Project Number 282910

ÉCLAIRE

Effects of Climate Change on Air Pollution Impacts and Response Strategies for European Ecosystems

Seventh Framework Programme

Theme: Environment

D16.2 Map of critical ozone uptake thresholds at European scale

Due date of deliverable: **01/10/2013** Actual submission date: **06/11/2013**

Start Date of Project: **01/10/2011** Duration: **48 months**

Organisation name of lead contractor for this deliverable : **RIVM**

Project co-funded by the European Commission within the Seventh Framework Programme		
Dissemination Level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	☐
RE	Restricted to a group specified by the consortium (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

1. Executive Summary

Existing ozone thresholds, mostly developed by the ICP Vegetation network under the LRTAP Convention and now further investigated in several ECLAIRE work packages, have been compiled and scrutinized for their applicability in large-scale (European) assessments.

Critical thresholds of ozone have shifted from limits on the accumulated ozone concentration above a threshold (AOT) to the phytotoxic ozone dose (POD), mostly related to yield reductions. To assess the exceedance of those critical thresholds, a database on the coverage of 20 tree species (groups) has been compiled on a 0.01°×0.01° grid covering Europe. Using the RCA3-ECHAM5_A1B-r3 scenario, agreed to be used by all DGVM/SVGM model simulations within ECLAIRE, those exceedances can be assessed for any year in the period 1960-2050. Examples for the years 2000 and 2030 are given below.

Findings of the ongoing ECLAIRE activities (e.g. DO3SE modelling), which might lead to adjustments/modifications of the current thresholds, will be included as soon as they become available.

2. Objectives:

Critical ozone thresholds have been compiled to allow the mapping of their exceedances on a European scale under different climate/pollution scenarios.

3. Activities:

Existing ozone thresholds, mostly developed by the ICP Vegetation network under the LRTAP Convention and now further investigated in several ECLAIRE work packages, have been compiled and scrutinized for their applicability in large-scale (European) assessments.

4. Results:

Critical thresholds of ozone have shifted from limits on the accumulated ozone concentration above a threshold (AOT) to the phytotoxic ozone dose (POD), and these are related to yield reductions. E.g., the yield reduction (RY, in %) for spruce (*Picea* spp.) is linearly related to the POD_1 (in mmol/m^2) by $RY = 100–0.24 \cdot POD_1$. A database on the coverage of 20 tree species (groups) has been compiled on a 0.01°×0.01° grid (about 0.5 km×1km) covering Europe and this is used to assess the exceedance (and thus yield reduction) due to ozone for forests on a European scale. Fig. 1 shows as an example the exceedance in the years 2000 and 2030, the latter under the common ECLAIRE scenario RCA3-ECHAM5_A1B-r3, on the rotated Lon-Lat grid (grid size: 0.44°×0.44°) agreed to be used for all DGVM/SVGM models within ECLAIRE.

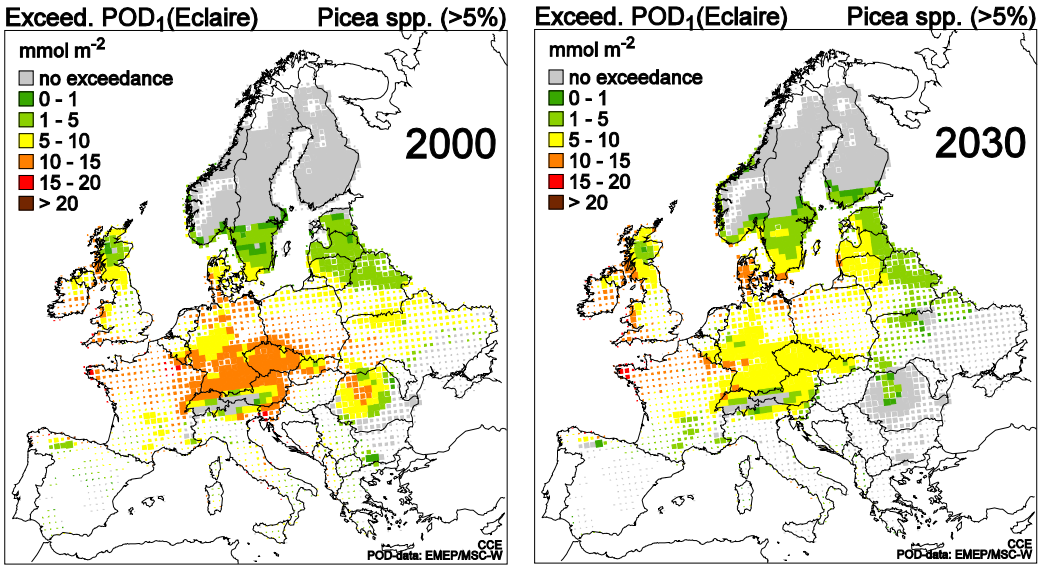

Figure A: Exceedance of the POD1 critical threshold (averting a yield reduction of > 5%) for spruce (*Picea* spp.) in the year 2000 (left) and 2030 (right) under the RCA3-ECHAM5_A1B-r3 scenario (Note: size of coloured grid cells reflects coverage of spruce).

Analogous relationships have been compiled for other tree species (groups) and crops. The current thresholds are independent of geographical location and local (soil) parameters, and thus a mapping of them is of little practical value. New results on ozone impact indicators and thresholds are expected from the ongoing activities (both experimental and modelling) in other ECLAIRE components.

5. Milestones achieved:

Not linked to any specific milestone.

6. Deviations and reasons:

The short delay of one month allowed incorporating discussions/findings from the General Assembly meeting in Oct. 2013.

7. Publications:

None

8. Meetings:

Discussions at General Assembly meetings and technical meeting at IIASA (22-23 March 2012).

9. List of Documents/Annexes:

None