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Comparison of the Biomass Production Efficiency (BPE) seasonal evolution for a forest, a crop and a grassland under similar soil and climatic conditions

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Context
- Uncertainties in spatiotemporal variability of C allocation models within ecosystems (Campioli et al., 2013)
- Better understanding of C allocation would help to predict the strategies adopted by ecosystems to adapt to climate change
- Long term ecosystem C emissions depend indeed of where the C assimilates goes (i.e. deciduous tree leaves having a life span shorter than the woody part,...) (Trumbore, 2006)

Ecosystem Efficiencies

Component of interest (CI) to analyze

General objectives
- Obtain BPE for a weekly to monthly scale
- Compare the BPE of a forest, a crop and a grassland under almost identical climatic and pedological conditions
  - Study relationship with climate and management
  - Analysis of adaptability to climate change (if available: climate variability)

References


Biomass Production Efficiency (BPE) Vicca et al., 2012

- Introduced to distinguish the BPE from the ratio NPP/GPP (which also includes VOCs and root exudates) as BP is often used as proxy for NPP
- Show the part of C assimilated through photosynthesis used by plant for biomass production

Potential determining factors:
- Nutrient availability (Vicca et al., 2012; Sheriff et al., 1986)
- Age (controversial: De Lucia et al., 2007; Vicca et al., 2012)
- Species (Ryan et al., 1997; Aubinet et al., 2009)
- Atmospheric CO2 concentration (Matamala et al., 2003)

Experimental Sites

Studied soil type: Calci-brunicol

1998

(AFES, Growth follow-up)

Tree growth increment
Crop, Grassland monthly sampling

Biochemical analysis

Tree monthly micro-coring, Crop and Grassland monthly sampling

Forest Cl: gravimetric determination (Schädel et al., 2010)
Crop, grassland Cl: chemical, IR determination (Cesar laboratory, France)

Method

Flux tower/mast

- Wind speed
- Wind direction
- Radiation
- Precipitation
- CO2/H2O covariance

Obtaining GPP

use of big-plate online tool

References


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