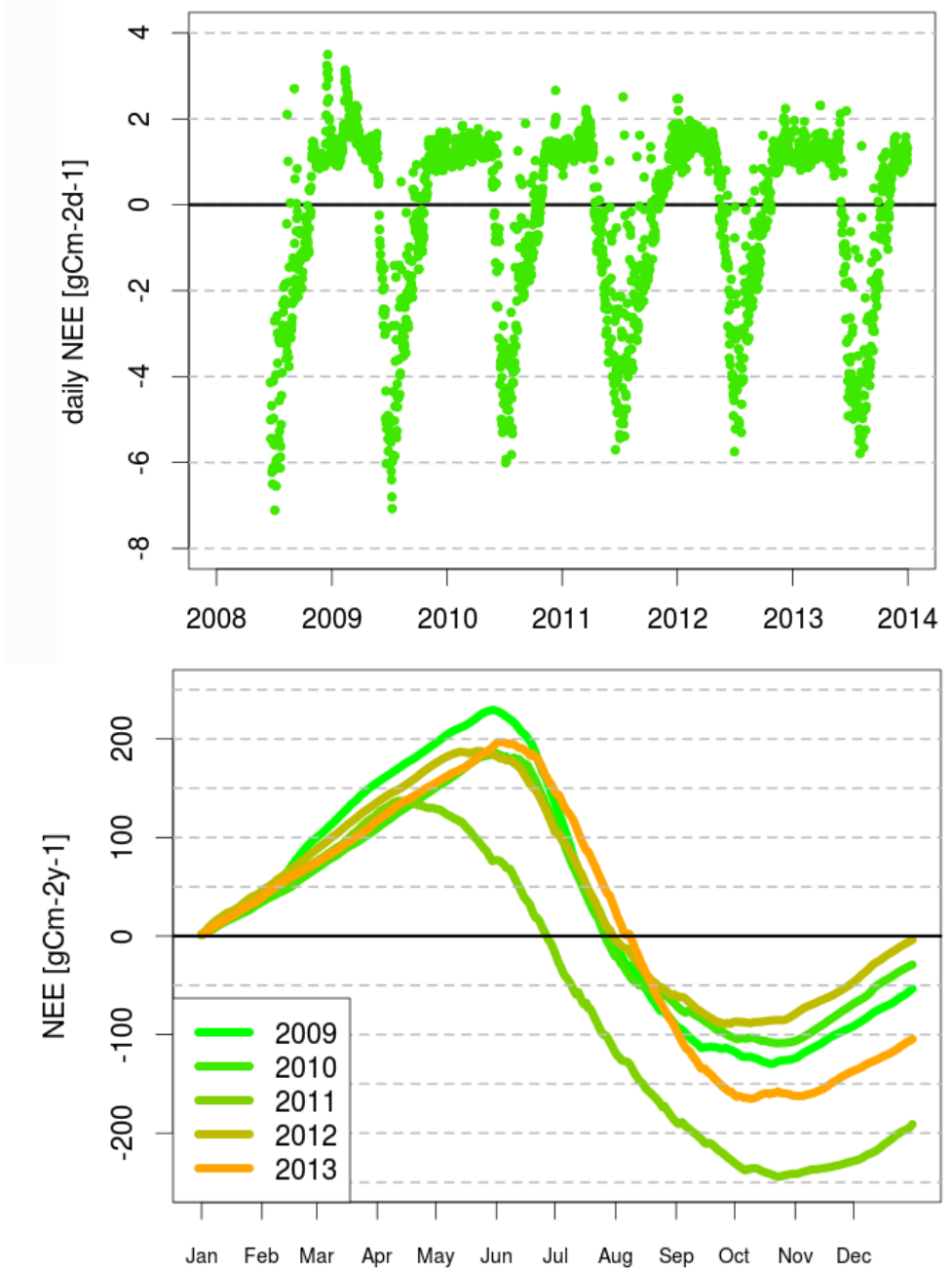
Functional studies



Daily and cumulative NEE in 2006



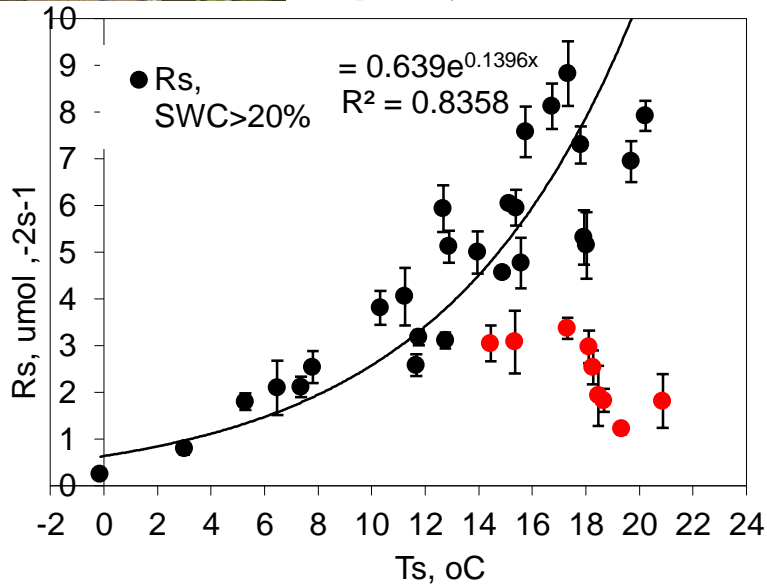
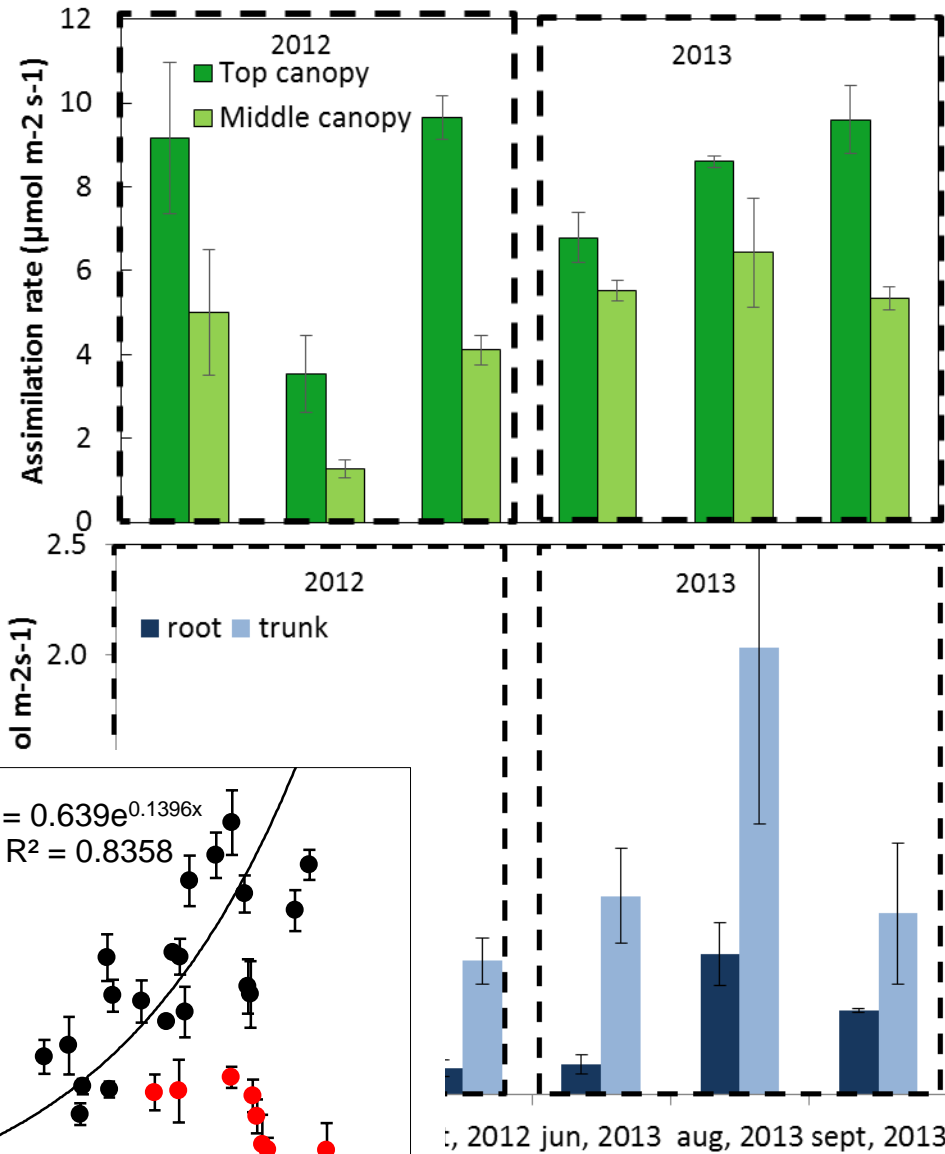
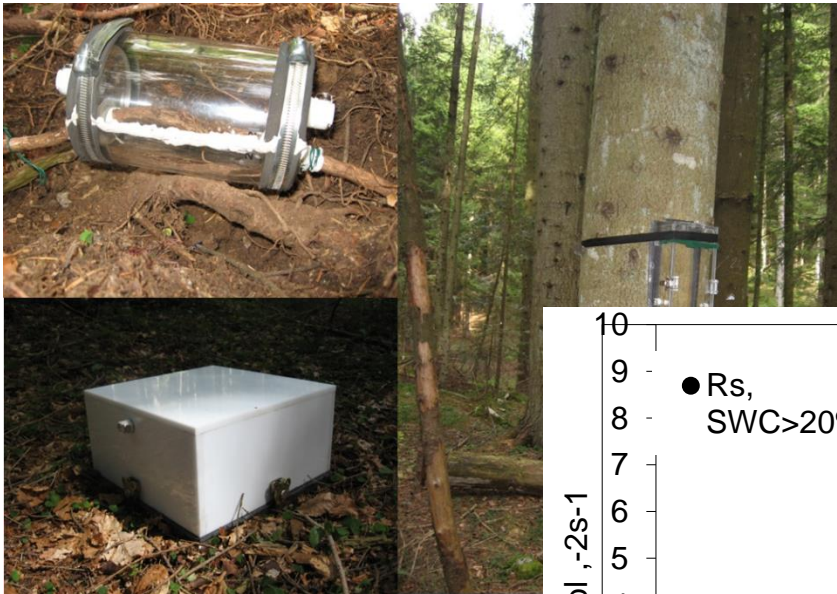
**Torgnon:**  
Abandoned grassland  
Height 2100m asl, West Alps  
Eddy flux since 2008  
Automated soil respiration flux since 2009  
Auxiliary measurements





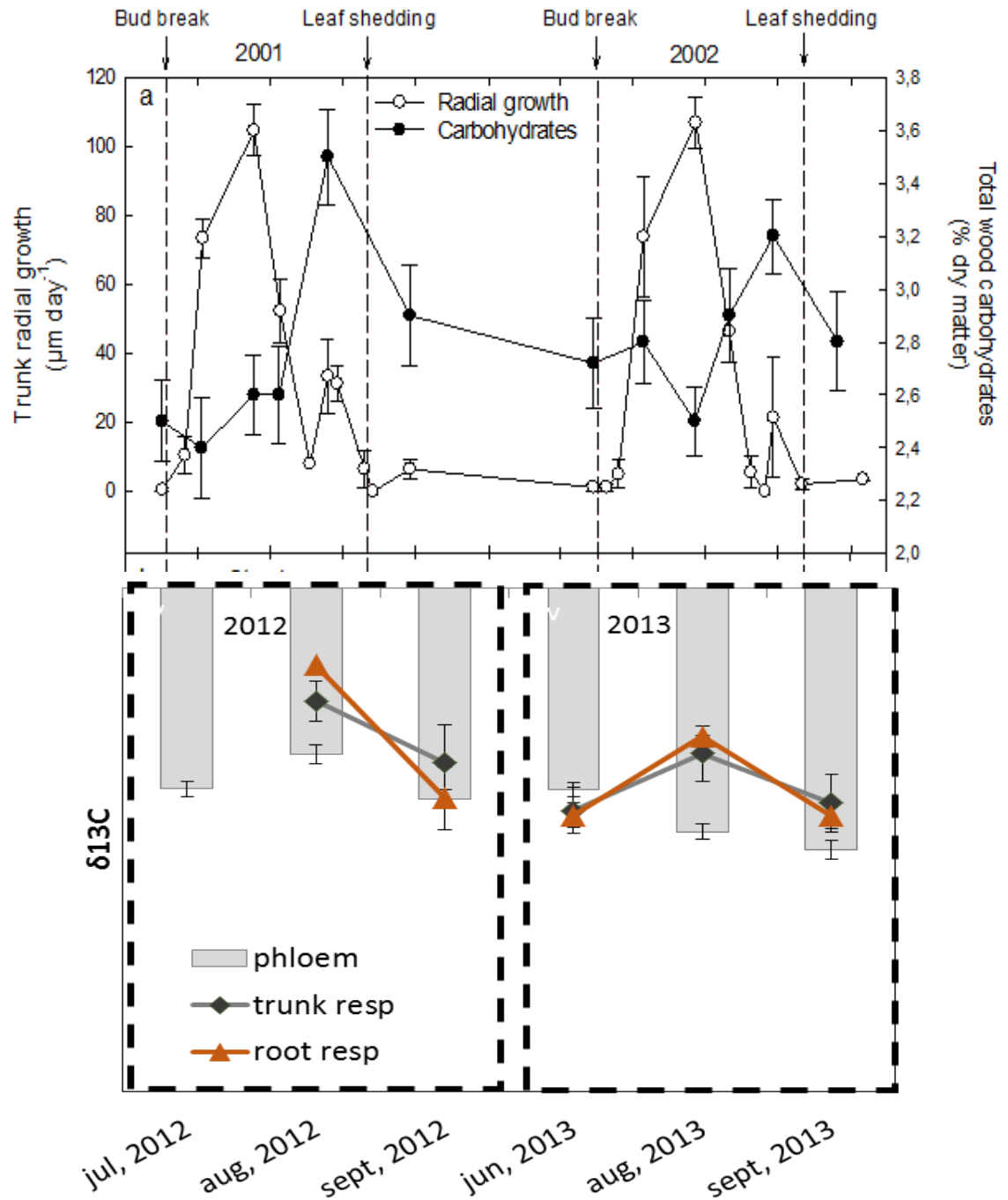
Functional studies:

- Partitioning of net ecosystem exchange on small plot scale into respiration and assimilation components.
- Effect of environmental drivers on each single component



- Compound analyses and stable isotopes to study C allocation patterns within the ecosystem

Seasonal variations in radial growth and wood carbohydrates content in the trunk



Isotopes as proxy for allocation changes(?):  
Trunk and root respiration are fuelled by the soluble sugars transported with the phloem during the growing period and by other sources (reserves) when the allocation changes from growth to accumulation.

# MULTISPECTRAL RADIOMETER SYSTEM MSR16R (*CROPSCAN, Inc.*)

The ***CROPSCAN*** multispectral radiometer MSR16R will allow us to collect continuous canopy reflectance measurements and compute several reflectance indices.

Expected results:

- find a **good correlation between NDVI and green fAPAR** in order to use NDVI measurements as proxy of fAPAR in LUE model for ecosystem productivity calculations.
- observe that **NDVI tracks changes in NEE** throughout the season
- work on the **validation and comparison between remote sensing and ecophysiological parameters** possibly related to gas exchange or environmental stress.