

BVOC Emissions from trees - Forming ozone or protecting against ozone?

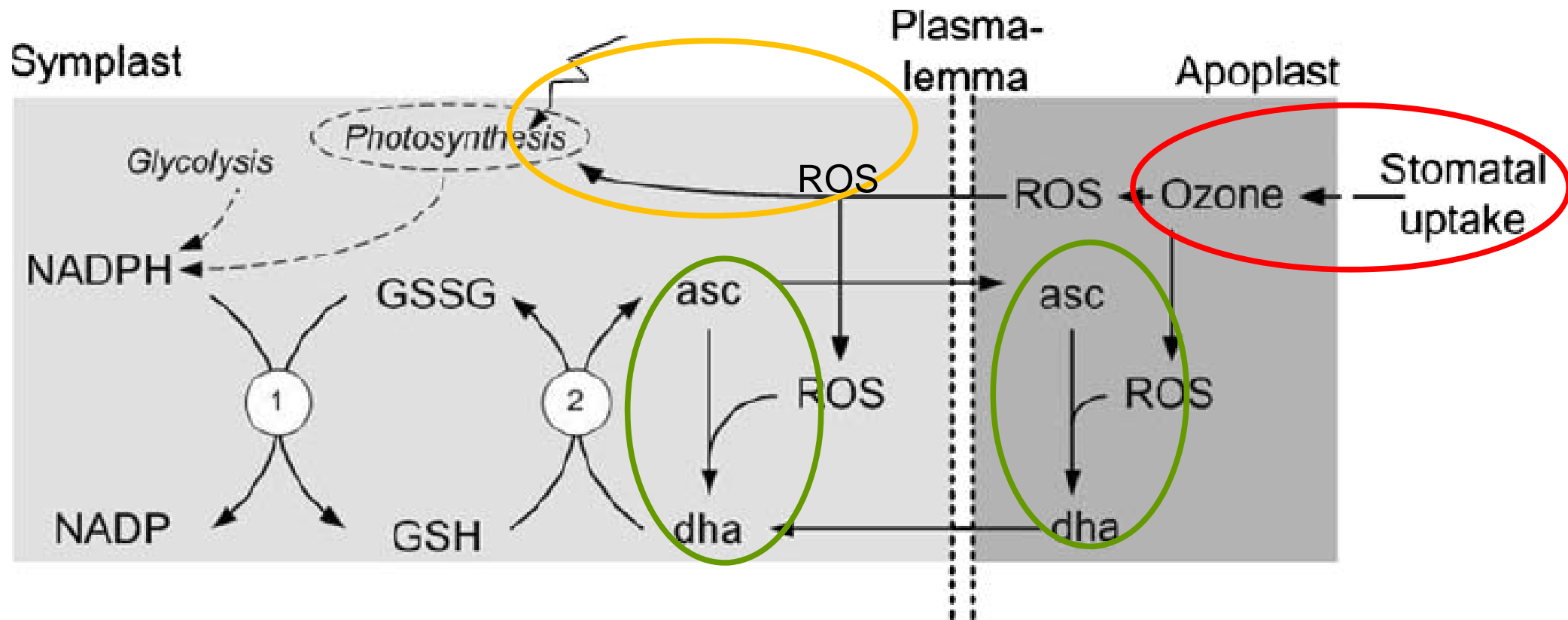
Rüdiger Grote

(Ruediger.Grote@kit.edu, https://www.researchgate.net/profile/Ruediger_Grote/)

Institut für Meteorologie und Klimaforschung, Atmosphärische Umweltforschung, Garmisch-Partenkirchen, Direktor: Prof. Dr. Hans Peter Schmid



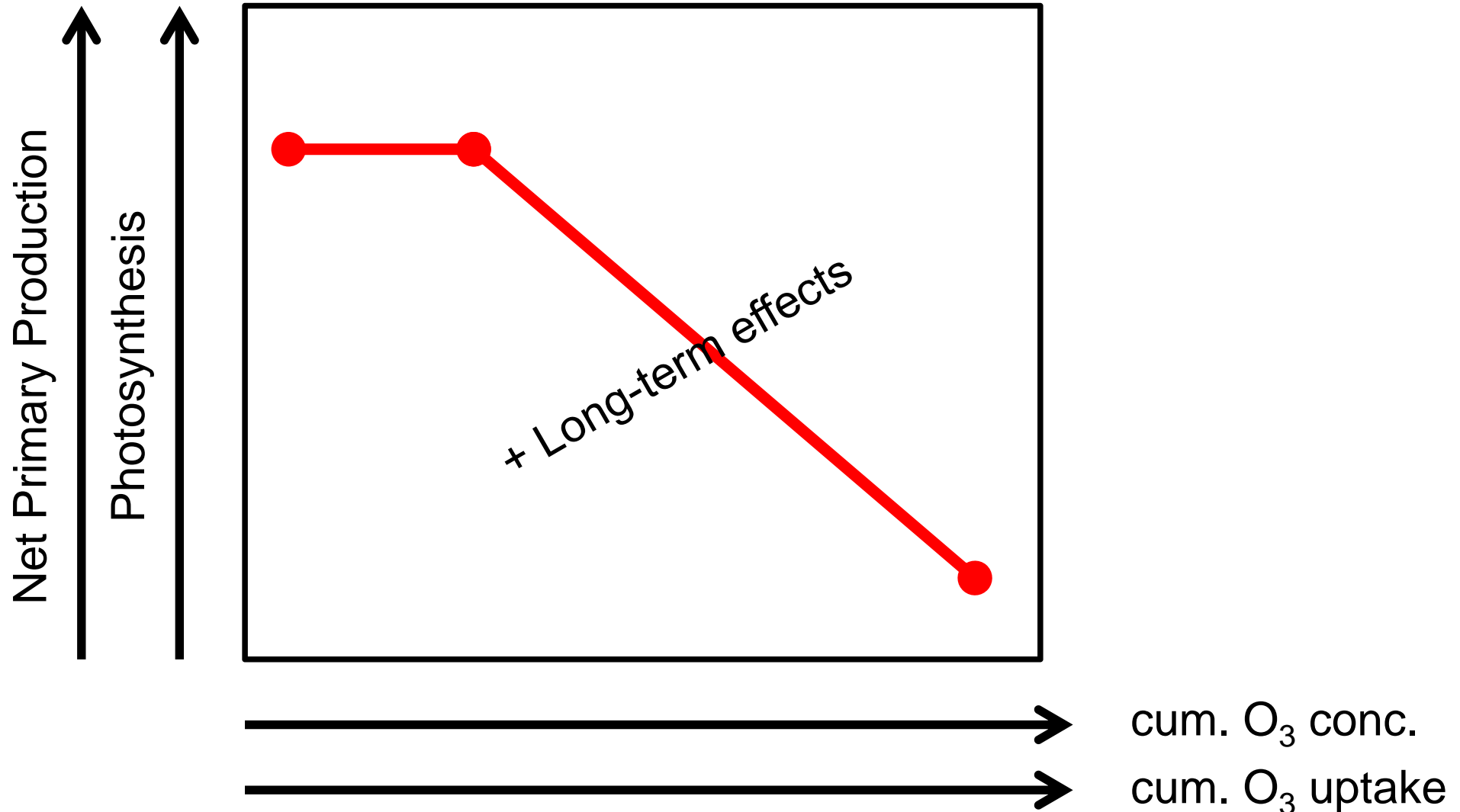
Ozone Impacts - Determined



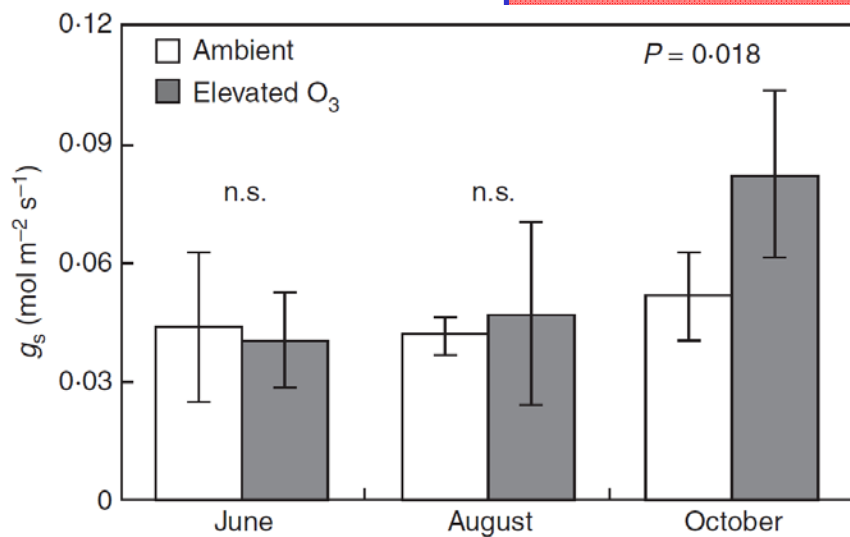
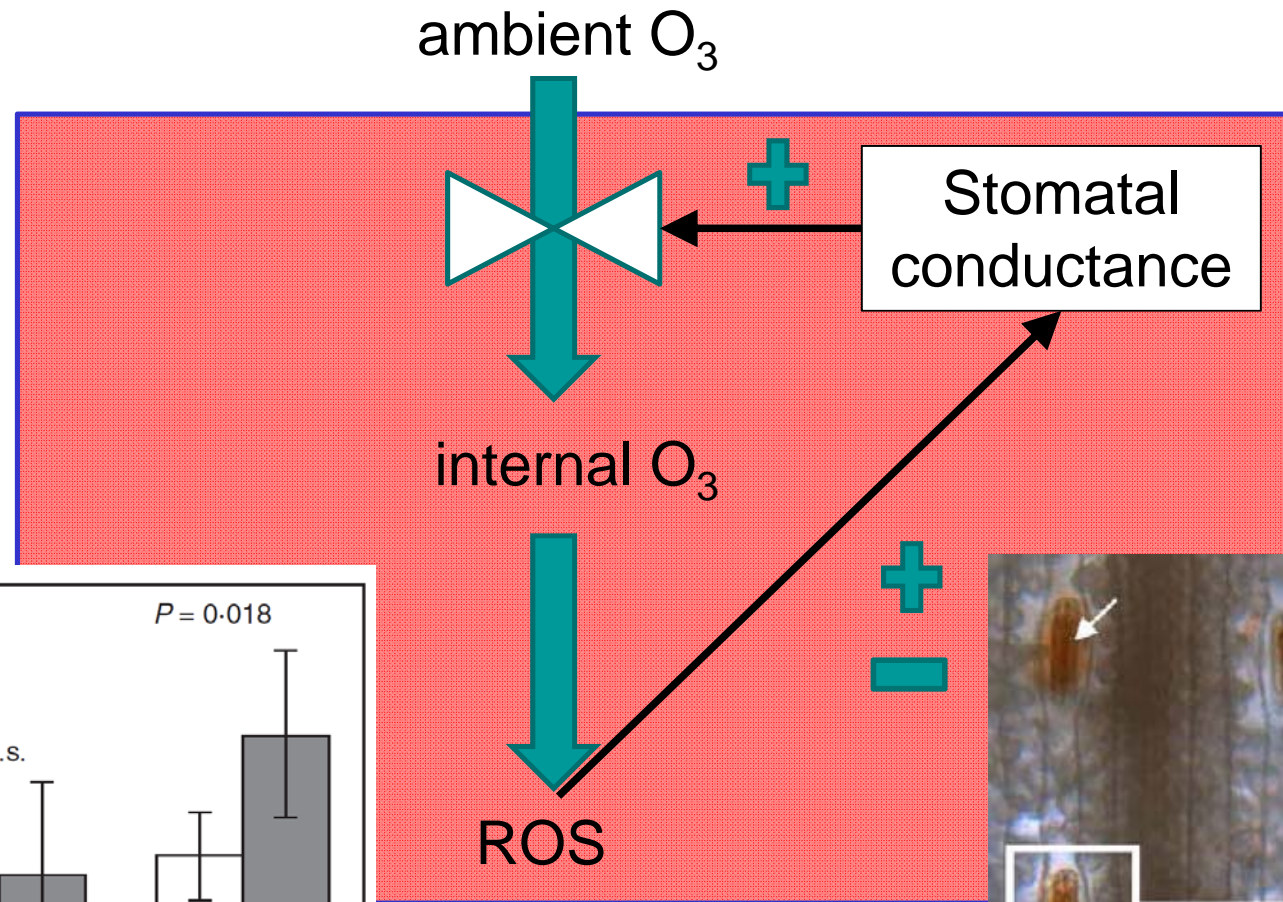
- ① Glutathione-Reductase
 - ② dha-Reductase
- GSH: Reduced Glutathione
 GSSG: Oxidized Glutathione
 asc: Ascorbate
 dha: Dehydro-L-Ascorbic acid
 ROS: reactive oxygen species

Fuhrer al. 2009 (Naturwiss.)

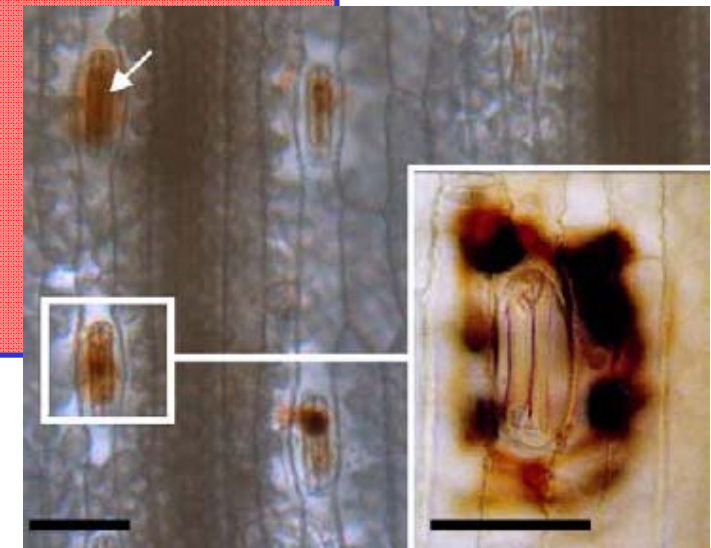
Ozone Impacts - Modelled



Ozone Feedbacks in the Plant

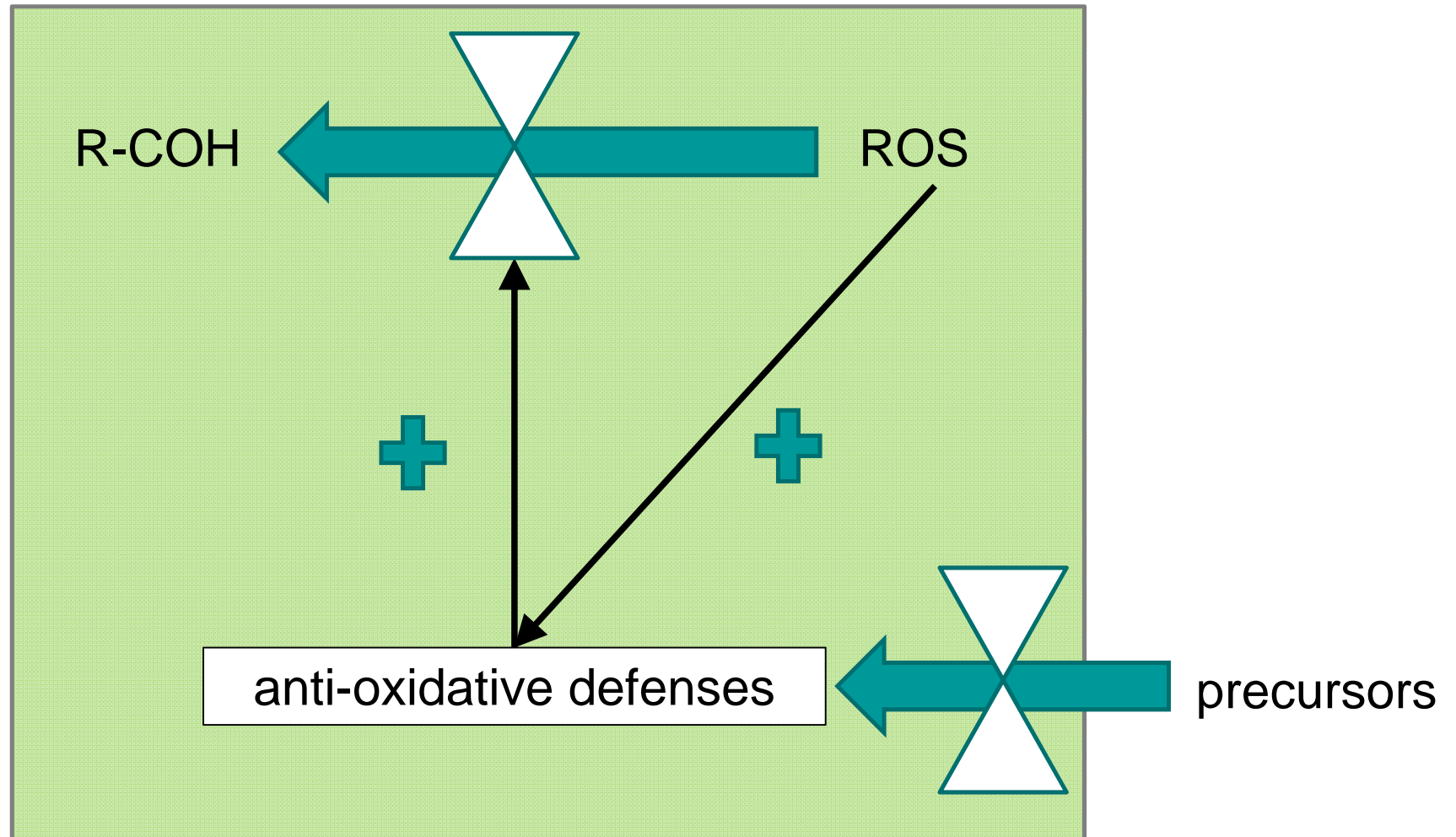


Hoshika et al. 2013 (Ann.Bot.)

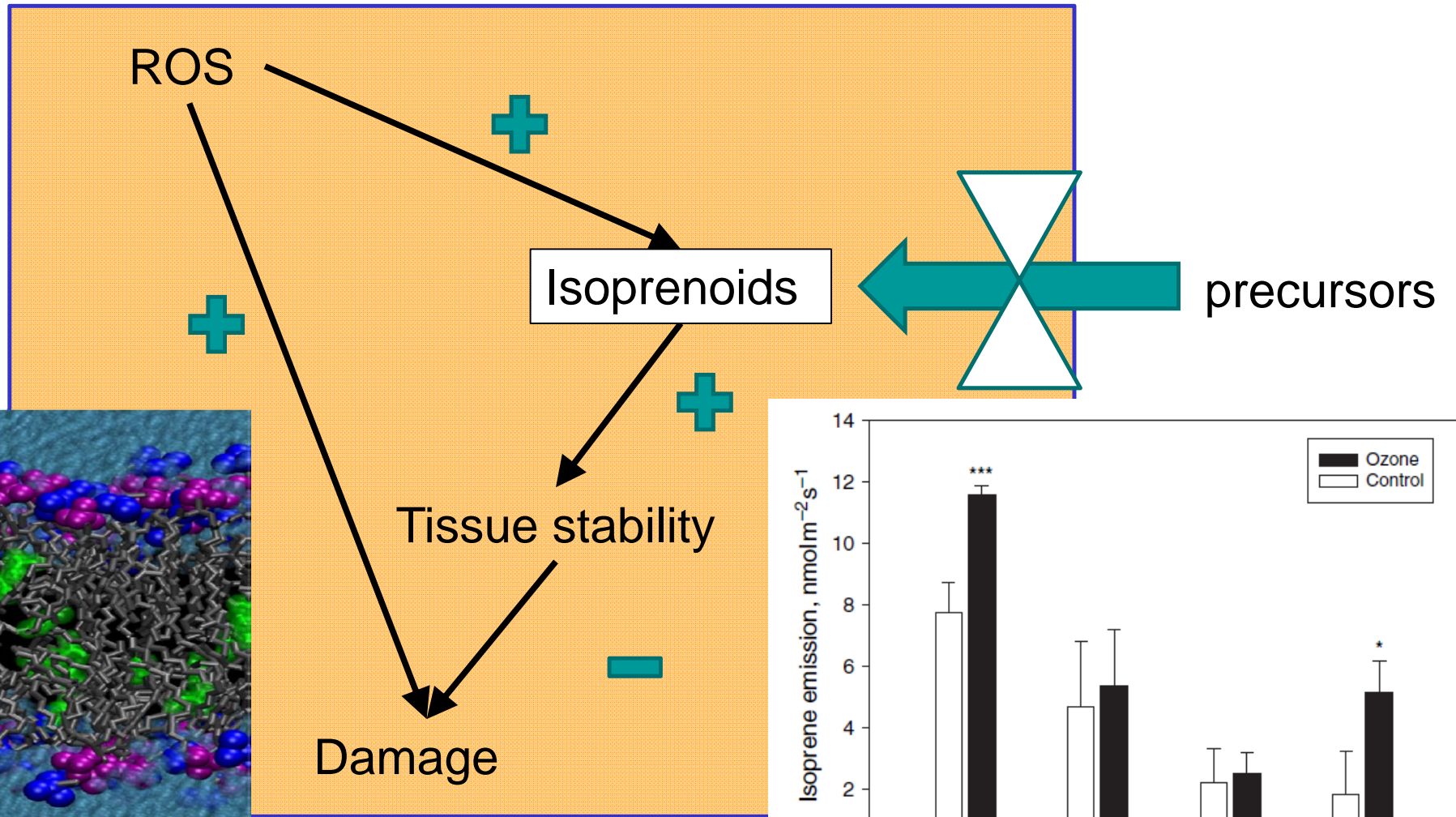


Picchi et al. 2010 (AEE)

Ozone Feedbacks in the Plant



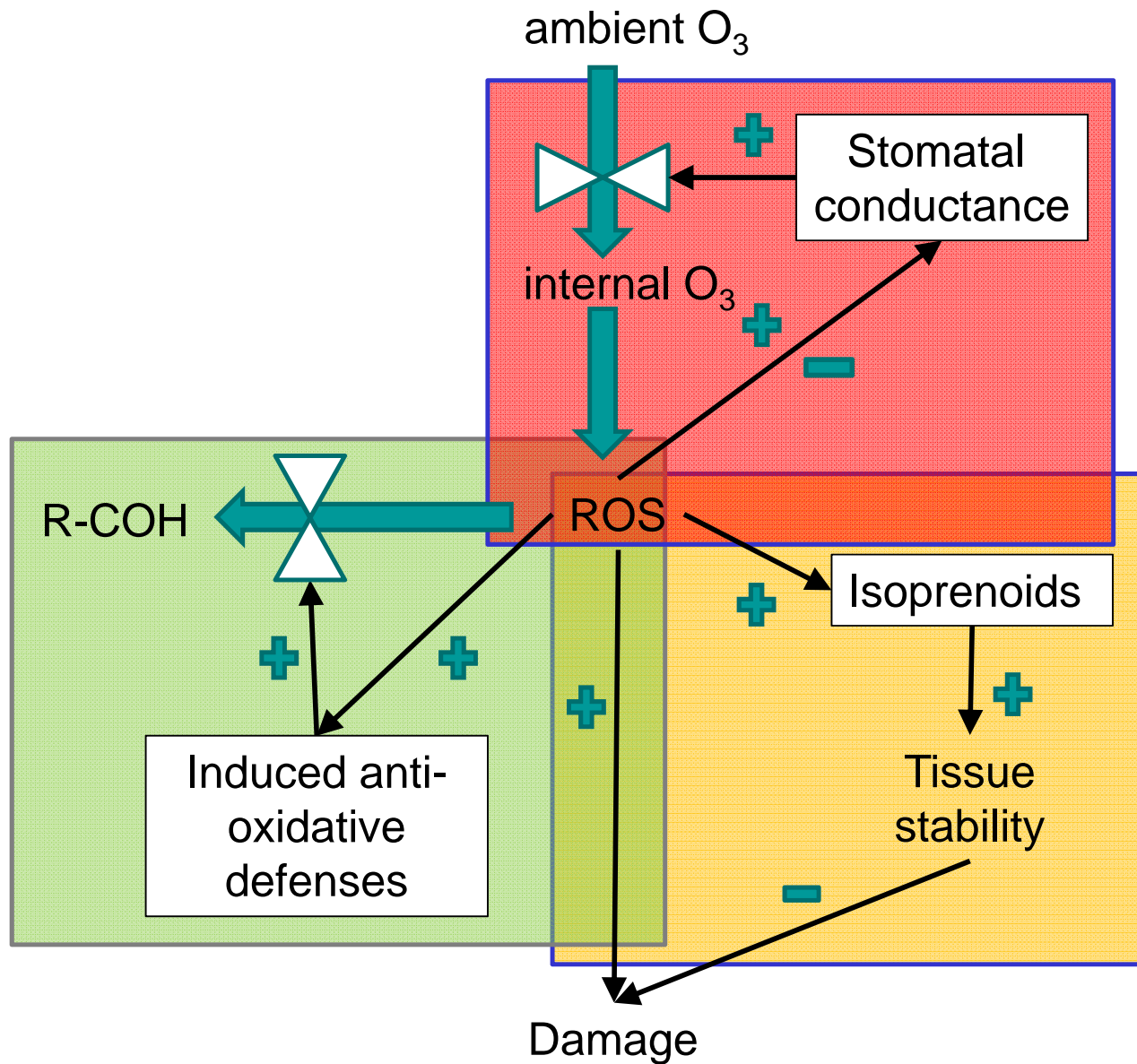
Ozone Feedbacks in the Plant



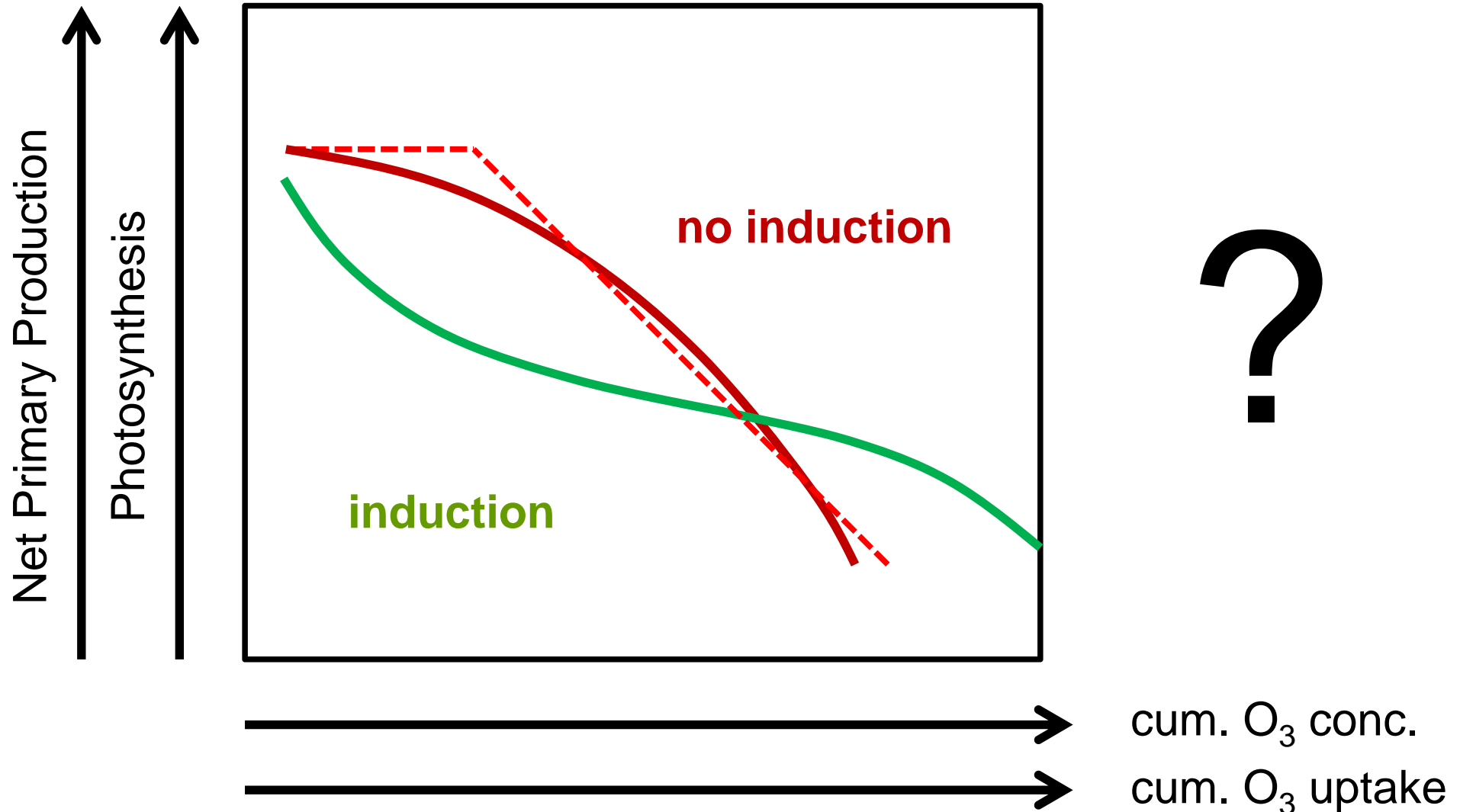
Siwko et al. 2007 (Biochimica)

Fares et al. 2006 (Phys. Plant.)

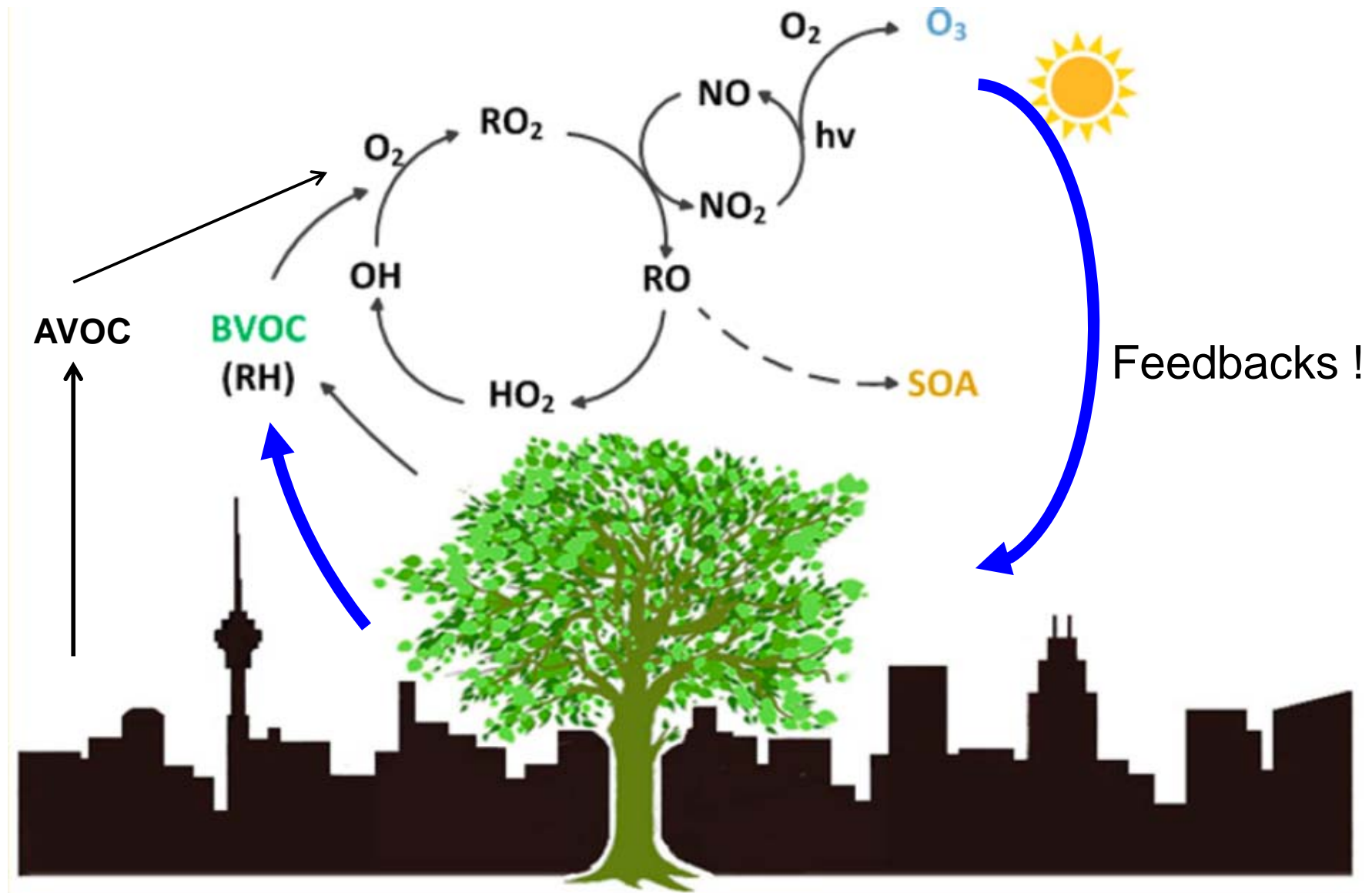
Ozone Feedbacks in the Plant



Ozone Impacts – Not Modelled



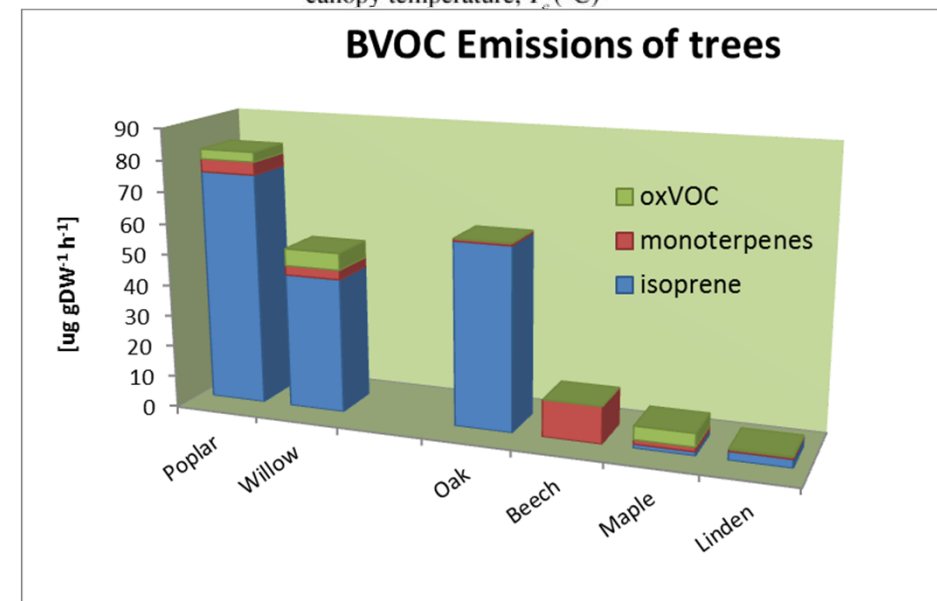
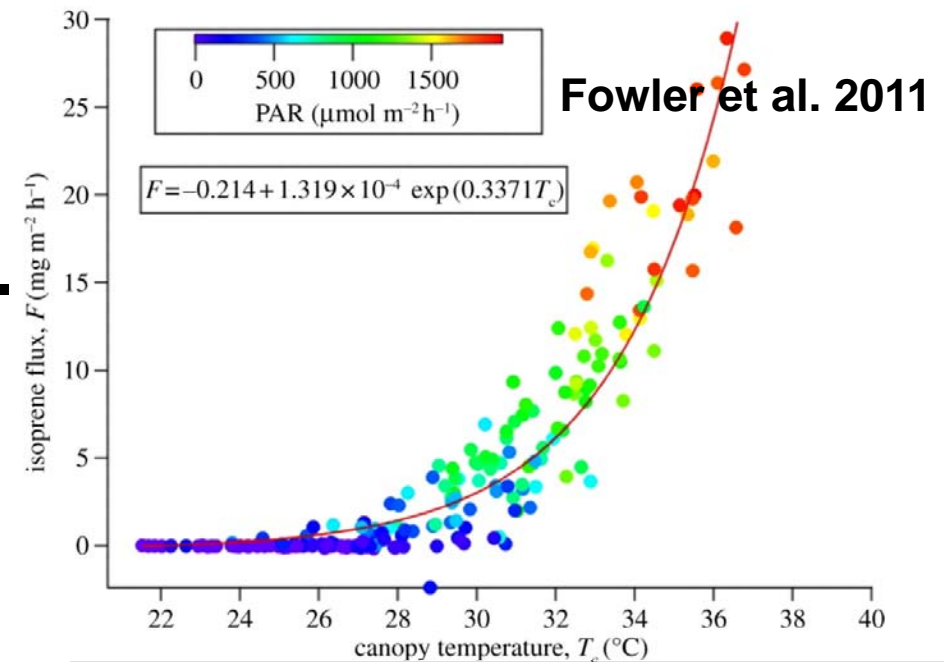
Plant – Atmosphere Feedback



Relevance of BVOC emissions

- Climate change will increase temperatures and ozone conc.
→ + BVOC

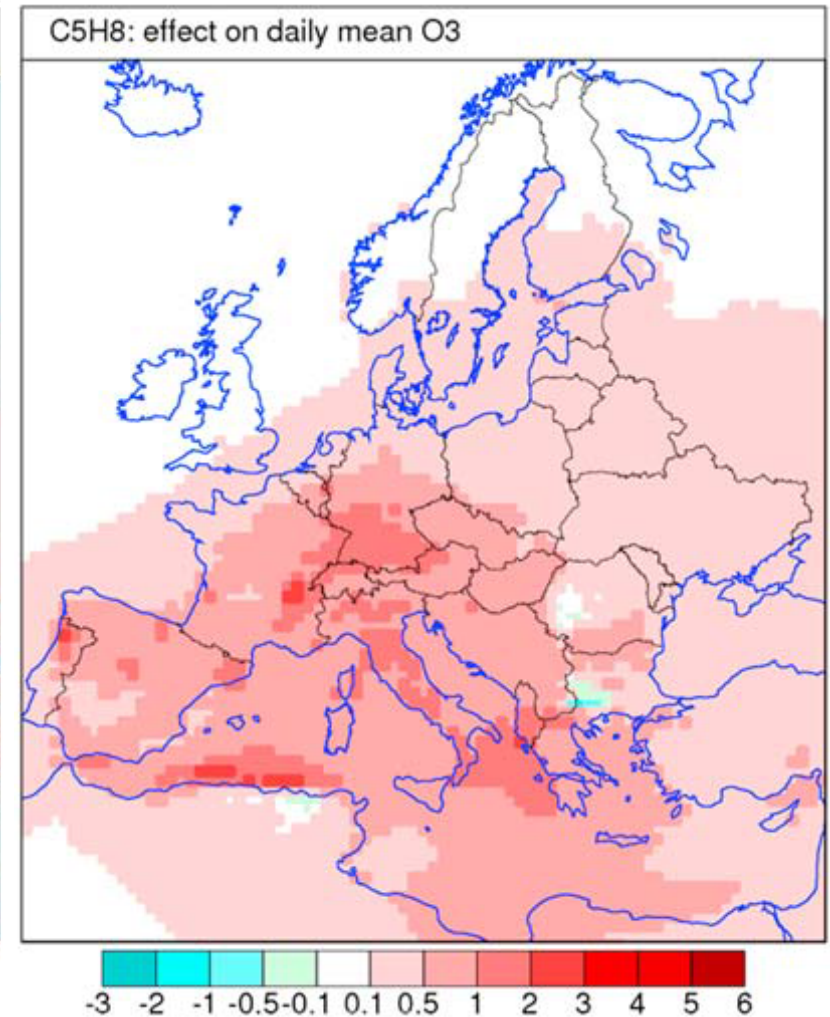
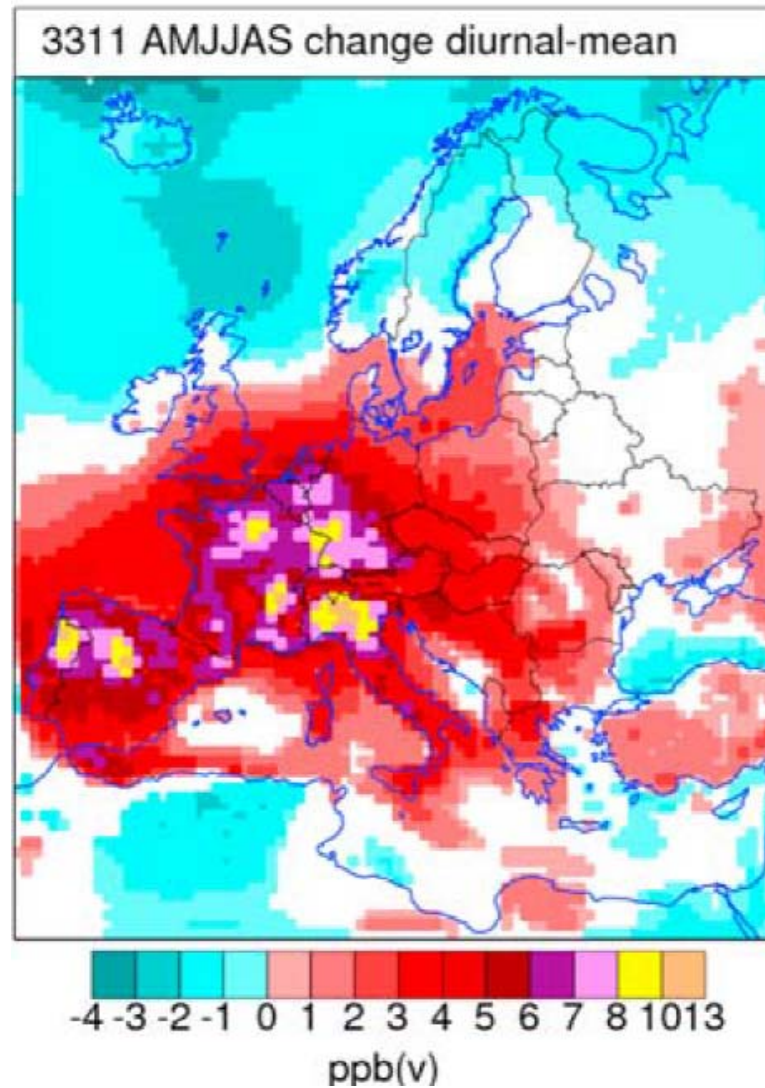
- Land Use Change will promote bioenergy plants
→ + BVOC



Relevance of Climate Change

Increase of summer ozone conc. due to climate change up to 2100

Right: Additional impact of rescaled BVOC emission

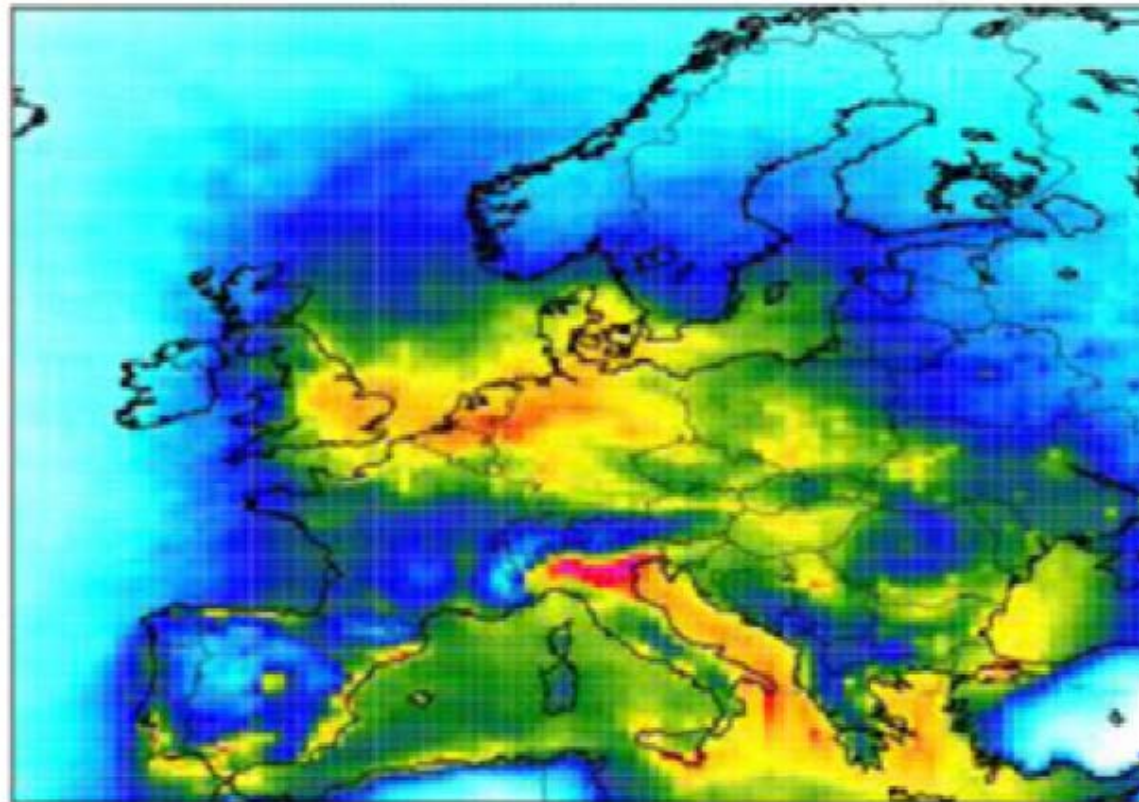


Andersson et al. 2010 (JGR)

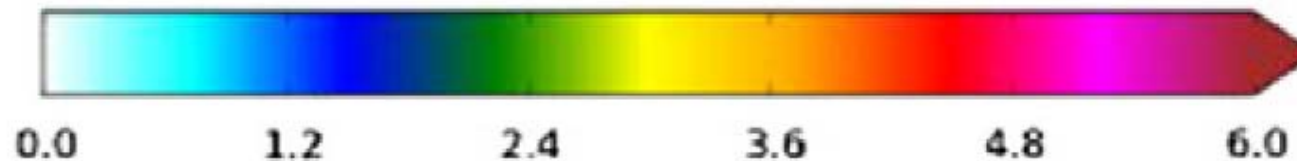
Relevance of Land Use Change

relative increase upon landuse change

5 % crop & grassland converted into poplar plantations



(6 °C corresponds to 40% AOT40 increase)



mean of daily ozone maxima [% increase] Beltman et al. 2013 (AE)

Conclusion

BVOC Emissions from trees
- Forming ozone or protecting against ozone?

Both!

Thank's