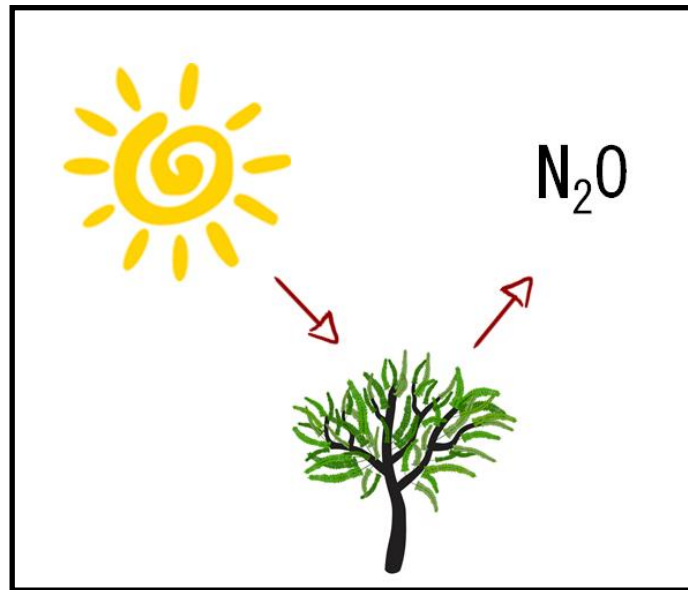


# N<sub>2</sub>O emission from plant surfaces

– light stimulated and a global phenomenon

Teis N. Mikkelsen<sup>1</sup>, Dan Bruhn<sup>2</sup>, Kim Pilegaard<sup>1</sup> & Per Ambus<sup>3</sup>



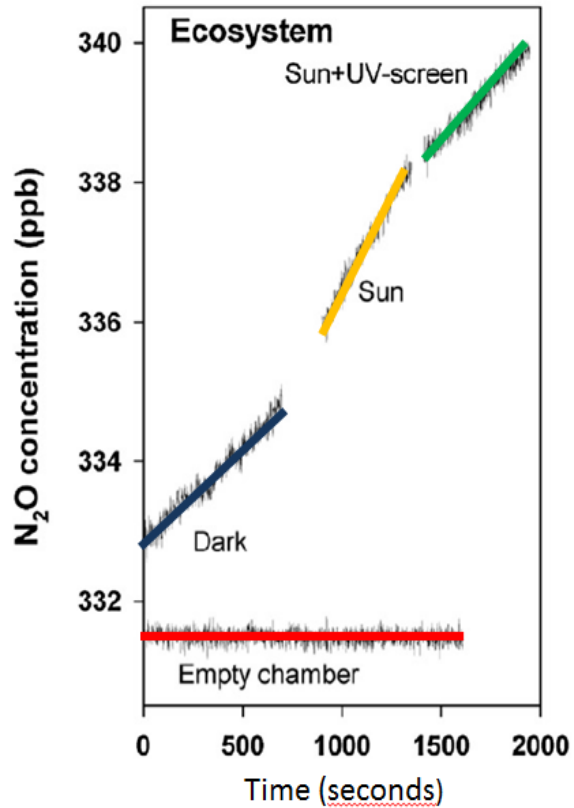
[EGU2017-6538](#) | PICOs | BG2.19/SSS10.19

**N<sub>2</sub>O emission from plant surfaces - light stimulated and a global phenomenon.**

*Teis Mikkelsen, Dan Bruhn, and Per Ambus*

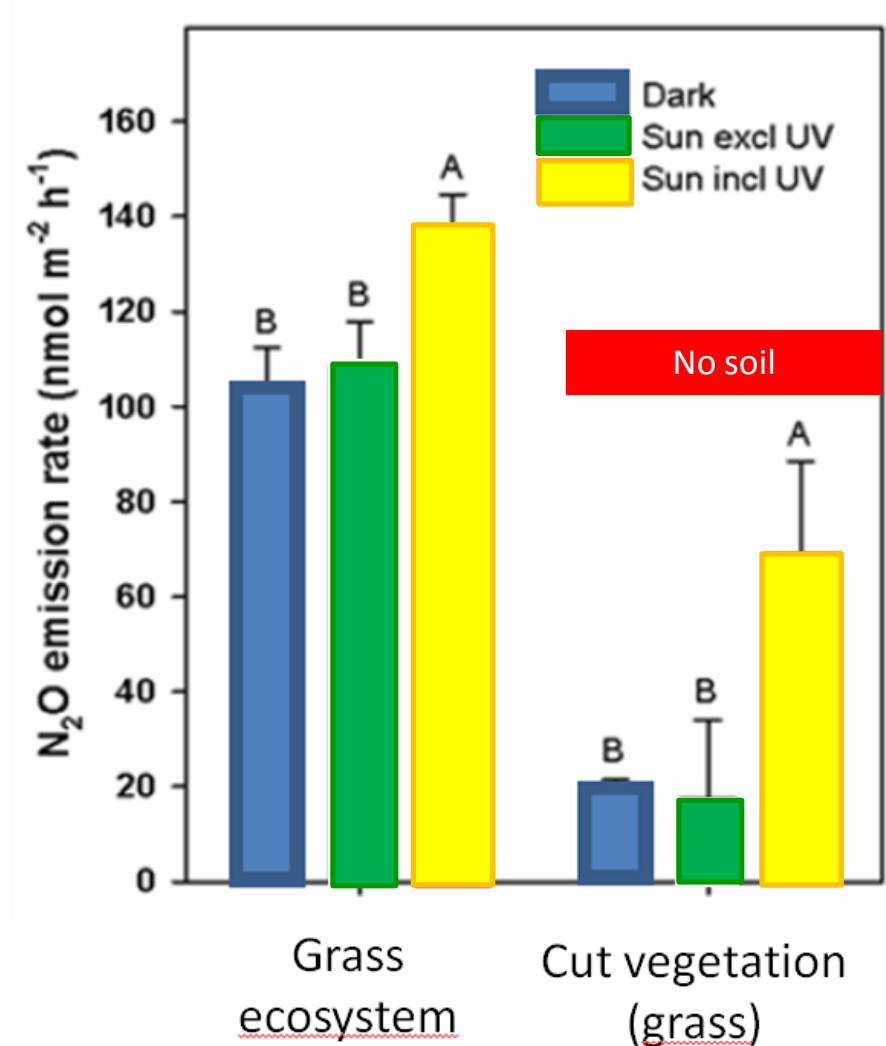
Thu, 27 Apr, 09:04–09:06, PICO spot A

Real-time measurements of N<sub>2</sub>O concentrations.



Field

N<sub>2</sub>O/CO analyser - enhanced cavity spectroscopy (Los Gatos Research Inc, USA) connected in closed-loop.

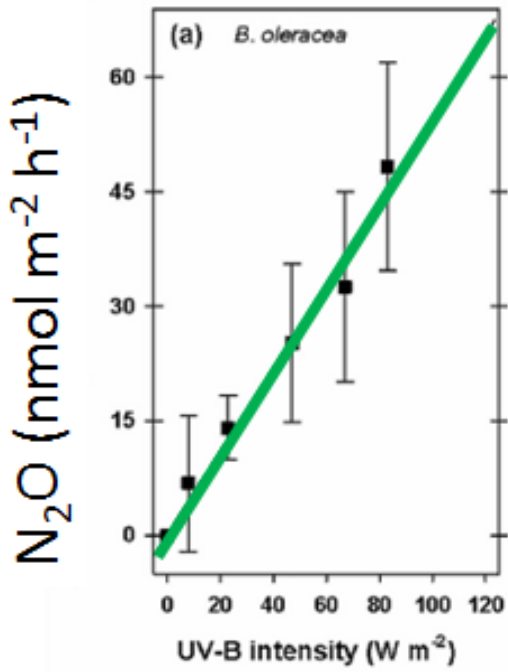


UV-B

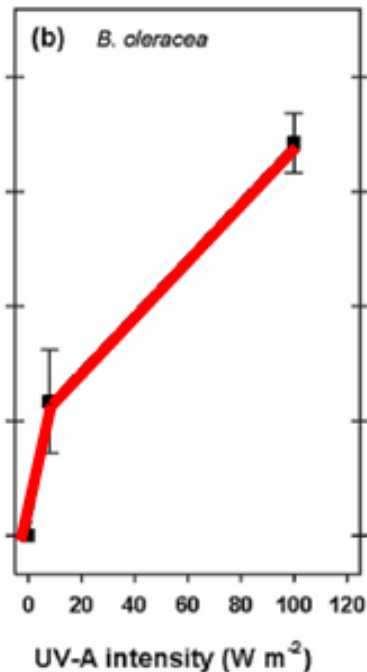
UV-A

PAR

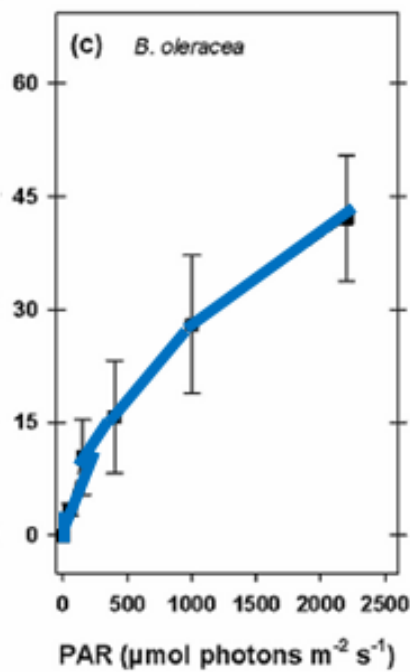
Temperature



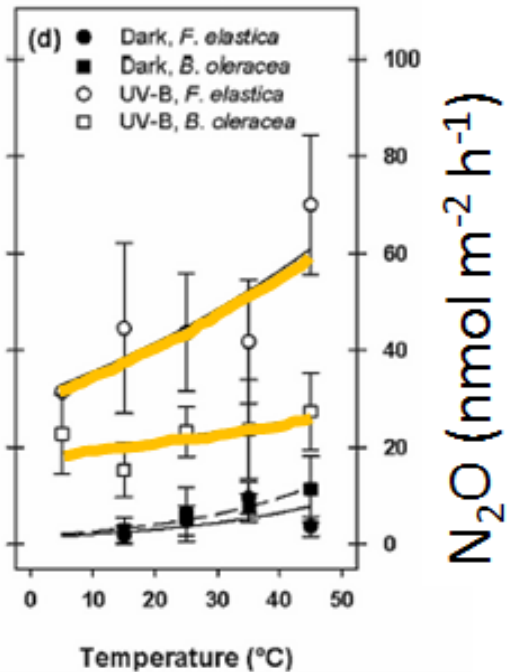
*Brassica oleracea*



*Brassica oleracea*



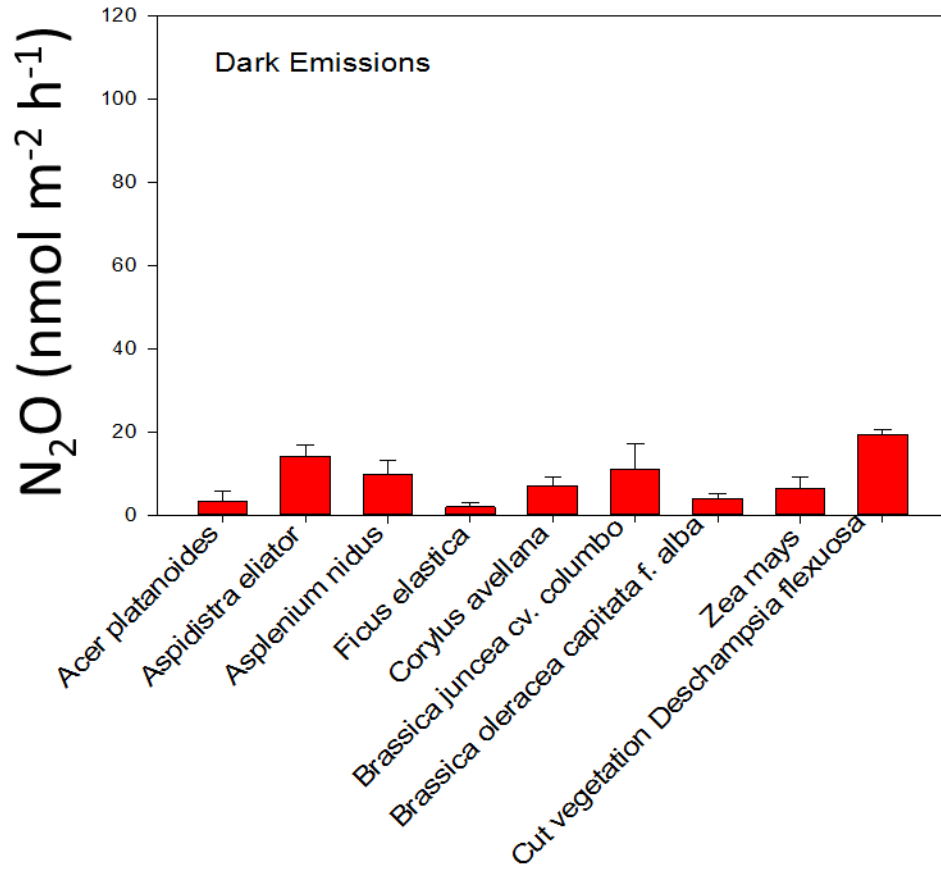
*Brassica oleracea*



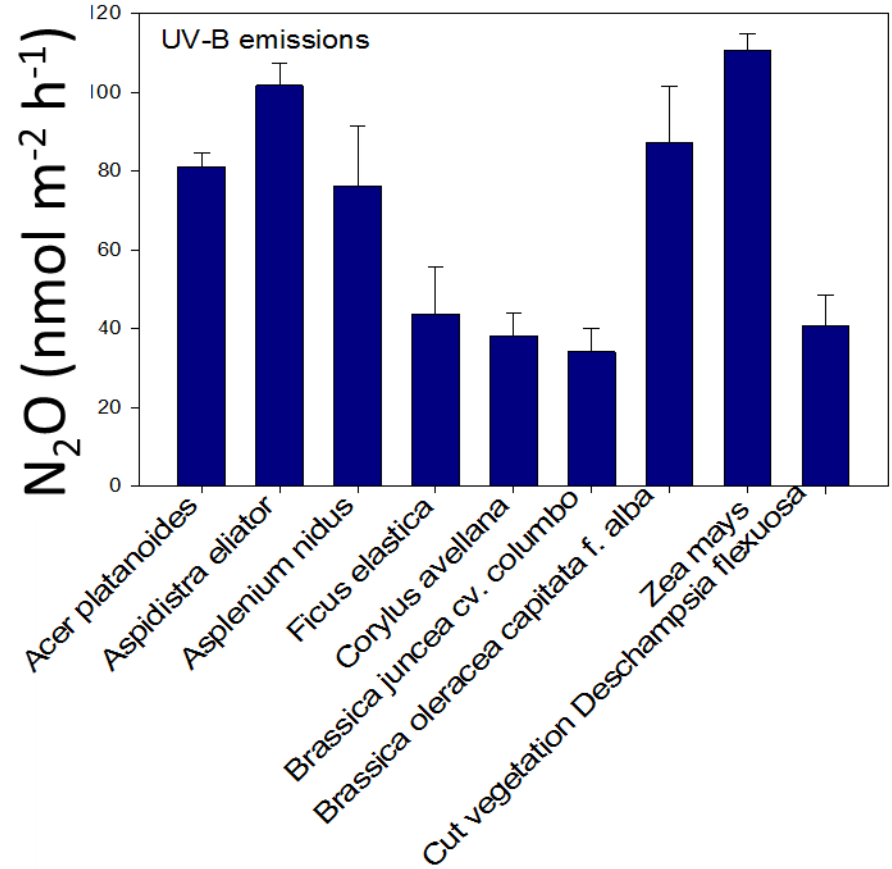
*Brassica oleracea*  
+ *Ficus elastica*

Leaf  $N_2O$  emission responses to light intensities and temperature.

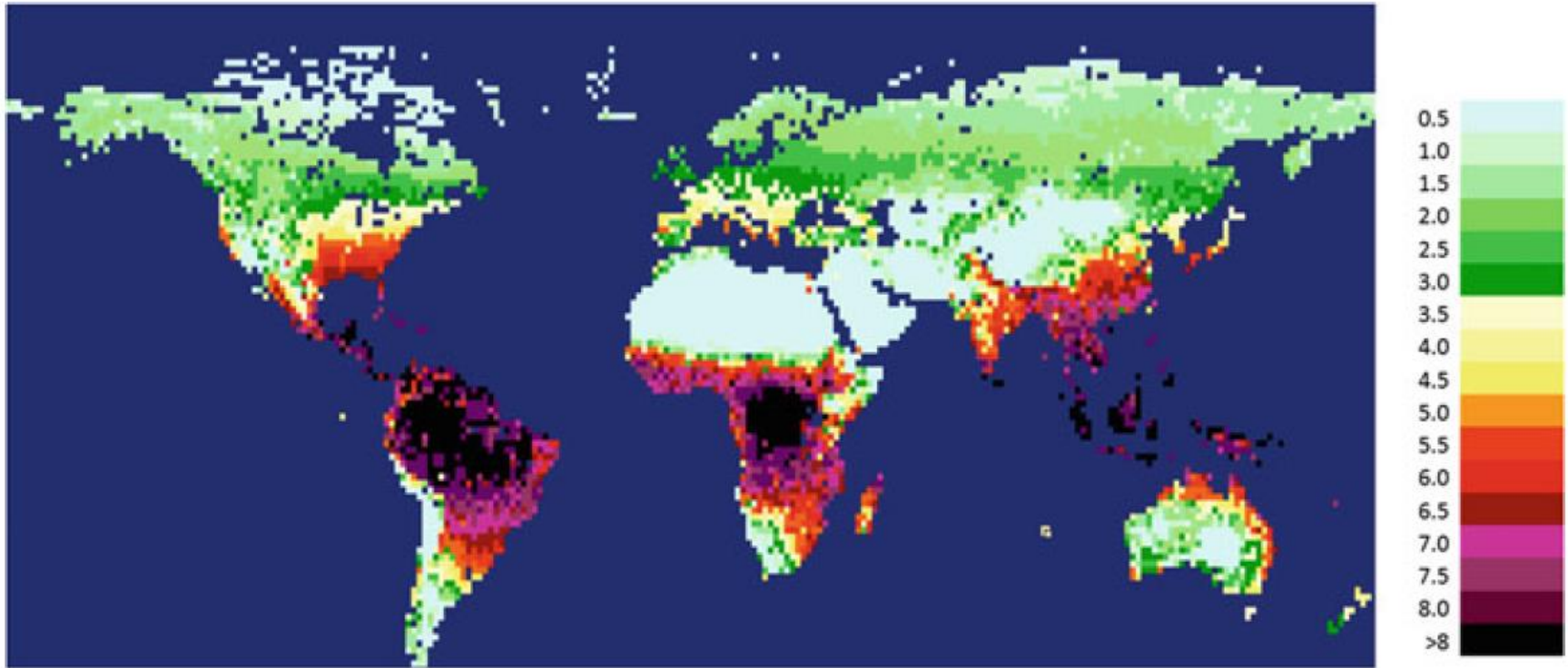
Dark



UV-B



Estimated annual global  $\text{N}_2\text{O}$  emissions ( $\text{mg N}_2\text{O m}^{-2}$ ) from terrestrial vegetation surfaces, induced by temperature and natural UV-radiation



Global  $\text{N}_2\text{O}$  upscaling is based on geospatial satellite information on UV-B, temperature and land surface classifications derived from normalized difference vegetation index (NDVI) and snow cover.



## Perspectives and conclusions

- Plants release  $N_2O$  in natural sunlight, mostly due to UV
- The  $N_2O$  formation appears to be at the surface of leaves, however only c. 26% of the UV-induced  $N_2O$  appears to originate from plant-N
- Ecosystem emission of  $N_2O$  may be up to c. 30% higher than hitherto assumed
- $N_2O$  (and  $CH_4$ ) measurements with chambers should use UV and light transparent chambers for including vegetation emissions

### Literature:

**Mikkelsen TN, Bruhn D & Ambus P. (2016).** Solar UV Irradiation-Induced Production of Greenhouse Gases from Plant Surfaces: From Leaf to Earth. *Progress in Botany*, DOI 10.1007/124\_2016\_10.

**Bruhn D, Albert KR, Mikkelsen TN & Ambus P. (2014).** UV-induced  $N_2O$  emission from plants. *Atmospheric Environment* 99, 206-214.