



LIÈGE université
Gembloux
Agro-Bio Tech



Rotational and continuous grazing does not affect the total net ecosystem exchange of a pasture grazed by cattle but modifies CO₂ exchange dynamics

Louis Gourlez de la Motte
Yves Beckers
Bernard Bodson
Bernard Heinesch
Marc Aubinet

ICOS

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National
Network
Belgium

Dorinne Terrestrial Observatory : Intensively managed pasture Candidate ICOS site

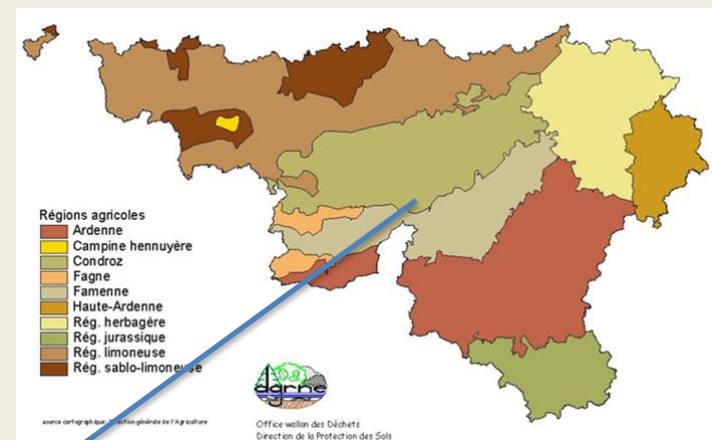


Carbon sink

Average 5 year **Net Biome Productivity**

-163 g C m⁻² yr⁻¹

(Gourlez de la Motte et al., 2016)

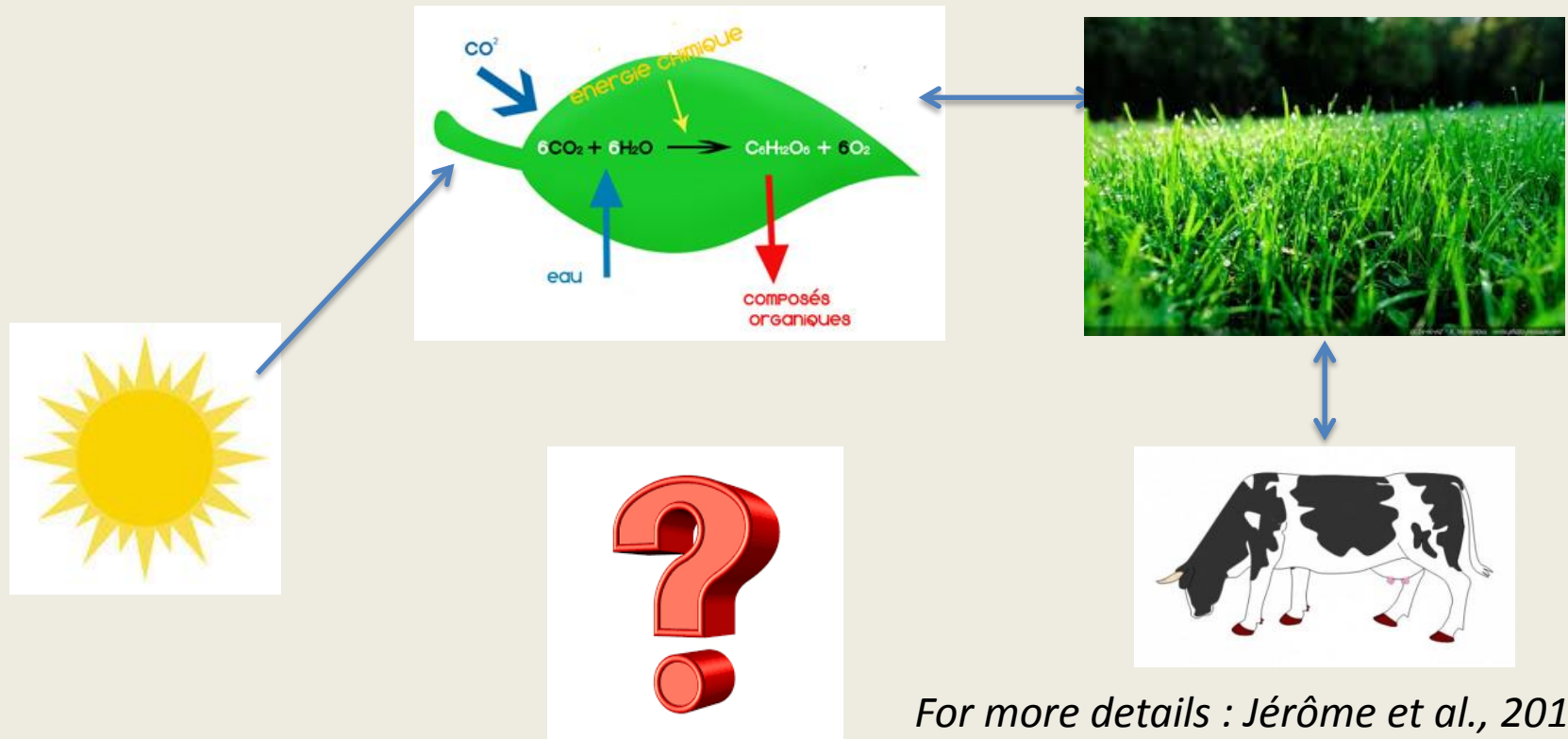


CO₂ fluxes, methane, and other variables
measured since 2010



Grazing impact on CO₂ fluxes :

Photosynthesis



For more details : Jérôme et al., 2014

Impact of grazing timing-management ?
Rotational grazing ? Continuous grazing ?

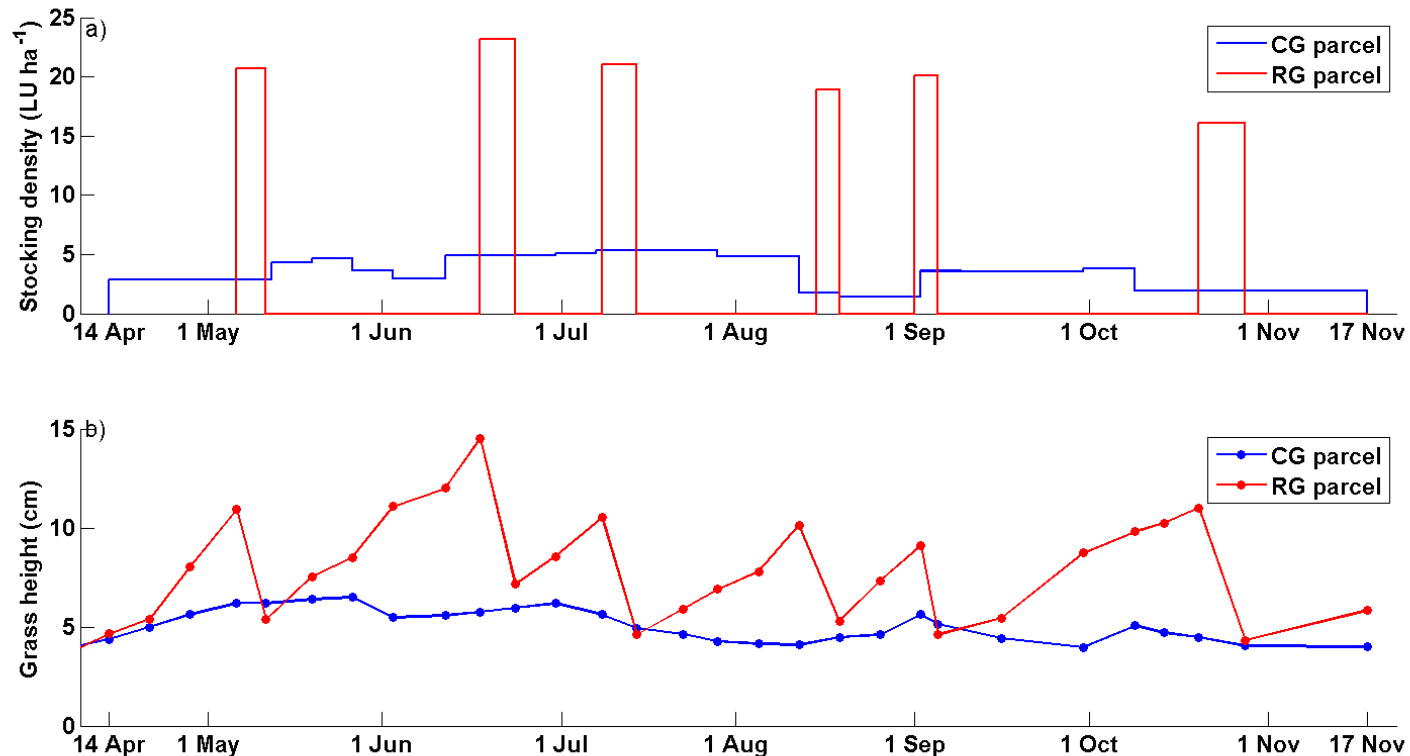
Rotational grazing vs continuous grazing



- Eddy covariance CO_2 flux measurements
- Same measurement systems
- Footprint filtering
- Biomass measurements
- Experiment from April 2015 to November 2015



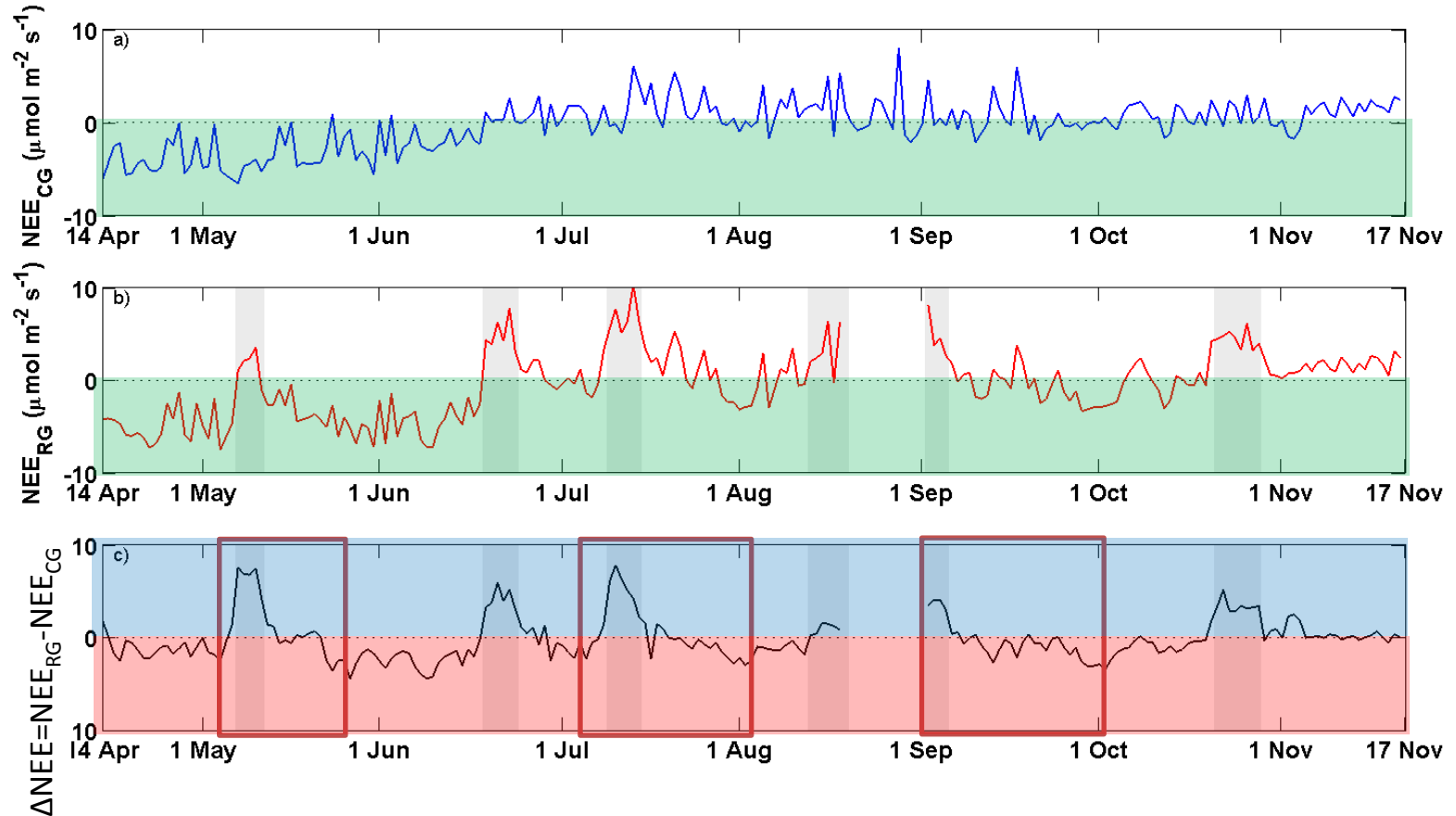
Rotational grazing vs continuous grazing



Rotational grazing : 6 rotations, 36 days of grazing, and **1.9 LU ha⁻¹ yr⁻¹**

Continuous grazing : 220 days of grazing, **2.1 LU ha⁻¹ yr⁻¹**

Grazing method impact on CO₂ flux dynamics

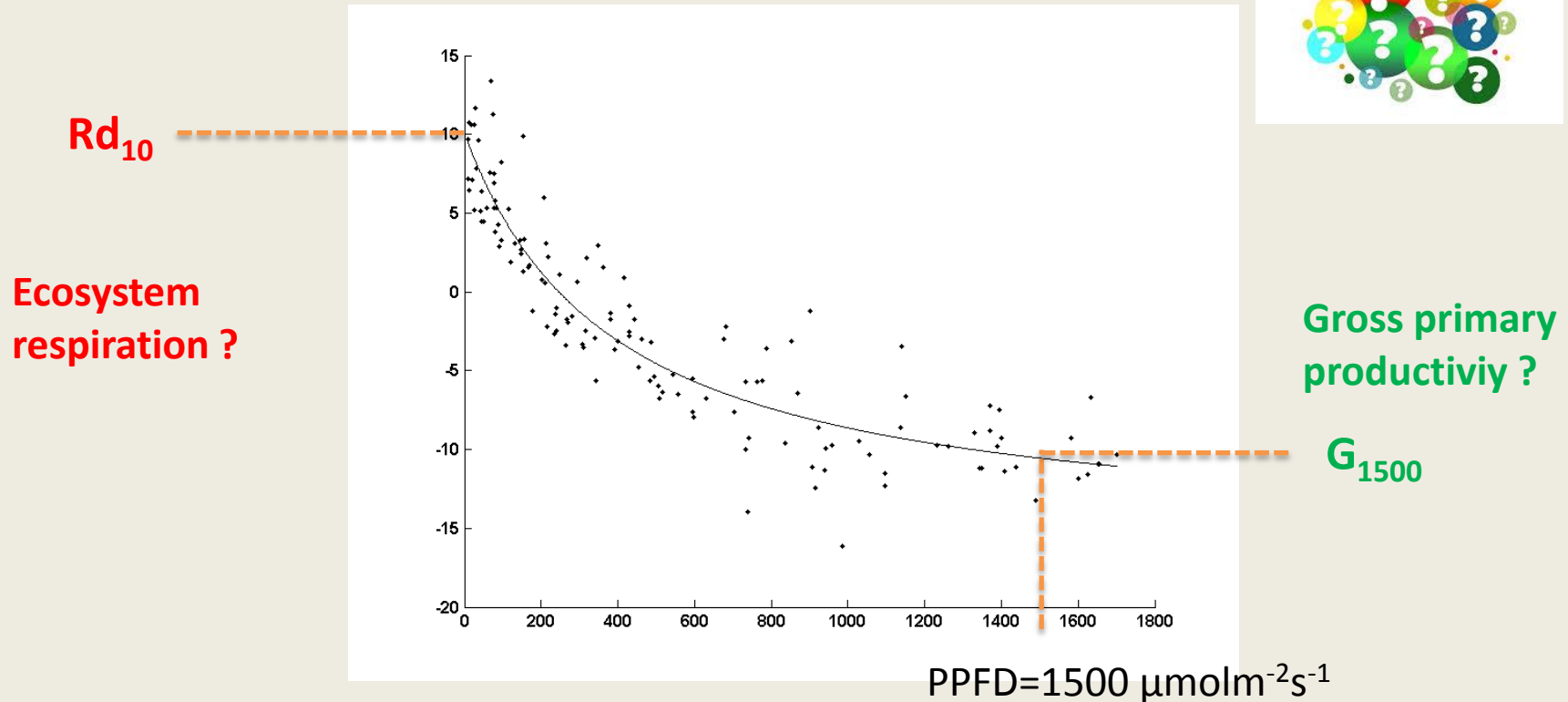


Does grazing impact NEE dynamics through
photosynthesis, ecosystem respiration or both ?

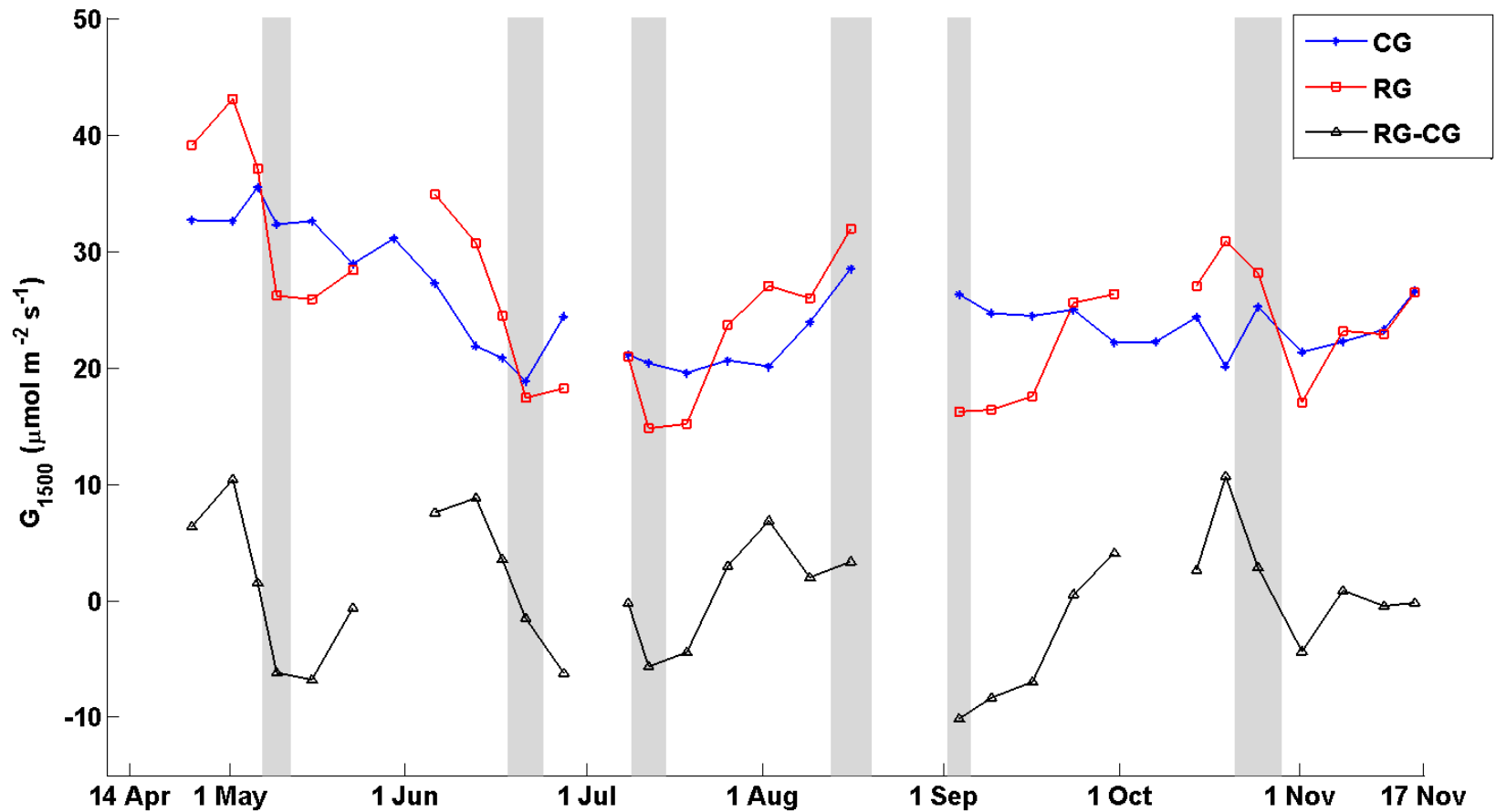
Grazing method impact on CO₂ flux dynamics : Daytime analysis

(cf Lasslop et al., 2010)

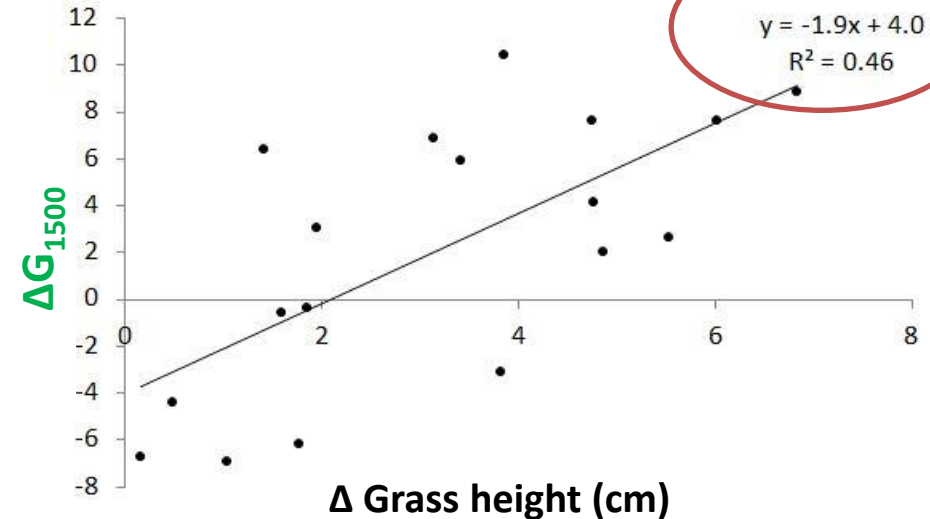
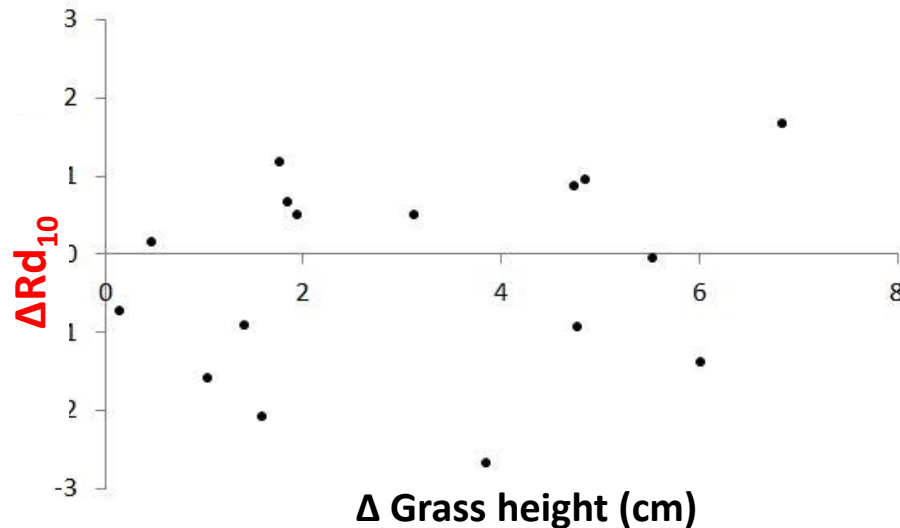
Who is responsible ?



$$NEE_{\text{day}} = -\frac{\alpha \times \text{PPFD} \times G_{1500}}{\alpha \times \text{PPFD} + G_{1500} \left(1 - \frac{\text{PPFD}}{1500}\right)} + Rd_{10} \times \exp \left\{ E_0 \left(\frac{1}{T_{\text{ref}} + 46.02} - \frac{1}{T_s + 46.02} \right) \right\}$$

Grazing method impact on CO₂ flux dynamics : G_{1500} 

Grazing method impact on CO₂ flux dynamics : relation to biomass

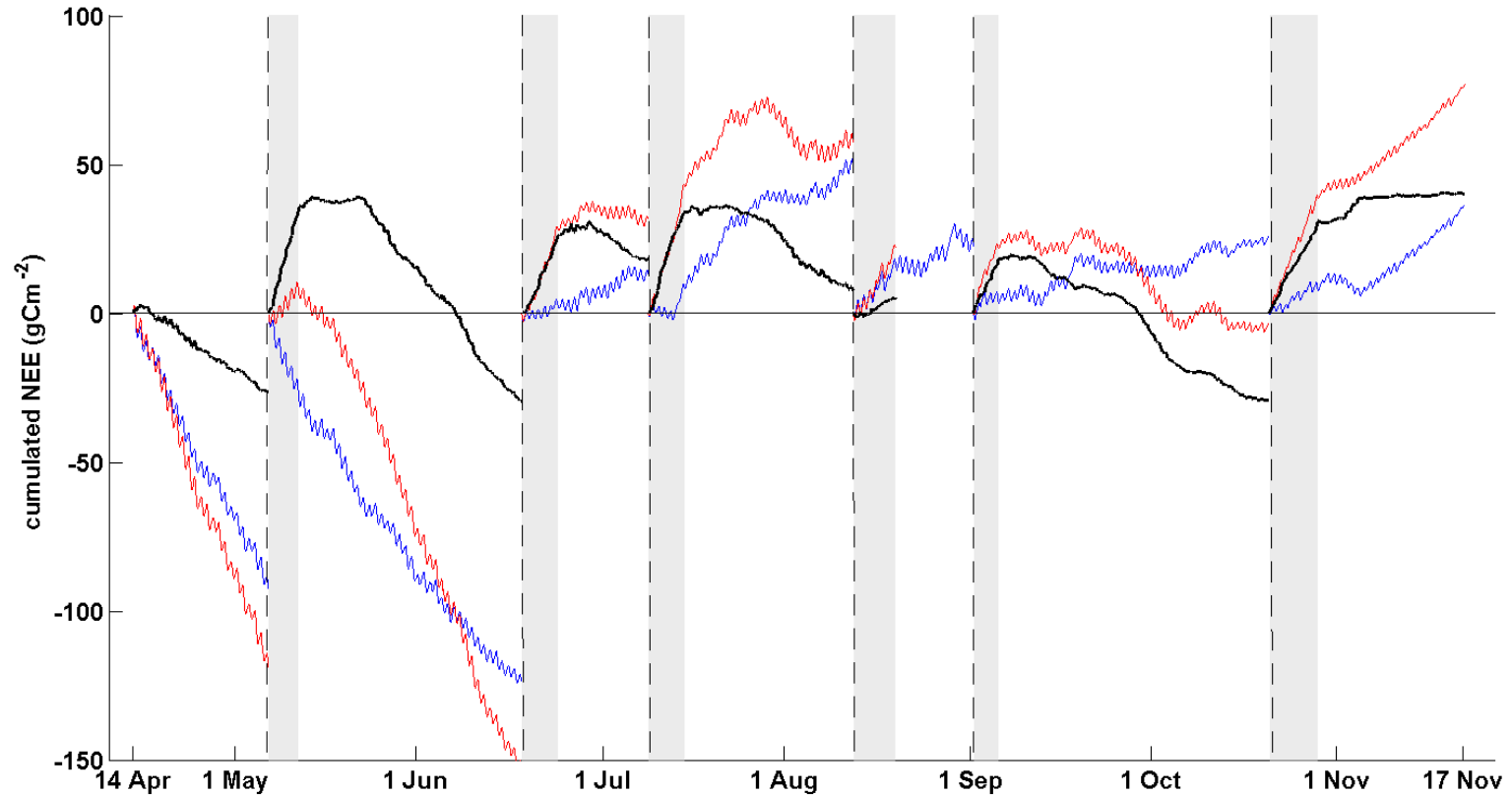


- Significant relationship between differences in standing biomass and vegetation photosynthetic capacity
- No such relationship for ecosystem respiration

→ Photosynthesis seems to be the most impacted by grass heights/grazing

What about total NEE ? Implications for the carbon budget ?

Grazing method impact on total NEE



Total NEE_{RG} = -88 g C m⁻² yr⁻¹

Total NEE_{CG} = -74 g C m⁻² yr⁻¹

≠ Not significant

- CO₂ flux showed very different dynamics between the two grazing management
- The strong link between light curve response parameters and standing biomass highlights the need to account for biomass changes when modelling or studying other environmental drivers
- No evidence that rotational grazing offers an overall benefits in term of carbon storage



Thank you !