ICP Vegetation update

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** Financial support provided by Defra (UK) and UNECE*

Task Force Meeting 2024

In person: 19-22 February 2024. Hosted by Lithuanian Research Centre for Agriculture and Forestry.
62 registered participants

Next meeting will be In Person (hopefully!), February 2025 in Albania

ICP Vegetation

Overview

Current major topics:

Ozone impacts (global), in current and future scenarios

Nitrogen (impacts on vegetation and deposition to mosses)

Metal deposition (mosses as biomonitors) – Europe+

Participation

63 countries/territories currently contributing

Albania	Czechia	Iceland	Moldova	Spain
Algeria	Denmark	India	Mongolia	Sweden
Argentina	Egypt	Indonesia	Montenegro	Switzerland
Armenia	Estonia	Ireland	Norway	Tanzania
Austria	Faroe Islands	Italy	Pakistan	Thailand
Azerbaijan	Finland	Japan	Poland	Turkey
Belarus	France	Kazakhstan	Romania	Uganda
Belgium	North Macedonia	Kenya	Russian Fed.	Ukraine
Bulgaria	Georgia	Kosovo*	Rwanda	UK
Cambodia	Germany	Latvia	Serbia	USA
Canada	Greece	Lithuania	Slovakia	Vietnam
China	Hong Kong	Malawi	Slovenia	
Croatia	Hungary	Malaysia	South Africa	

Mapping Manual - Annexes

Soil Moisture Index: Led by CIEMAT (Spain). This documents the way in which soil water is used in the ozone deposition and flux calculations of the EMEP MSC-W chemical transport model (Simpson et al., 2007, 2012). Presents some problems associated with the availability of robust soil water data, and then the solution adopted for EMEP – the soil moisture index (SMI).

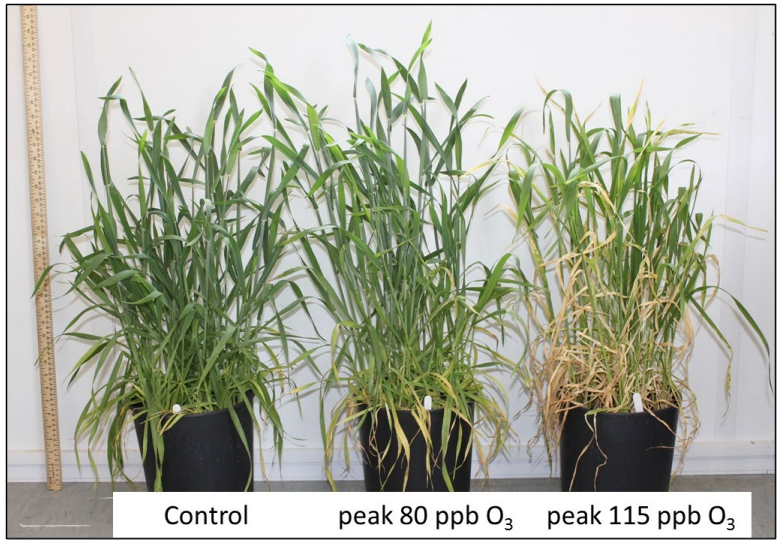
Similar 'supporting documents' to be prepared to support the moss survey – explaining reasoning for decisions and additional information

DO_3SE Model – will include grain protein

In wheat:
Ozone accelerates senescence
Ozone reduces remobilisation of N within the plant
Grainfill is reduced
% Grain protein is increased, but protein yield is reduced

We know global wheat yield is reduced by ozone
What is the impact on dietary protein?

N module has been developed for DO_3SE to investigate this



Signalling using VOCs

The signal emitted by flowers is altered by ozone – altered bVOC quality and quantity. Examples from crops and native (grassland) species

The floral signal is degraded by ozone (and NOx)

More difficult to locate flowers, especially from a distance, which increases foraging times

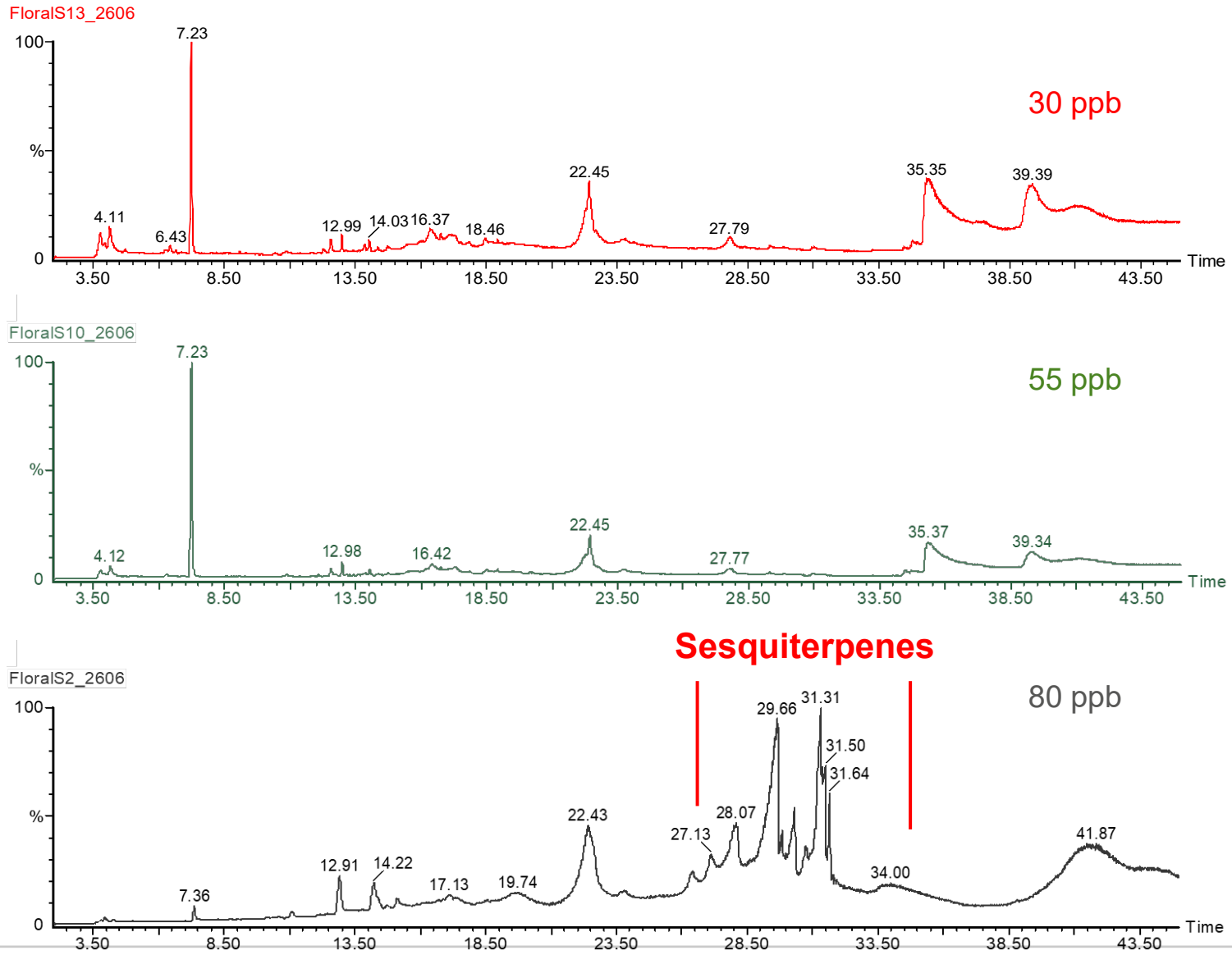
Foraging time is significantly increased with ozone concentrations of 60 ppb (Fuentes et al., 2016)

Floral BVOCs

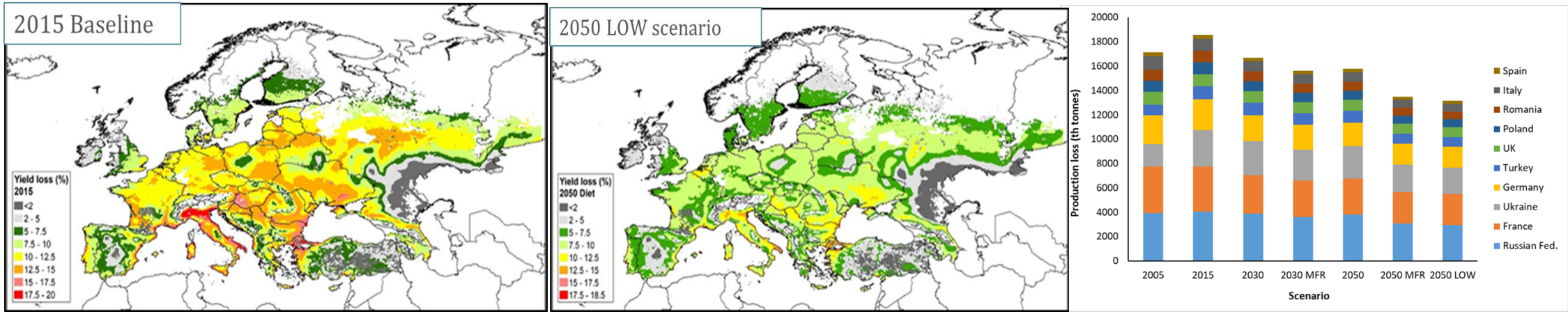
At ‘high’ (80 ppb) concentrations some BVOCs were no longer emitted (aldehydes and carboxylic acids)

Additional BVOCs were emitted (sesquiterpenes)

The overall ‘signature’ was dramatically changed



Review of the effectiveness of the Gothenburg Protocol



'Ready to go' with additional possibilities for:

Wheat production loss (% and Tonnes) due to ozone, using the POD_3IAM metric.

Deciduous forest biomass increment (related to biodiversity risk?)

More limited coverage for **grassland biodiversity**

Outreach – leaflets, youtube, webinars, online course

- ❑ Online course

  https://www.ceh.ac.uk/training/ozone-and-tropical-agriculture

- ❑ Youtube ozone overview

  https://youtu.be/OBEJB-60jQU

- ❑ Webinar on ozone and tropical agriculture. Q&A on ICP Vegetation website
- ❑ Leaflets/brochure on ozone impacts on vegetation
- ❑ Information for Plantwise Knowledgebank on ozone injury symptoms

Moss survey outreach (to be considered going forwards)

Moss survey

Rest of Europe		SEE Europe	EECCA	Others
[N]Belgium	[N]Latvia	[N]Albania	*Armenia **	Canada
Czech Rep.	[N]Netherlands	[N]Bulgaria	*Azerbaijan*	*Mongolia*
[N]Denmark-Faroe Islands	[N]Norway	*Greece-North **	[N]Belarus	*Vietnam*
Estonia	*Poland*	[N]North Macedonia	[N]Georgia	
[N]France	[N]Slovakia	Romania	*Kazakhstan*	*(India)*
Germany	*Spain-Rioja*	[N]Serbia	[N]Kosovo***	
[N]Iceland	[N]Sweden	[N]Slovenia	[N]Moldova	
[N]Ireland	[N]Switzerland	*Turkey-North*	[N]Russian Fed.	
[N]Italy-Bolzano	[N]United Kingdom		*Tajikistan*	

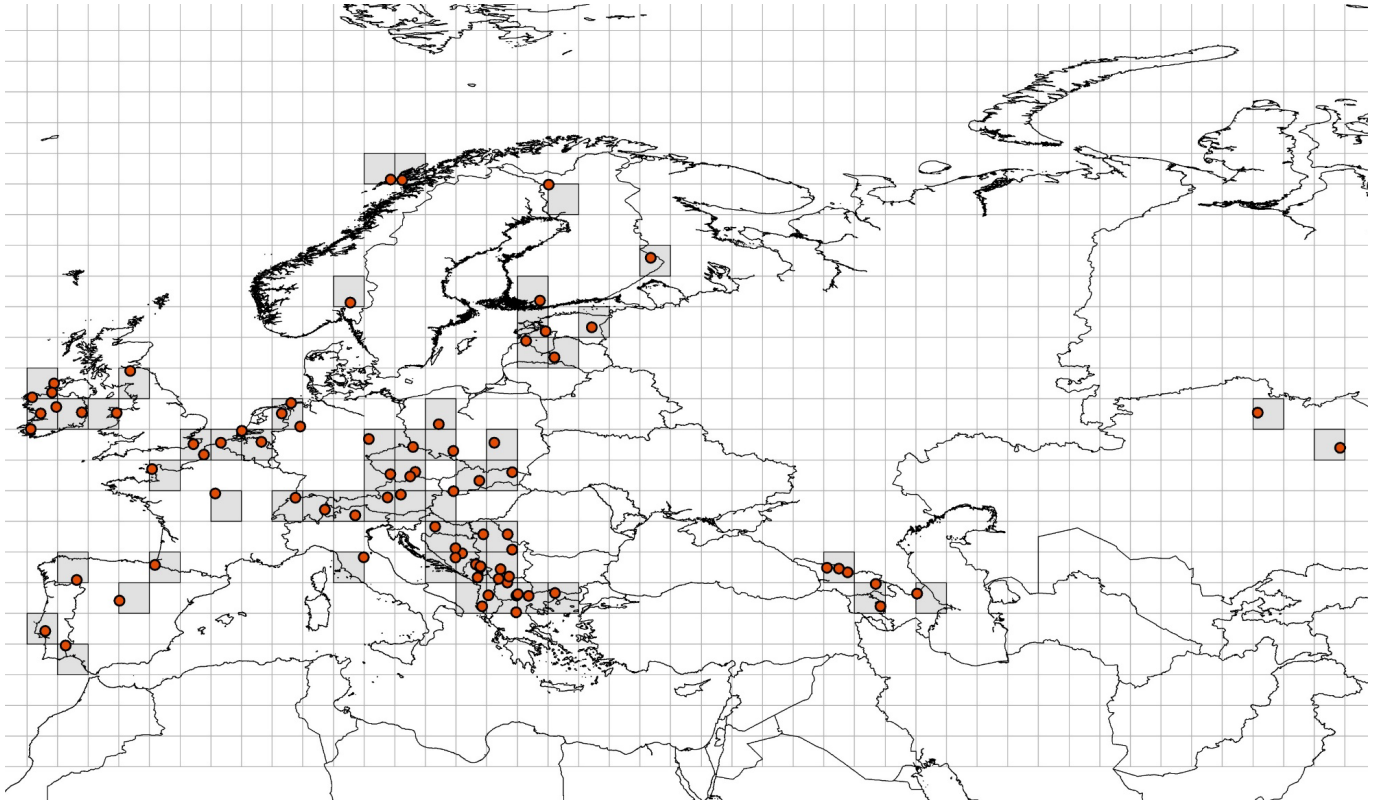
N *Included Nitrogen*
* *Collected samples, not analysed*
** *Collected samples, but no possibility to analyse them*

Black text = data received
Grey italics = previous participant, no data received to date

*** All references to Kosovo are made in the context of UN Security Council Resolution 1244 (1999)

Microplastic Atmospheric Deposition Assessment using Moss in Europe (MADAME)

Felicity Hayes, Julian Aherne, Stefano Loppi, Carmen Wolf, Mehriban Jafarova, Jochen Tuerk, Mike Wenzel, Richard Cross
And participants of the ICP Vegetation



>29 countries participating

Sample preparation complete
Sample analysis underway

MADAME – a few early results

Airborne microplastics are found throughout the UNECE region, even in rural areas such as Scandinavia and western Ireland.

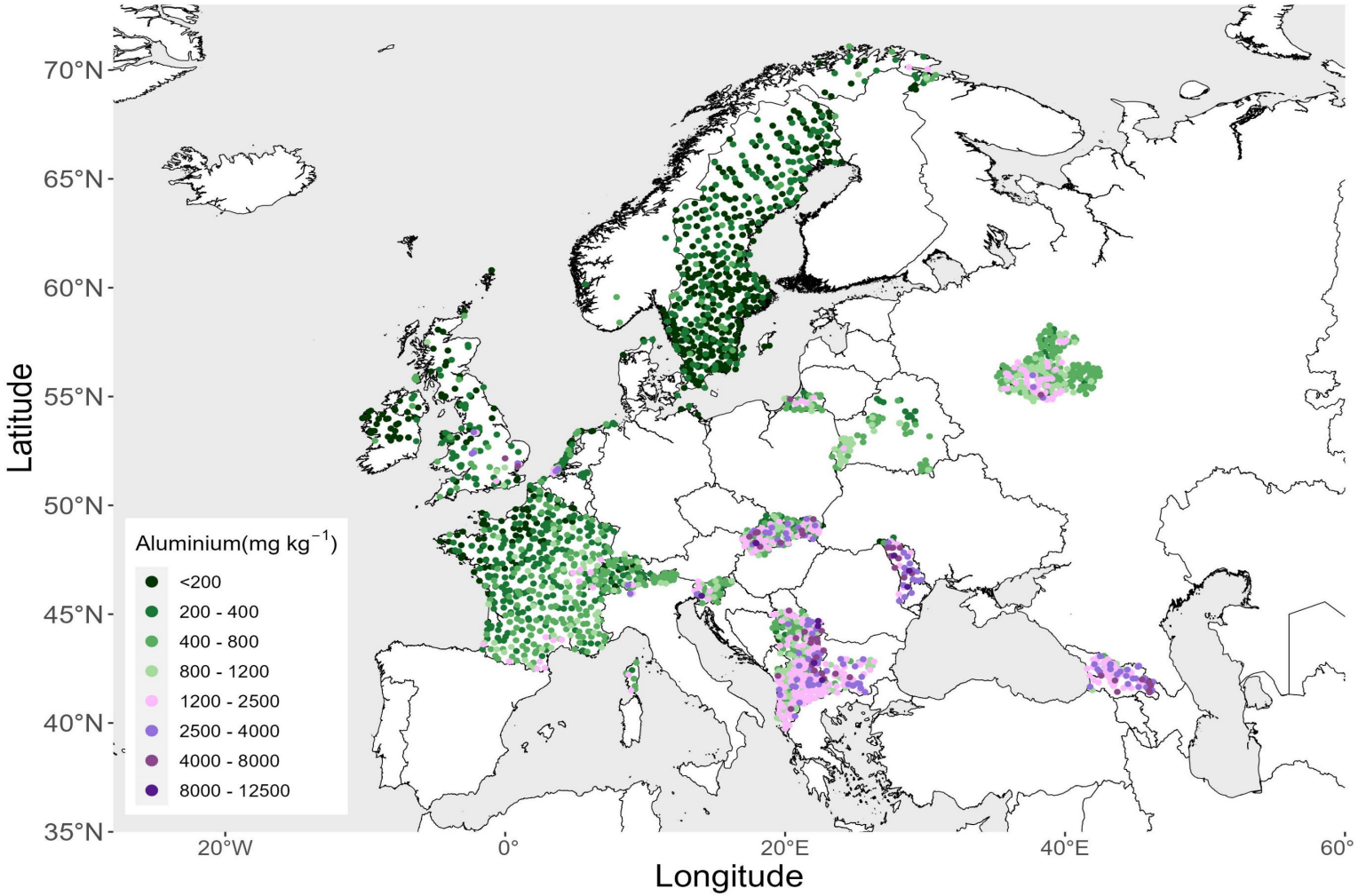
Mosses can be used as a biomonitor for microplastics, but does cause some analytical challenges. Moss is difficult to chemically digest in large quantities.

MADAME has found a wide range of microplastics in moss samples:

- textiles
- plastic litter
- foams

- polyurethane
- cellulose acetate
- polyethylene

Questions remaining about sources, retention time in moss, whether internal or external, impacts



New ‘colour blind friendly’ colour scheme to be used on maps relating to the 2020 survey

Maps using the original colouring will be presented in an annex to allow easy comparison to previous surveys

ICP Vegetation Workplan (2024/2025)

Number	Item	Notes
1.1.1.13	Call for data for moss survey 2025-2026	
1.1.1.13	Report on results from 2020– 2021/22 moss survey on HM, N and POPs	In progress
1.1.1.13	Report of survey of microplastic content of mosses (2022/2023) and potential for use of mosses as bioindicators of airborne microplastics	
1.1.1.14	Develop state of knowledge report: Impacts of O3 on C sequestration in Europe	With ICP Forests
1.1.1.15	Review critical levels for NOx	In progress
	Additional work relating to the Review of the Gothenburg Protocol, and impact to vegetation from the methane contribution to ozone formation	

Thank you