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## **Aerial Biomass Production Efficiency (aBPE) of a French beech Forest**

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# Aerial Biomass Production Efficiency (aBPE) of a French beech Forest: Preliminary results

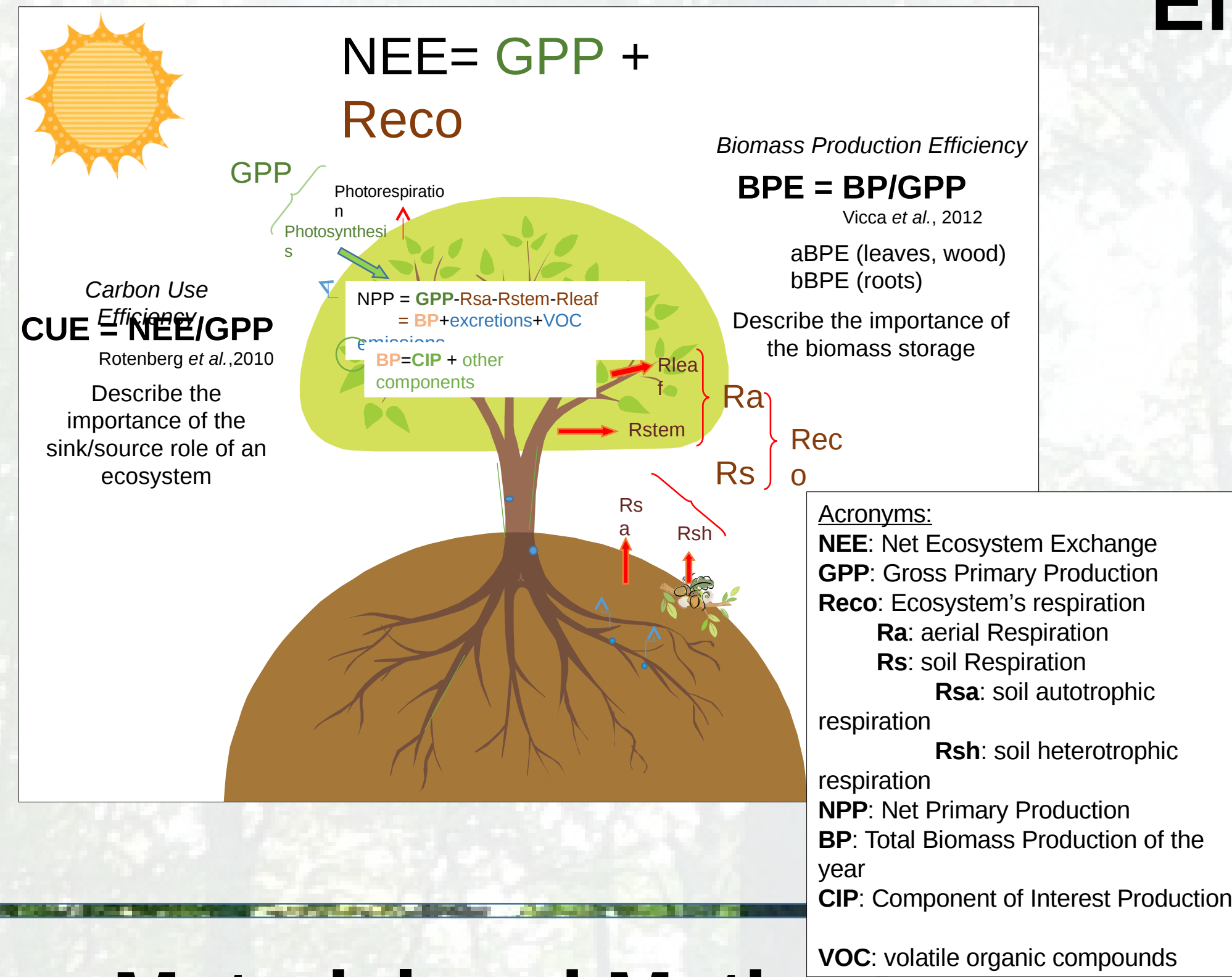
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## Context

- Existence of uncertainties in the role played by ecosystem in the global C balance
- Lack of knowledge in C allocation in plant
  - Critical control in the prediction of ecosystem long term C sequestration/emissions
- What are the parameters influencing the percentages of carbon assimilated allocated to the different tree components and processes?

## General objectives



## BPE: Biomass Production Efficiency

needed to distinguish the BPE from the ratio NPP/GPP (which also includes VOCs and root exudates) as BP is often used as proxy for Net Primary Production

- Potential determining factors:
  - Nutrient availability
  - Age (controversial)
  - Species
  - Atmospheric CO<sub>2</sub> concentration

Rem: Only above ground biomass production (and BPE) is considered here

## Material and Method

- Allometric equations fitted
- Biomass in kg C on the site (Genet et al., 2011):
  - Wood: BP (kg DM)x0,445
  - Leaves: BP (kg DM)x0,467
- Diameter } required
- Age } required
- Height } required
- Leaves biomass estimation:
  - Litter trap

## Results

### CO<sub>2</sub> fluxes: intra-year variations



**Annual CO<sub>2</sub> flux Values:**  
NEE ~ -513 g C/m<sup>2</sup>  
Reco ~ 1073 g C/m<sup>2</sup>  
GPP ~ -1587 g C/m<sup>2</sup>

### Biomass production and efficiency (kg C/ha)

	Alocrisol	Calci-Brunisol	Mean	Vicca et al., 2012
Woody biomass	3599	2647	3123	2903
Leaves	973	979	976	1313
Wood+Leaves	4572	3626	4099	4217
aBPE	0,32	0,25	0,28	0,17-0,39
CUE	0,32	0,20	0,15	

*Note: aBPE and CUE values are from 'This study'. Woody biomass, Leaves, and Wood+Leaves values are from Granier et al, 2000. Mean values are from Wu et al., 2013 and Barford et al., 2001.*

We considered there were no differences in the GPP's behavior between the 2 types of soil

## Conclusion and perspectives

- Site:
  - Our aBPE range within other medium nutrient availability forests
  - Higher CUE
  - C sink
- Influence of soil type on aBP
  - May be linked to stand age, acidity, depth difference
- Perspectives:
  - Intra-annual evolution of aBP (monthly scale)
  - Corresponding GPP
    - Monthly aBPE
  - Relate to seasonal variations in climate and phenology
  - Get into C allocation to wood component (holocellulose lignin) (same time scale)

## References

Barford et al. (2001) Science, 294, 1688–1691  
Falge et al. (2001) Agricultural and Forest Meteorology 107, 71-77

## Acknowledgments

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