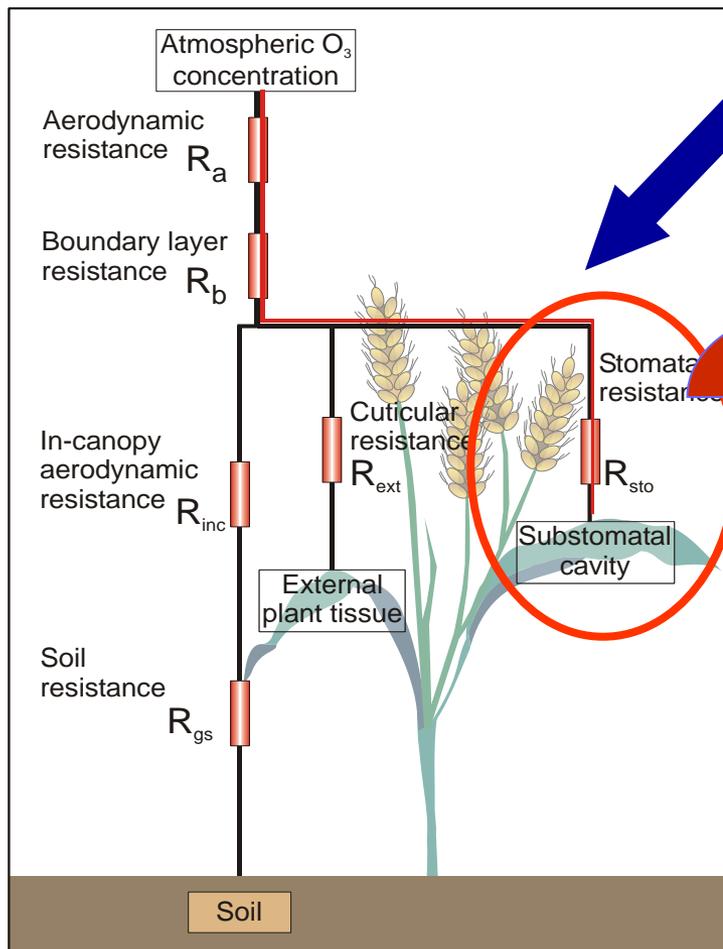


Preparations for the Ozone Critical Levels Workshop (November, 2016)

Gina Mills*, Sabine Braun, Per Erik Karlsson, Håkan Pleijel, Patrick Büker and Ignacio Gonzalez-Fernandez

Ozone risk assessment methodology



Ozone concentration
(AOT40)

Ozone flux/stomatal uptake
is growth stage dependent
and calculated from hourly
mean:

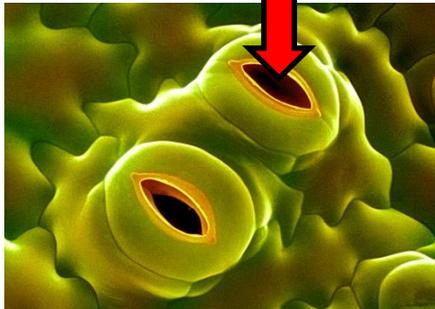
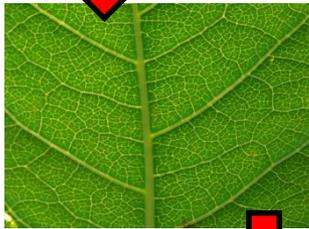
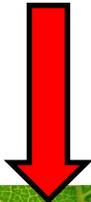
Ozone conc.
Light
Temperature
Humidity (VPD)
Soil moisture

Ozone flux and flux-effect models in LRTAP Manual

POD_γ-based functions and critical levels

Ozone
flux

Influenced by:
O₃
Temperature
VPD, PAR
SMD,
Phenology



Crops	Trees	Grasslands
Wheat *	Birch *	Clover spp*
Potato *	Beech *	Viola spp
Tomato *	Norway spruce *	Buttercup spp
Grapevine	Scots pine	Cocksfoot
Maize	Temperate oak	
Soybean	Poplar	
Sunflower	Aleppo pine	
	Holm Oak	

* Flux-effect relationships available

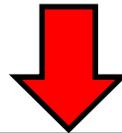
POD_γ: Phytotoxic Ozone Dose
(absorbed by plant)

Preparations for next Critical Levels Workshop

Hindås Methodology Workshop
Sweden, 24 – 25 November, 2015

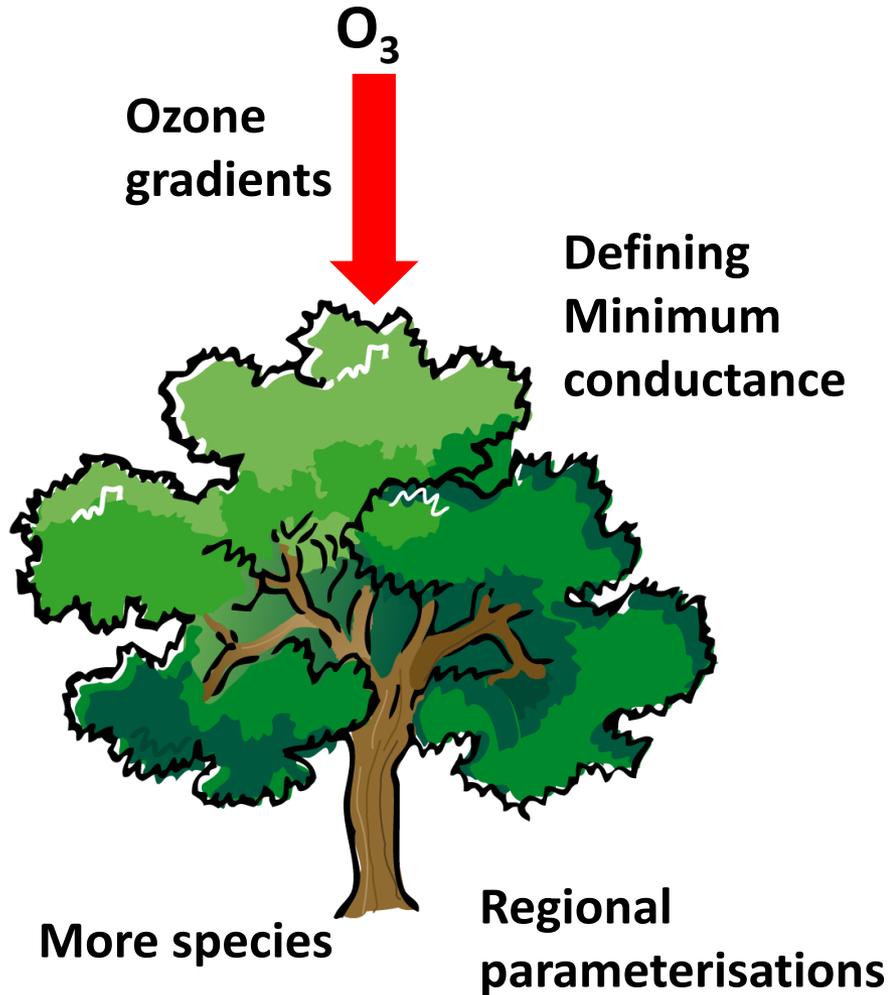


**Deganwy Response Functions
Workshop**
7- 9 June, 2016, UK

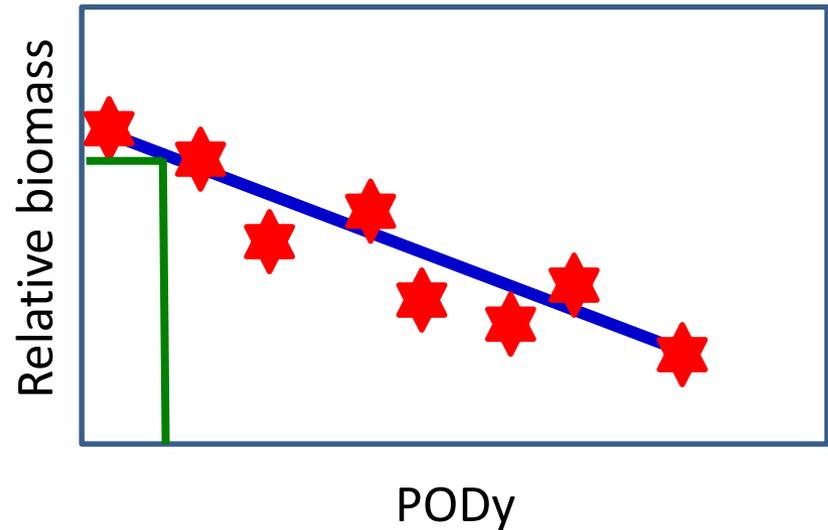


Ozone Critical Levels Workshop
w/s 7 November, 2016, Spain

Revision process



- Calculating relative biomass
- Time interval for accumulation of POD_y
- Defining Y



- Deriving critical levels e.g. long living vegetation

Working Groups

Forests, chaired by Patrick Büker, UK

Crops, chaired by Håkan Pleijel, Sweden

(Semi-)natural vegetation, chaired by Ignacio Gonzalez-Fernandez, Spain

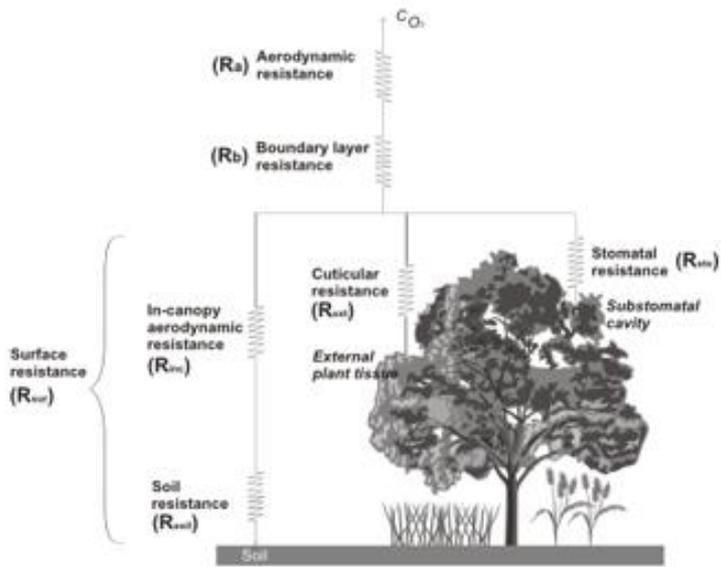
Supported by:

- Unified methodology (Sabine Braun, Switzerland)
- Field evidence (Felicity Hayes, UK)

SPARES

Critical levels for ozone, an evolving process

Year	Workshop	Progress
1988, 1989	Bad Harzburg, Germany	Annual mean
1992	Egham, UK	AOT40 introduced
1993	Bern Switzerland	AOT40 established
1996	Kuopio, Finland	AOT40 extended
1999	Gerzensee, Switzerland	First flux-based critical levels considered
2002	Gothenburg, Sweden	First flux-based critical levels accepted
2005	Obergurgl, Austria	CLs updated based on new knowledge
2009	Ispra, Italy	CLs updated based on new knowledge
2016	Madrid, Spain	CLs and methodology to be updated, including climate change impacts

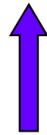
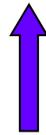
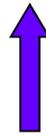
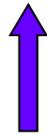
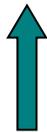


DO3SE

Deposition of Ozone for Stomatal Exchange

<http://www.sei-international.org/do3se>

$$g_{sto} = g_{max} * [\min(f_{phen}, f_{O3})] * f_{light} * \max\{f_{min}, (f_{temp} * f_{VPD} * f_{SWP})\}$$



Species-specific value

Separate functions for effects of phenology, ozone, light, temperature, VPD (humidity) and soil moisture (SWP) on stomatal conductance