Appendix A Call for Data 2014/15: Instructions

This appendix is a reprint of the instructions for the 2014-2015 Call for Data

Introduction

At its 33rd session (Geneva, 17-19 September 2014) the Working Group on Effects "…requested the CCE to organise the new call for data and report its results to the thirty-first meeting of the ICP Modelling and Mapping Task Force to be held in Zagreb (Croatia) in 2015 and to the Working Group at its thirty-fourth session" (para. 45; ECE/EB.AIR/WG.1/2014/2 in press)

The document in front of you contains the instructions on how to reply to this Call for Data 2014/15. The call aligns the critical load database to the new longitude-latitude deposition grid of EMEP and comprises critical loads determined by Simple Mass Balance (acidification and eutrophication), empirical critical loads, and critical loads for protecting plant species diversity.

Aims of the Call for Data

The aims of the Call for Data are:

To adapt the critical load database to the 0.50° × 0.25° and 0.1° × 0.1° longitude-latitude grids, used by EMEP, to ensure compatibility of the European critical loads database with these new EMEP grid resolutions;

To offer the possibility to NFCs to update their national critical load data on acidity and eutrophication;

Apply novel approaches to calculate nitrogen and sulphur critical load functions taking into account their impact on biodiversity. For this, National Focal Centres are encouraged to use the 'Habitat Suitability Index' (HS-index) agreed at the M&M Task Force meeting.

Deadline, documentation and other general information

Deadline for submissions is 23 March 2015.
Please email your submission to jaap.slootweg@rivm.nl. The data can be attached to the email, but large data files can also be uploaded; in this case contact Jaap Slootweg for instructions.

All information is also available on our website www.wge-cce.org under News. It is suggested to look there occasionally for updates.
To facilitate the integration into the European database at the CCE, you should use the Access Database template developed by the CCE. This template is described in Section 7.

Note: At the 33rd session of the Working Group on Effects it was "… noted that national data under the ICP Forests on critical loads and underlying variables would be provided to National Focal Centres of the ICP Modelling and Mapping in the coming weeks enabling them to complete the national critical loads data for inclusion in the European critical loads database" (para. 33e; ECE/EB.AIR/WG.1/2014/2 in press).

Therefore, Mapping and Modelling NFCs that receive critical load and underlying data from National Focal Points of the ICP-Forest are encouraged to include this data in their submission to the CCE, provided that the ICP-F data is complete and consistent with the submission instructions from the CCE. For this, NFCs are requested to add the attribute "measured" that the CCE introduced since 2008 to facilitate the incorporation of external data and indication of its origin. For reasons of quality control and assurance the CCE must stress, however, that only the NFCs of the ICP M&M have the responsibility/authority to submit national critical load data to the CCE for incorporation in the European critical loads database.

As with earlier calls for data, NFCs are requested to provide documentation of their submission that will be reported by the CCE in the 2015 reporting. This documentation is of importance for the justification of the use of your data in support of (European) air pollution abatement policies. Your documentation should focus on the data sources and methods applied in your country. You can consider the methods described in the Mapping Manual (www.icpmapping.org) as thoroughly documented; there is no need to repeat them; please enter as reference for the Mapping Manual 'ICP M&M, [yr]. Mapping Manual, www.icpmapping.org, accessed [day mon yr]', like in this document.

The CCE reporting requirements are best served by sending a Word document with a plain single-column layout. Please avoid complicated formatting of your text, tables and figures: E.g., no special fonts; also, figure captions should be plain text and not part of the figure! Please use the dot as a decimal separator and the comma as thousands separator.

The RIVM publication department has formulated stricter demands for figures to improve the electronic accessibility of your contribution by visually impaired readers: Please apply sufficient contrasting colours in your figures. In addition to a figure caption, please add an additional description of the figure especially for the blind; this text should have no references to colours, but a plain description of what is in the picture, e.g. "A map showing the heathlands in the centre of the Netherlands." This text should be entered as 'Alt Text', which can be found (in Word) by right-clicking the mouse on the figure, selecting 'Format…' and select the Alt-text tab when formatting a picture. You also may submit a separate document containing these extended captions.
The final layout will be done under CCE supervision by the RIVM publication department.

Types of Critical Loads and how to submit them
In the history of critical loads, the ICP M&M developed several methods of determining the maximum load for sulphur and/or nitrogen that would not harm an ecosystem. The 'classical' critical loads protected ecosystems against acidification or eutrophication. The limits to the maxima of the critical loads were (most often) concentrations in the soil solution involving the elements H, Al and the base cations for acidification. A simple mass balance (SMB) allows then to calculate the maximum of S and N depositions. Since 2005 we include empirical critical loads in the databases. In recent years, we aimed at developing

critical loads based on biodiversity. We now distinguish four types of critical loads (variable names are also used in the Tables):

Critical loads of acidity (CLacid): The maxima for S and N (See Figure 5.1 in the Mapping Manual (ICP M&M) are given by CLmaxS, CLminN and CLmaxN and generally computed by the SMB model.

Critical loads of nutrient nitrogen (CLnut): For eutrophication the nitrogen deposition is limited by a maximum concentration of N in the soil solution; also here an SMB is applicable. This deposition is denoted as CLnutN.

Empirical critical loads (CLemp): Based on observed effects in ecosystems at different nitrogen depositions (mostly by addition experiments) a maximum nitrogen deposition was agreed upon by experts for more than 40 ecosystem types. These depositions are called empirical critical loads, CLempN (Bobbink and Hettelingh, 2011).

Biodiversity critical loads (CLbdiv): Vegetation modelling can be used to establish limits of chemical variables (e.g., a minimum pH and maximum N concentration) at which typical/desired/key plant species for a habitat/ecosystem can thrive/survive. Values for N and S deposition combinations, i.e. critical loads, can then be derived with soil-chemical models (e.g. SMB) and associated data. These biodiversity N and S critical loads are named (in analogy to acidification) CLNmin, CLSmax, and CLNmax, CLSmin (see Figure 1).
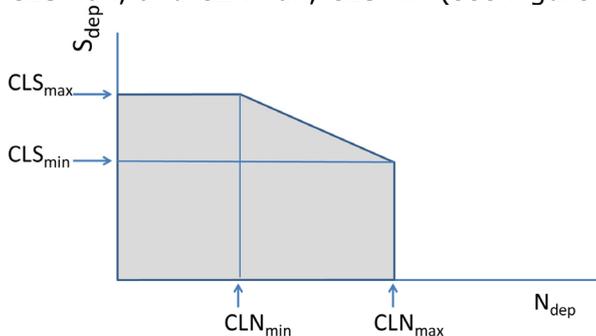

Figure 1. Critical load function for plant diversity, characterised by the two points (CLNmin,CLSmax) and (CLNmax,CLSmin).

Integrating critical loads into a single nitrogen-sulphur critical load function

The four types of critical loads distinguished in the previous paragraph are defined by 9 variables in total (see Figure 2). In a strict interpretation of the definition of a CL of N and S, the final critical load would be the minimum of the individual CLs. Such a final N-S critical load function is illustrated in Figure 2: the darkest area represents combinations of Ndep and Sdep for which none of the critical loads is exceeded. NFCs should not perform this minimization (unless for national purposes). This minimization might be carried out by the CCE when investigating the exceedances of the different CLs.
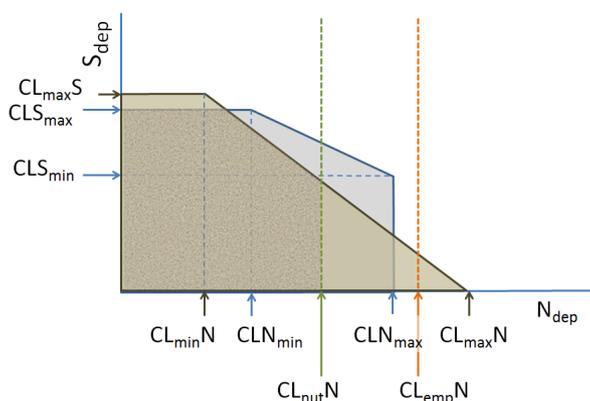
Figure 2. The 9 critical load quantities asked in this Call (see Tables below): CLnutN, CLempN, the 3 quantities defining the acidity CL function (CLmaxS, CLminN, CLmaxN) and the 4 quantities defining the new biodiversity CL function (CLNmin, CLSmax, CLNmax and CLSmin). The darkest area shows the 'minimal critical load function', i.e. all combinations of Ndep and Sdep, for which none of the CLs is exceeded.

The grid system

An ecord is the part of an ecosystem that lies entirely in a single $0.10° \times 0.05°$ Longitude-Latitude grid cell. A grid cell is referred to by its lower-left (south-west) grid coordinates in decimal degrees. You will need to overlay the new grid with your maps containing the data to determine the locations (and potentially divisions) of your critical loads. Most countries apply ArcGIS for the spatial operations. In the Annex 1 to this document[4] you can find detailed instructions for generating the grid, including useful attributes. Following this procedure for your country will help integrating the data into the CCE data base.

Access Database template

The Tables in the database have different purposes and are listed below.
ecords – General site data like coordinates.
CLacid, CLnut, CLemp, CLbdiv – Critical loads, one table for each type, with its related limits.
SiteInfo – General background data for the site.

Table 1. Attributes of the database-table 'ecords'.

Variable	Explanation	Note
SiteID	Unique(!) identifier of the site	1)
Lon	Longitude (decimal degrees)	2)
Lat	Latitude (decimal degrees)	2)
EcoArea	Area of the ecosystem within the grid cell (km2)	3)

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[4] Not printed in this report

Variable	Explanation	Note
Method	The sum of: 1 – Classical SMB for acidification 2 – Classical SMB for nutrient nitrogen 4 – Empirical critical load 8 – Critical loads derived from plant species diversity protection	4)
Protection	0: No specific nature protection applies 1: Special Protection Area (SPA), Birds Directive applies 2: Special Area of Conservation (SAC), Habitats Directive applies 3: SPA and SAC (1 and 2) 4: SPA or SAC (1 or 2) [don't know which one(s)] 9: A national nature protection program applies (but not 1 to 4!) -1: protection status unknown	
EUNIScode	EUNIS code, max. 6 characters	5)

Notes on Table 1 (see last column):

Use integer values only (4-bytes)!

The geographical coordinates of the site or a reference point of the polygon (sub-grid) of the receptor under consideration (in decimal degrees, i.e. 48.533 for 48º31', etc.);

Please remove spurious records with an ecosystem area smaller than 1 ha, unless it has relevance other than for exceedance calculations (e.g. a Natura 2000 site). Furthermore, make sure that the ecosystem area does not exceed the size of the land area of your country in the respective grid cell;

Consider all methods and add the number. E.g., if you applied SMB for acidification and empirical critical load (but neither estimated a CLnutN nor a CLbdiv) this should be 5;

You can find information on EUNIS at http://eunis.eea.eu.int/

Table 2. Attributes of the database-table 'CLacid'.

Variable	Explanation
SiteID	Identifier of the site (see ecords Table)
CLmaxS	Maximum critical load of sulphur (eq ha^{-1} a^{-1})
CLminN	Minimum critical load of nitrogen (eq ha^{-1} a^{-1})
CLmaxN	Maximum critical load of nitrogen (eq ha^{-1} a^{-1})
Crittype	Chemical criterion used for acidity CL calculations: 1: molar [Al]:[Bc]; 2: [Al] (eq m−3); 3: base sat.(-); 4: pH; 5: [ANC] (eq m−3); 6: molar[Bc]:[H]; 7: molar [Bc]:[Al]; 8 molar [Ca]:[Al]; 11: molar [Al]:[Bc] AND [Al] > 0.1meq/L; −1: other
Critvalue	Critical value for the chemical criterion given in 'Crittype'

Table 3. Attributes of the database-table 'CLnut'.

Variable	Explanation
SiteID	Identifier of the site (see ecords Table)
CLnutN	Critical load of nutrient nitrogen (eq ha^{-1} a^{-1})
cNacc	Acceptable (critical) N concentration for CLnutN calculation (meq m^{-3})

Table 4. Attributes of the database-table 'CLemp'.

Variable	Explanation
SiteID	Identifier of the site (see ecords Table)
CLempN	Empirical critical load of nitrogen (eq ha^{-1} a^{-1})

Table 5. Attributes of the database-table 'CLbdiv'.

Variable	Explanation
SiteID	Identifier of the site (see ecords Table)
CLNmin	Minimum critical load of nitrogen (eq ha^{-1} a^{-1})
CLSmax	Maximum critical load of sulphur (eq ha^{-1} a^{-1})
CLNmax	Maximum critical load of nitrogen (eq ha^{-1} a^{-1})
CLSmin	Minimum critical load of sulphur (eq ha^{-1} a^{-1})
HScrit	Critical value of the Habitat Suitability Index

Table 6. Attributes of the database-table 'SiteInfo'.

Variable	Explanation
SiteID	Identifier of the site (see ecords Table)
nANCcrit	The quantity –ANCle(crit) (eq ha^{-1} a^{-1})
thick	Thickness (root zone!) of the soil (m)
bulkdens	Average bulk density of the soil (g cm^{-3})
Cadep	Total deposition of calcium (eq ha^{-1} a^{-1})
Mgdep	Total deposition of magnesium (eq ha^{-1} a^{-1})
Kdep	Total deposition of potassium (eq ha^{-1} a^{-1})
Nadep	Total deposition of sodium (eq ha^{-1} a^{-1})
Cldep	Total deposition of chloride (eq ha^{-1} a^{-1})
Cawe	Weathering of calcium (eq ha^{-1} a^{-1})
Mgwe	Weathering of magnesium (eq ha^{-1} a^{-1})
Kwe	Weathering of potassium (eq ha^{-1} a^{-1})
Nawe	Weathering of sodium (eq ha^{-1} a^{-1})
Caupt	Net growth uptake of calcium (eq ha^{-1} a^{-1})
Mgupt	Net growth uptake of magnesium (eq ha^{-1} a^{-1})
Kupt	Net growth uptake of potassium (eq ha^{-1} a^{-1})
Qle	Amount of water percolating through the root zone (mm a^{-1})
lgKAlox	Equilibrium constant for the Al-H relationship (log10) (The variable formerly known as Kgibb)
expAl	Exponent for the Al-H relationship (=3 for gibbsite equilibrium)
cOrgacids	Total concentration of organic acids (m*DOC) (eq m^{-3})
Nimacc	Acceptable nitrogen immobilised in the soil (eq ha^{-1} a^{-1})
Nupt	Net growth uptake of nitrogen (eq ha^{-1} a^{-1})
fde	Denitrification fraction (0≤fde<1) (-)
Nde	Amount of nitrogen denitrified (eq ha^{-1} a^{-1})
Slope	(°)
Aspect	Angle between North and the perpendicular line of the slope (degrees up to 360°, measuring clockwise) (°)
Prec	Precipitation (mm a^{-1})
TempC	Temperature (°C)
Theta	Water/moisture content [m^3 m^{-3}]
Altitude	Above sea level (m)
Corg	Organic carbon content (%)
Sand	% sand in the soil
Clay	% clay in the soil
Bsat	Base saturation (-)
Cpool	Amount of carbon in the topsoil (g m^{-2})

Variable	Explanation
CNrat	C/N ratio in the topsoil (g g^{-1})
Measured	On-site measurements included in the data for CL calculations: 0: No measurements, 1: ICP Forest, 2: ICP Waters, 4: ICP Integrated Monitoring, 8: ICP Vegetation, 16: Other measurement programme. (if more than one of the listed possibilities applies, add the numbers!)

References:
Bobbink R and Hettelingh J-P (eds), 2011. Review and revision of empirical critical loads and dose response relationships. Proceedings of an international expert workshop, Noordwijkerhout, 23-25 Juni 2010, RIVM eport 680359002, Coordination Centre for Effects, RIVM, Bilthoven

ICP M&M, 2014. Mapping Manual, www.icpmapping.org, accessed 22 Oct 2014