

Update of Critical loads for (possible) use in IAM for policy support under EU and LRTAP Convention

Coordination Centre for Effects (CCE)
ICP on Modelling & Mapping
Working Group on Effects

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Call for Critical Loads (CL) Data 2017:

- Issued 2015
- Reported at TF ICP M&M (Wallingford, 4-6 April 2017)
- Updates/corrections till 5 May 2017
- Reported to (and approved by?) WGE in fall

Types of CLs asked:

a) “Classical” CLs:

- CLs of N and S acidity (CL function, CLF)
- CL of eutrophication: $CL_{eutN} = \min\{CL_{nutN}, CL_{empN}\}$
... submitted by 13 NFCs

b) CLs of biodiversity (CLF)

... submitted by 6 NFCs

... other countries filled with European Background Database

Notation:

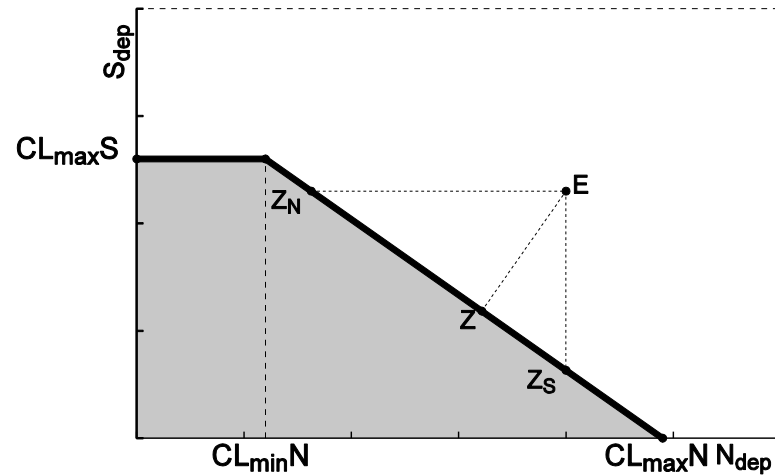
CL of eutrophication:

CLeutN (formerly CLnutN)

CLF of acidity:

CLmaxS,

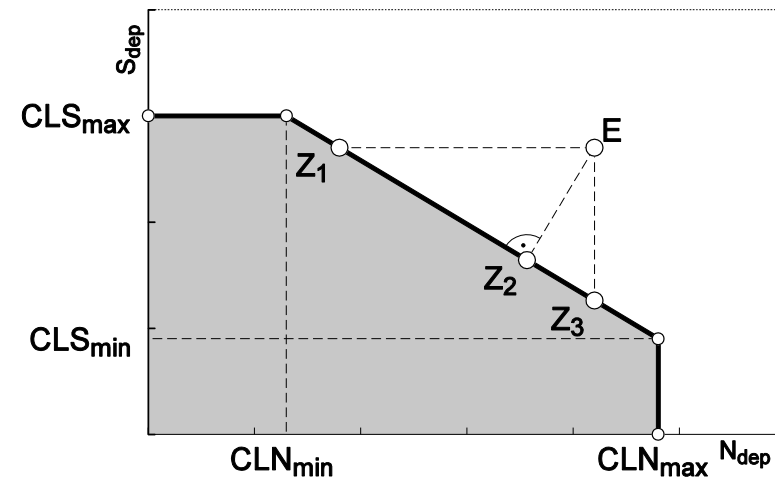
CLminN, CLmaxN



CLF for biodiversity:

CLSmax, CLNmax

CLNmin, CLSmin



(Draft) European critical load database 2017

Note:

**All data presented here are preliminary
and should not be cited or quoted!**

European database of critical loads for eutrophication 2017 vs. 2015

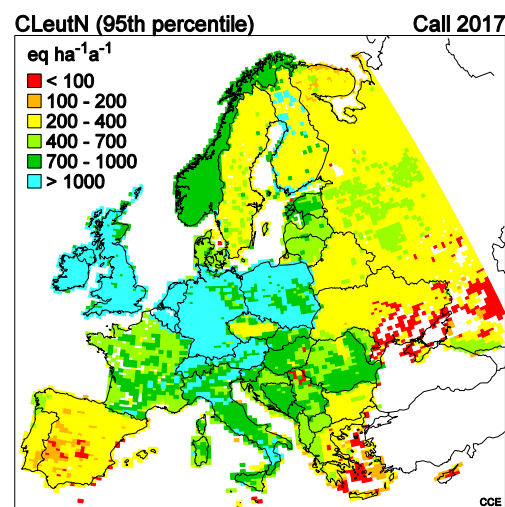
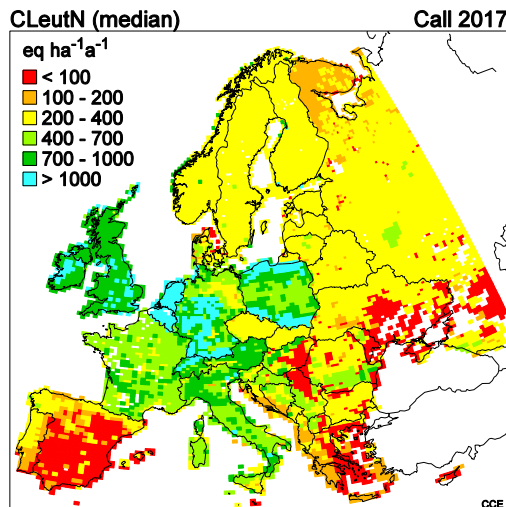
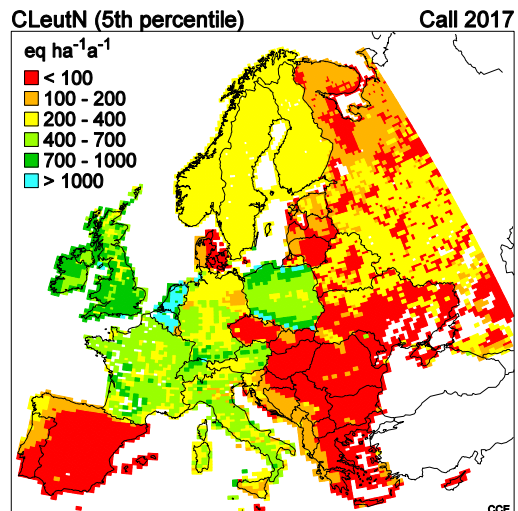
NFC data + CCE background DB for other Parties

Protecting 95%

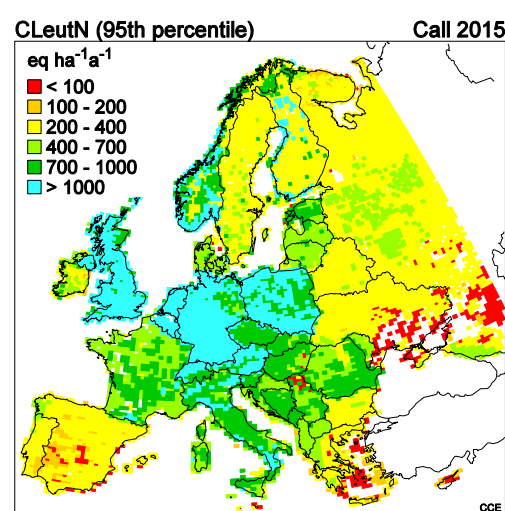
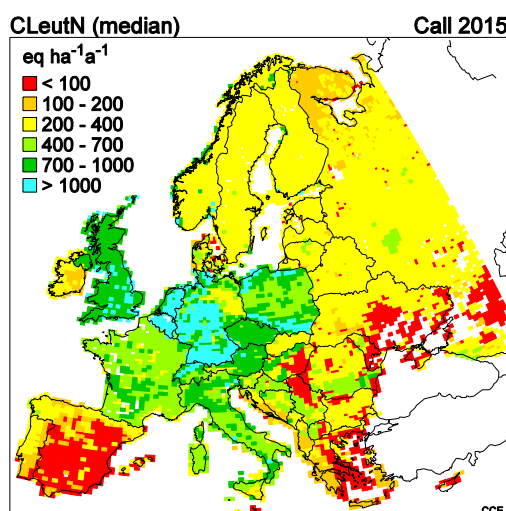
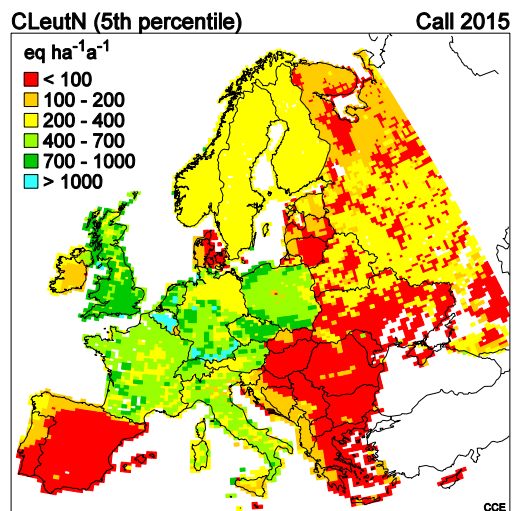
Protecting 50%

Protecting 5%

2017



2015



European database of critical loads for acidification

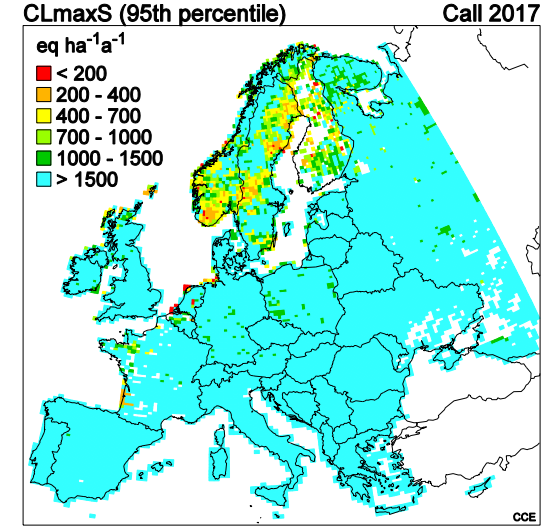
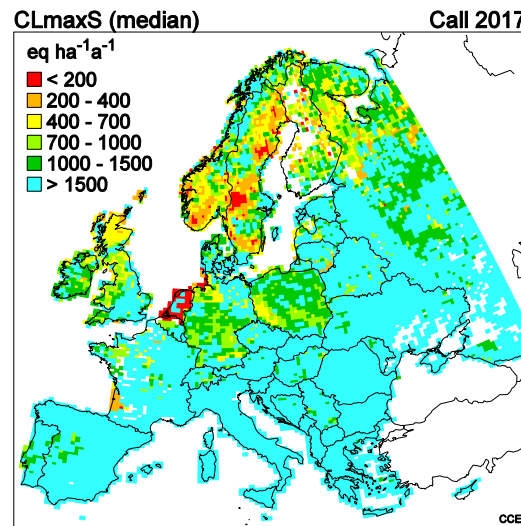
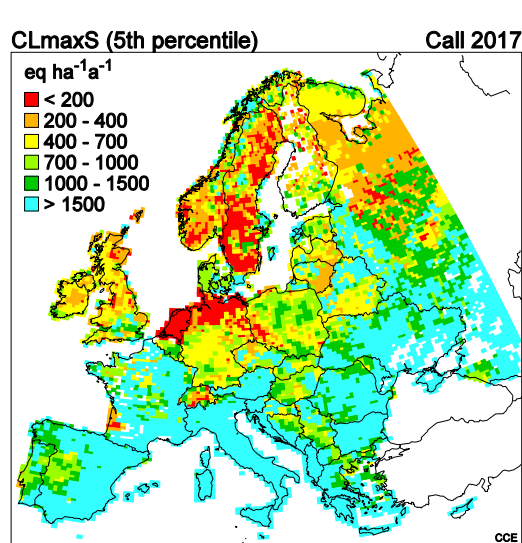
NFC data + CCE backgrounddata for other Parties

Protecting 95 %

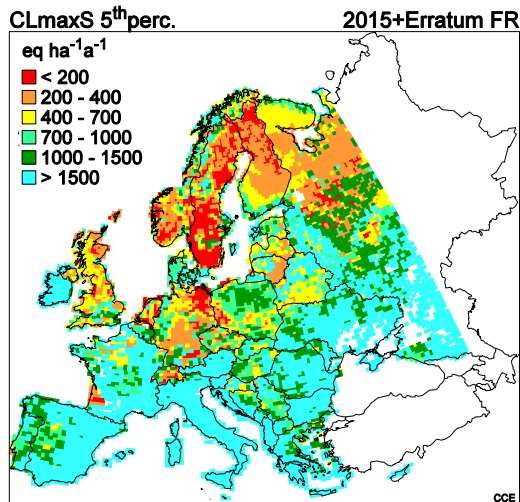
Protecting 50 %

Protecting 5 %

2017



2015

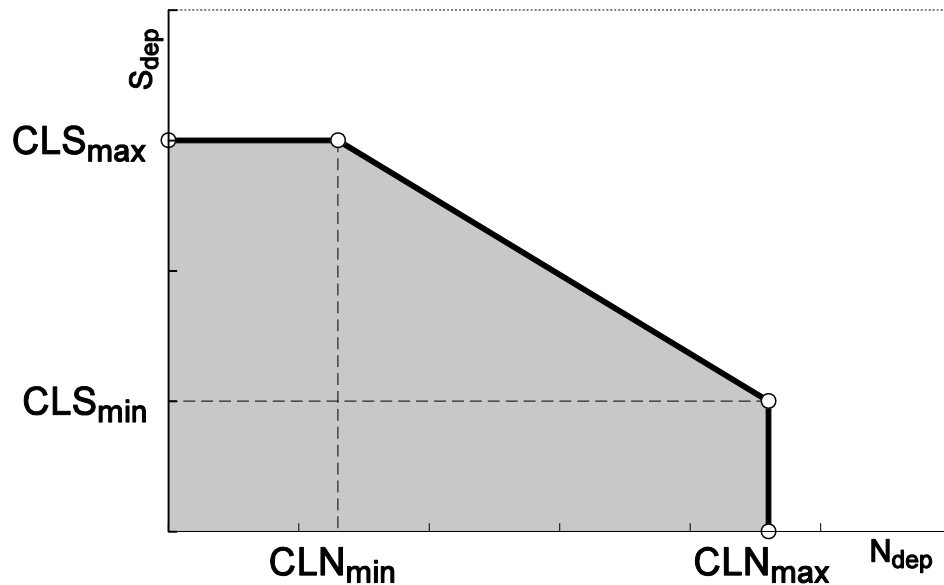
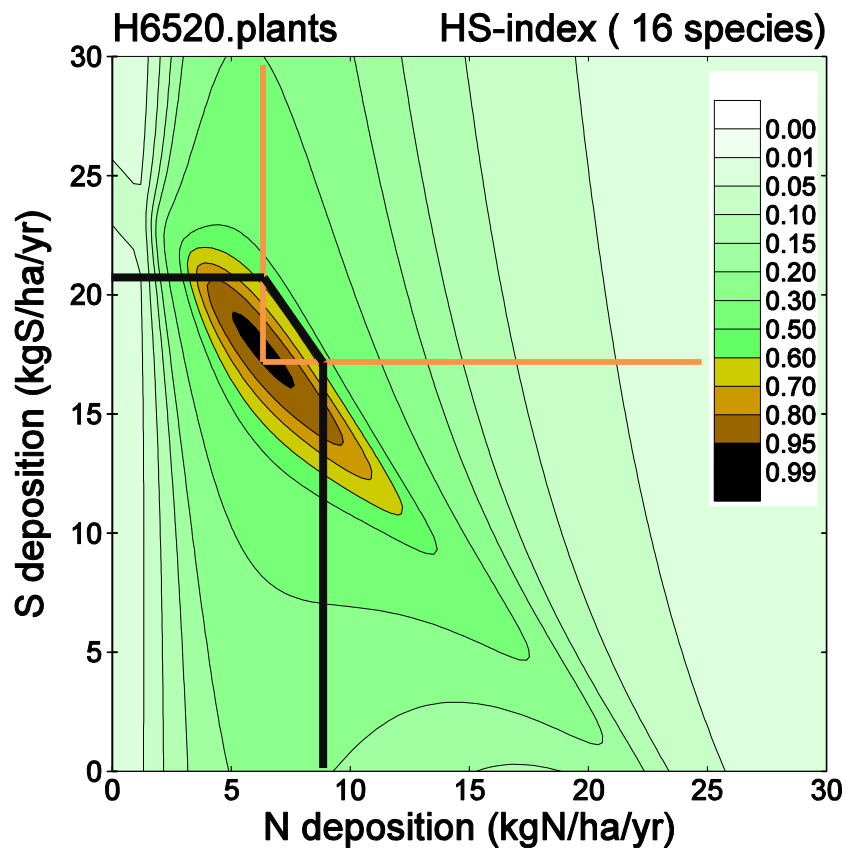


Source: CCE SR 2015, Fig. 2.9 (incl. revised French NFC data)

European CL_{bio} database 2017

(not [yet] for TFIAM policy support)

CL_{bio} : Define critical/acceptable value of HSI (e.g. 80%) and derive/simplify to a CL-function



4 numbers (CLs): $0 \leq \text{CLN}_{\min} \leq \text{CLN}_{\max}$
and $0 \leq \text{CLS}_{\min} \leq \text{CLS}_{\max}$

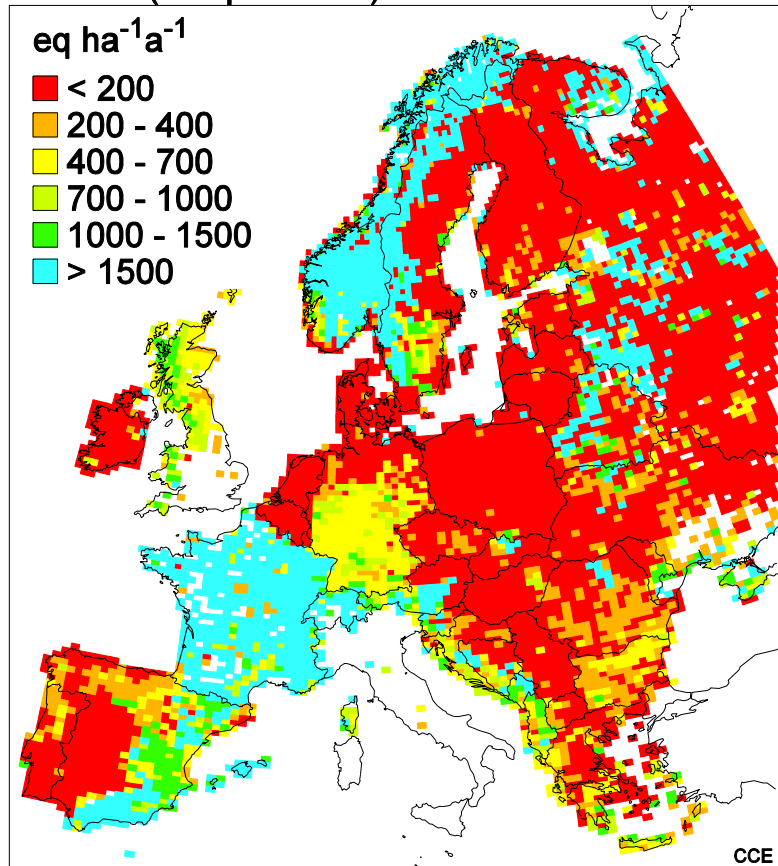
European database of critical loads of biodiversity 2017

NFC data + CCE background DB for other Parties

**CLSmax,
protecting 95%**

CLSmax (5-th percentile)

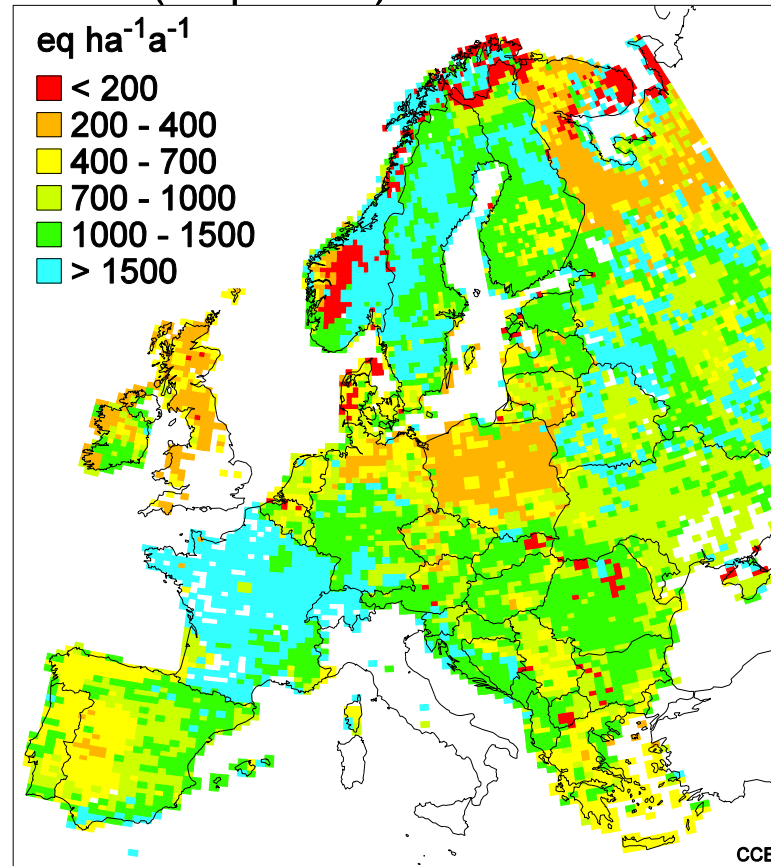
Call 2017



**CLNmax,
protecting 95%**

CLNmax (5-th percentile)

Call 2017



Comparison of:

- CLaci and CLbio
- CLeutN and CLNmax

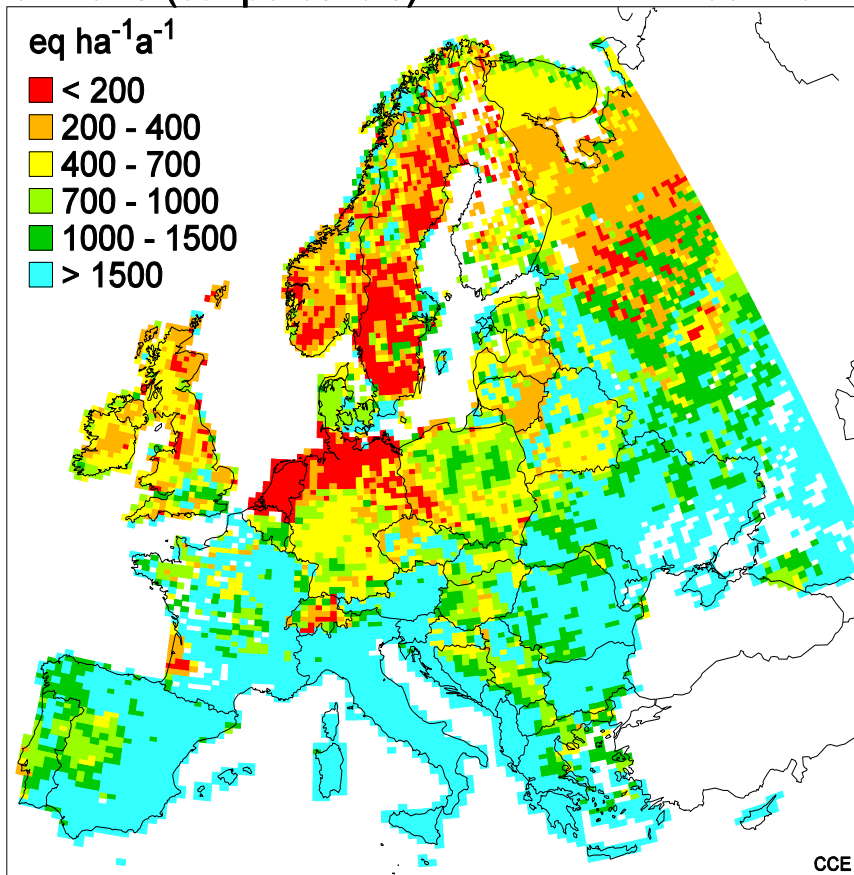
Comparing 5-th percentile CL_{aci} and CL_{bio}

CL_{aci} (CL_{maxS})

CL_{bio} (CLS_{max})

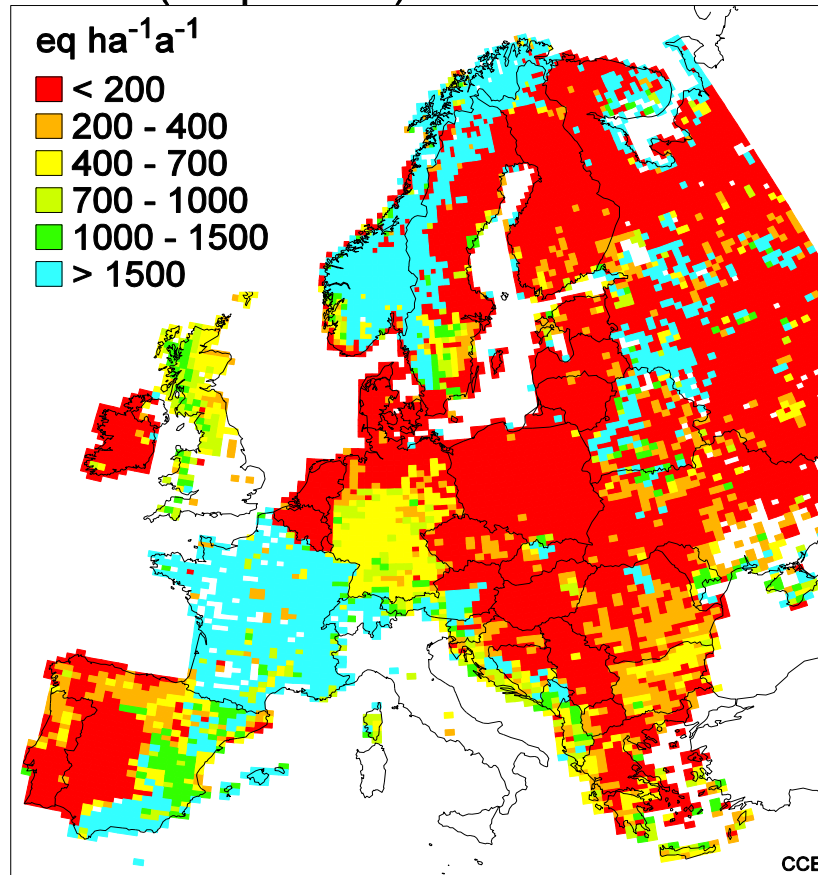
CL_{maxS} (5th percentile)

Call 2017



CLS_{max} (5th percentile)

Call 2017



Comparing 5th percentile $CL_{eut}N$ and CLN_{max}

$CL_{eut}N$

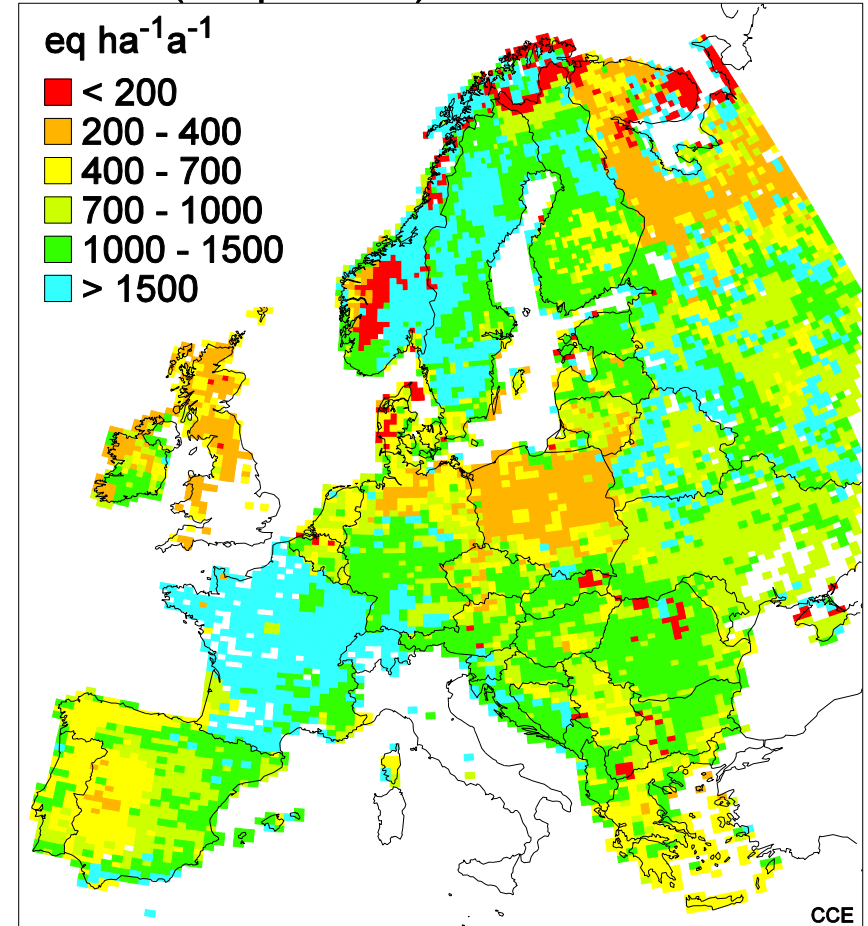
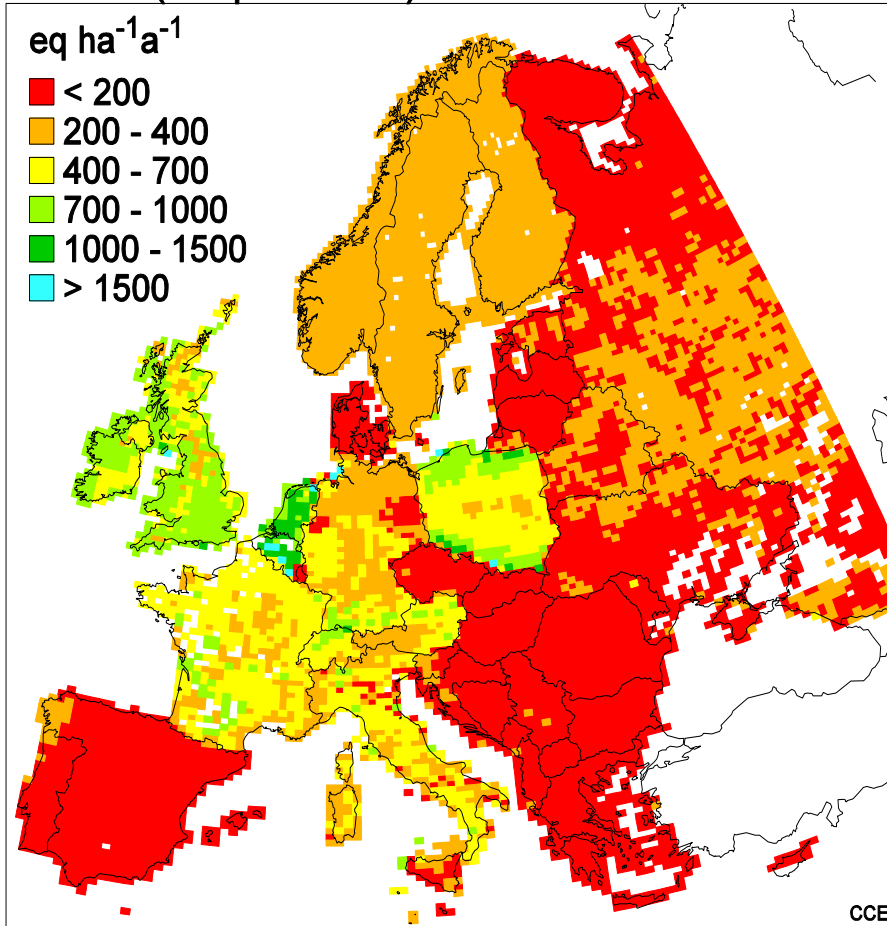
CLN_{max}

$CL_{eut}N$ (5th percentile)

Call 2017

CLN_{max} (5th percentile)

Call 2017



Exceedances in 2005 and 2020

using a Reference (CIAM) NEC-D emission scenario

Area at risk of acidification

(as percentage of 3.2 million km² of ecosystem area)

2005: 10 % area at risk

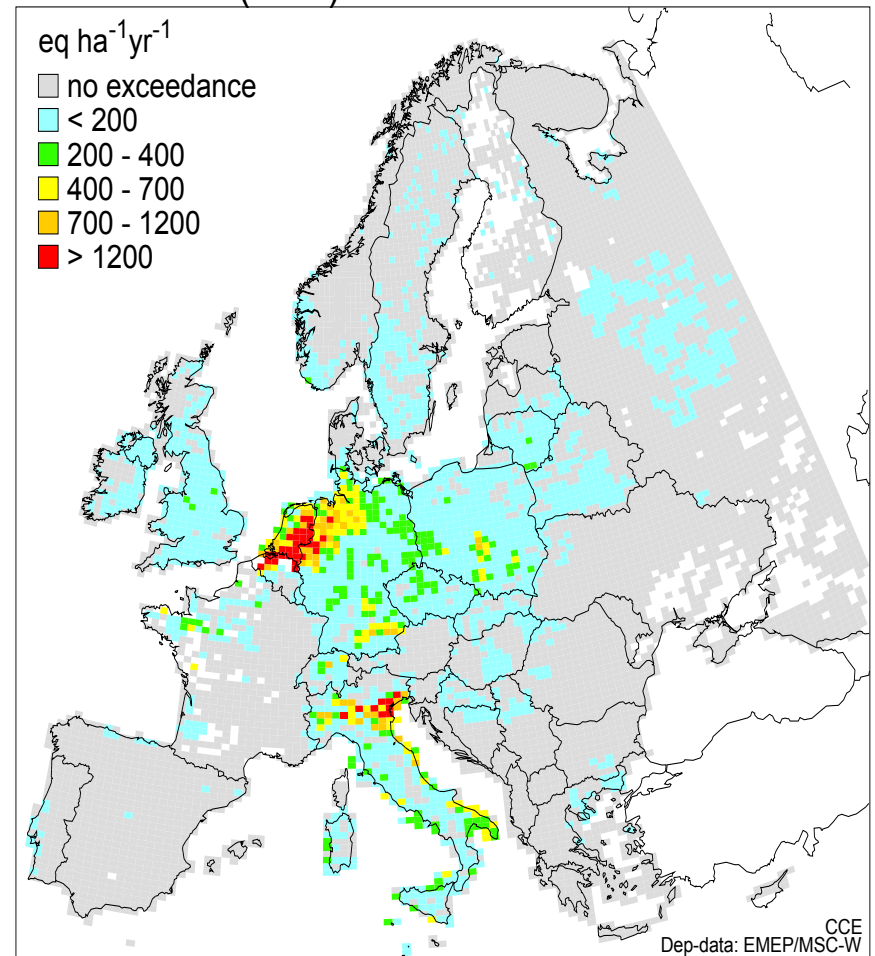
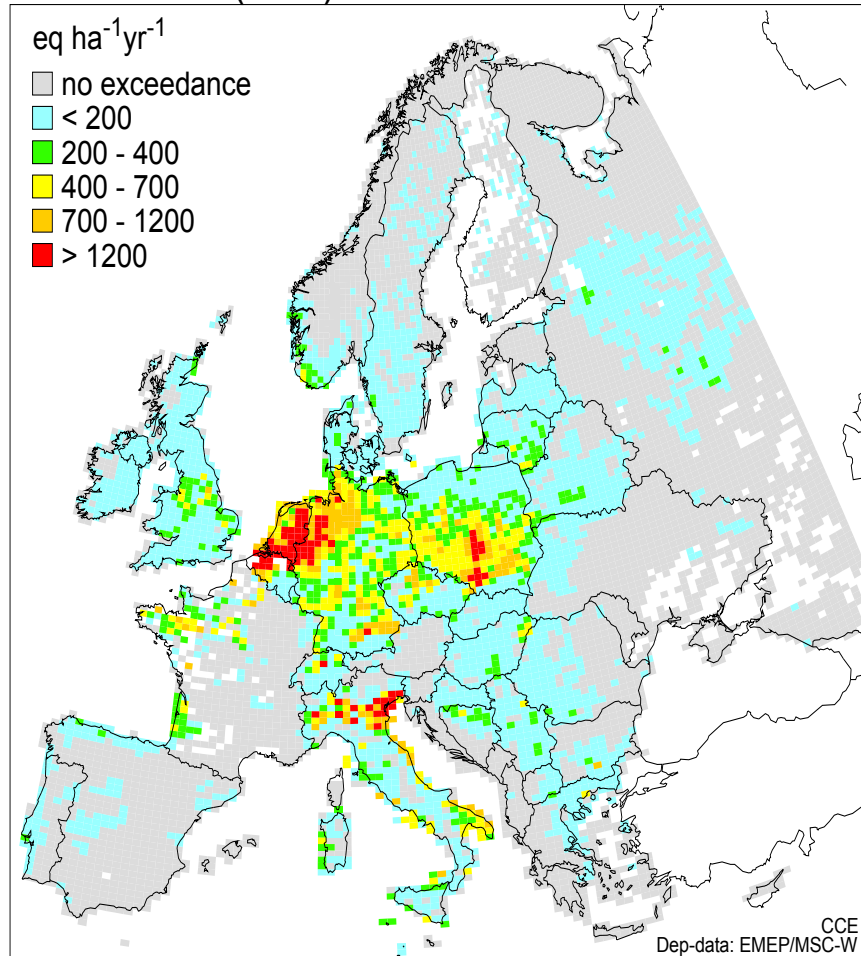
2020: 5 % area at risk

Exceedance (AAE) of CL_{aci}

REF-2005

Exceedance (AAE) of CL_{aci}

REF-2020



Area at risk of eutrophication

(as percentage of 2.9 million km² of ecosystem area)

2005: 67 % area at risk

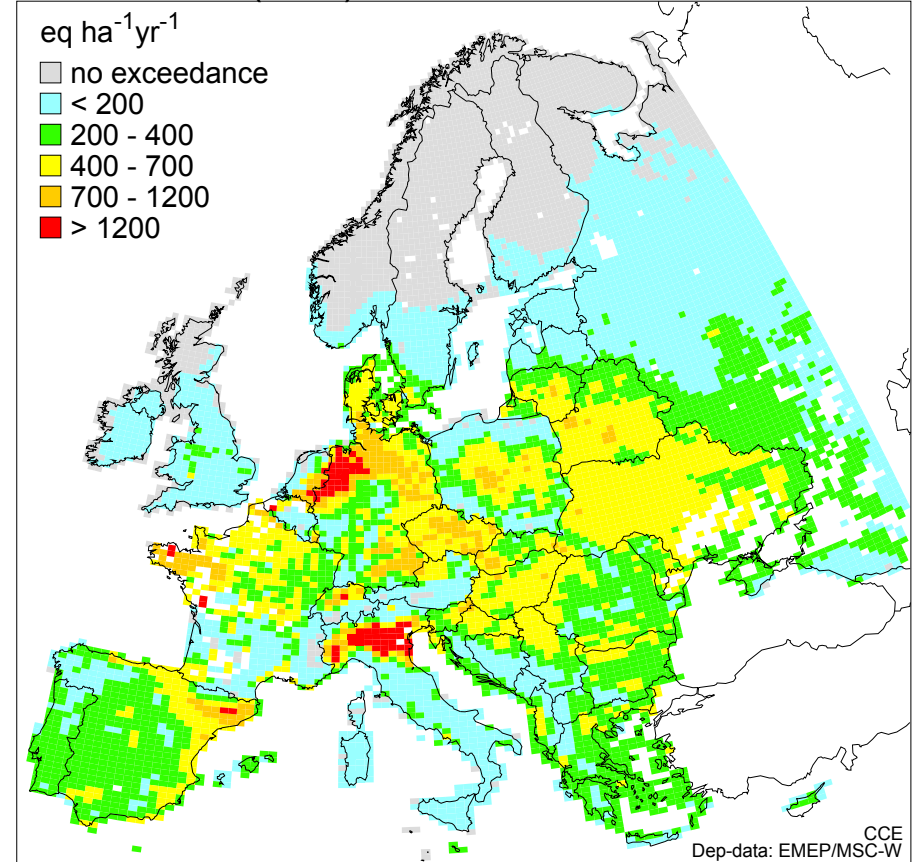
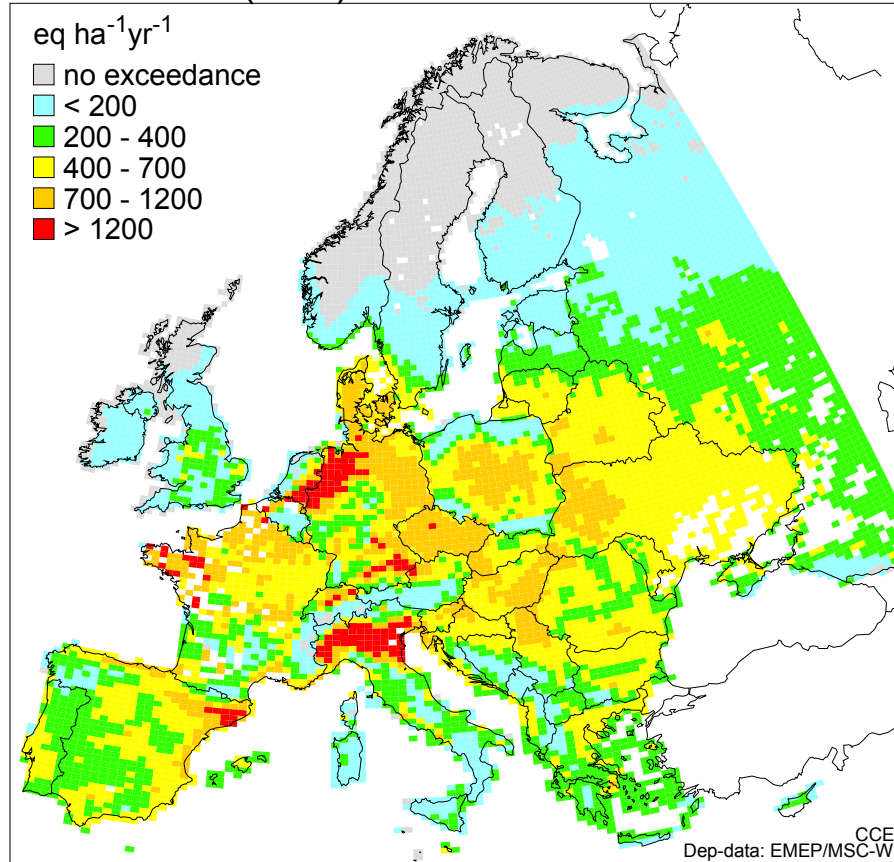
2020: 59 % area at risk

Exceedance (AAE) of CLeutN

REF-2005

Exceedance (AAE) of CLeutN

REF-2020

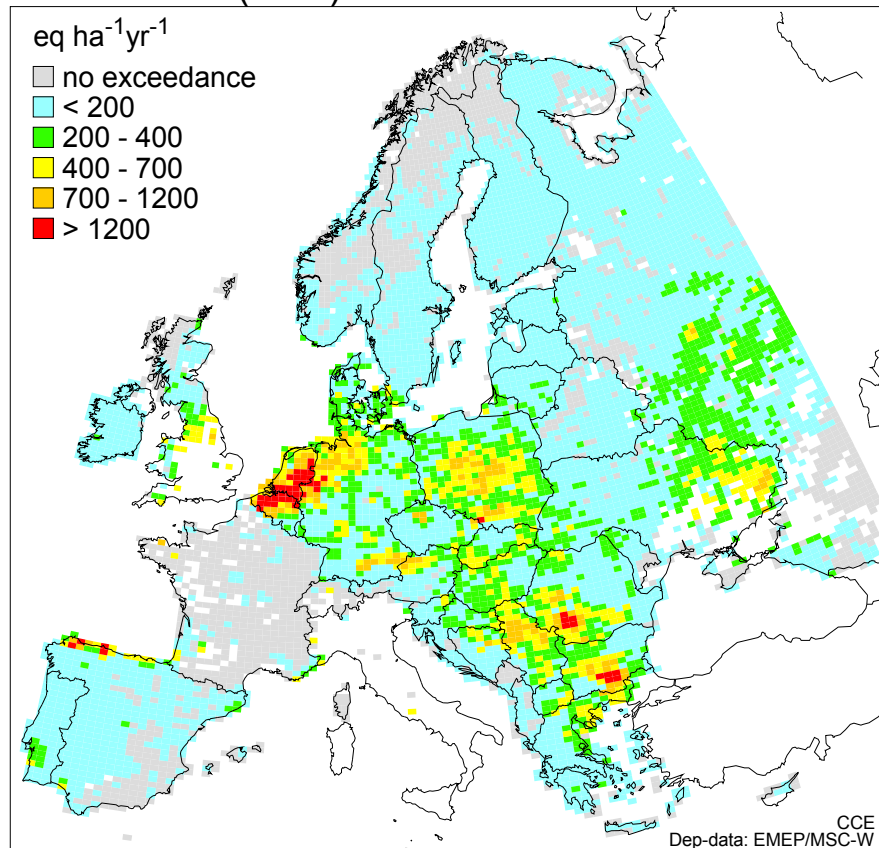


CL_{bio} exceedance (AAE) and area at risk (as percentage of 1.6 million km² covering 23 habitats)

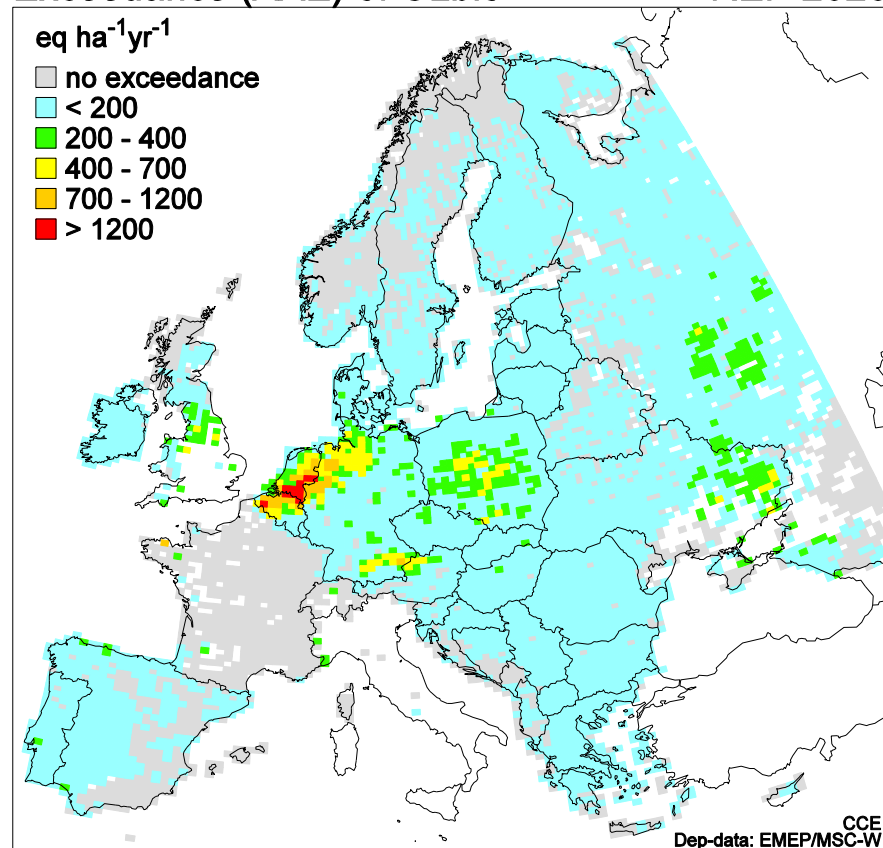
2005: 19 % area at risk

2020: 17 % area at risk

Exceedance (AAE) of CL_{bio} REF-2005



Exceedance (AAE) of CL_{bio} REF-2020



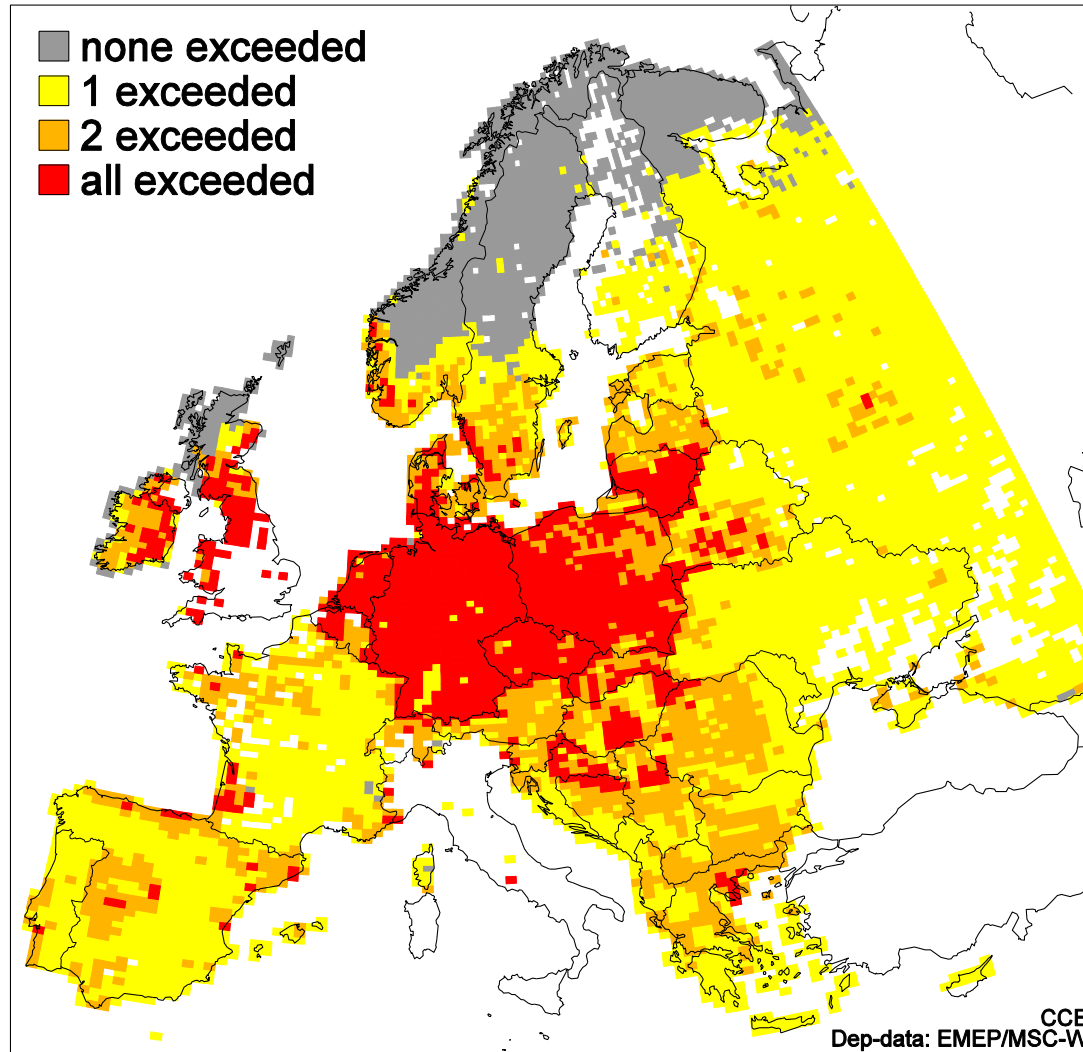
Robustness and uncertainty

Robustness of identifying areas at risk by using exceedances that are computed with varying types of critical loads (“Ensemble assessment” of different critical load methods)

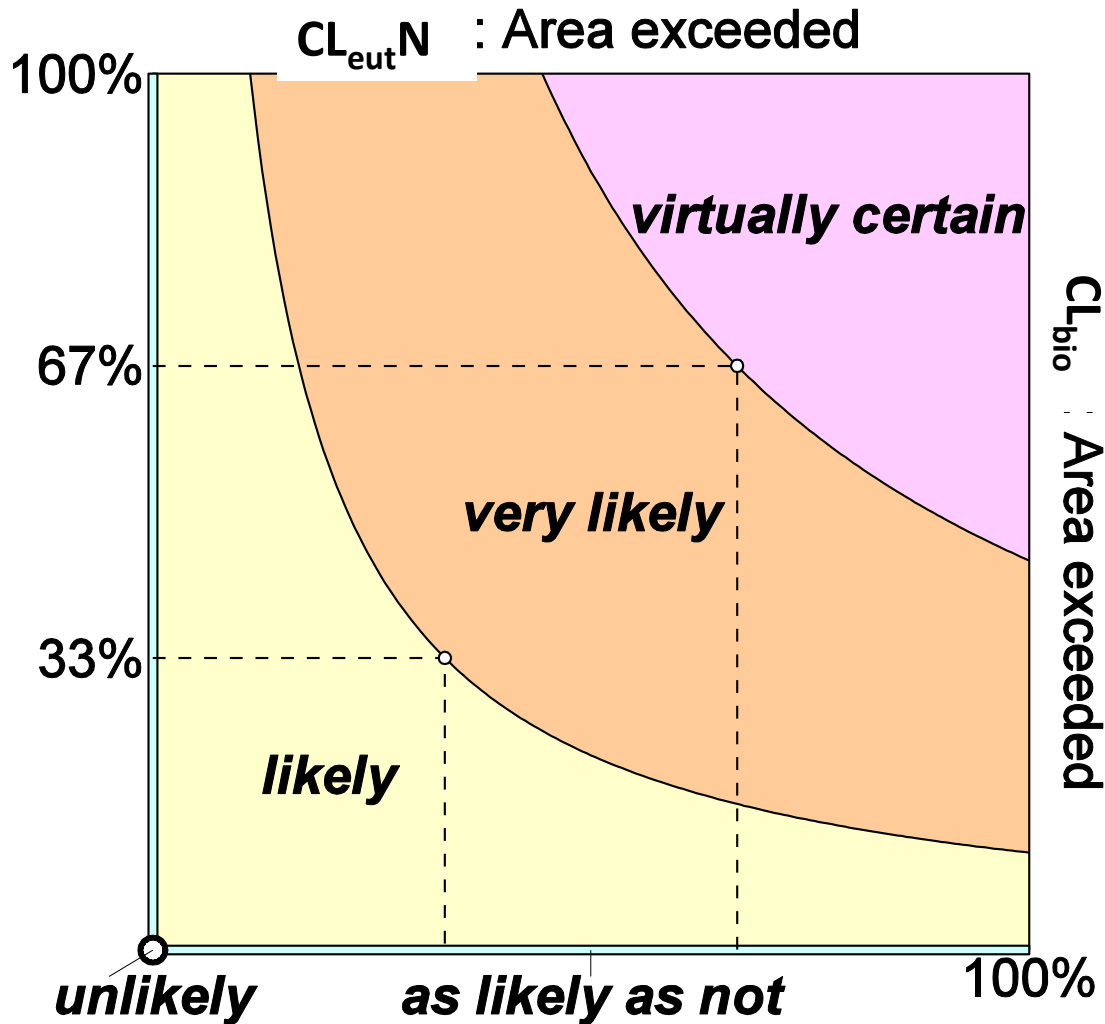
Distribution of the exceedance of three kinds of N critical loads

CLmaxN / CLeutN / CLNmax

REF-2005



Likelihood scale of the simultaneous probability of exceedances of two kinds of critical loads

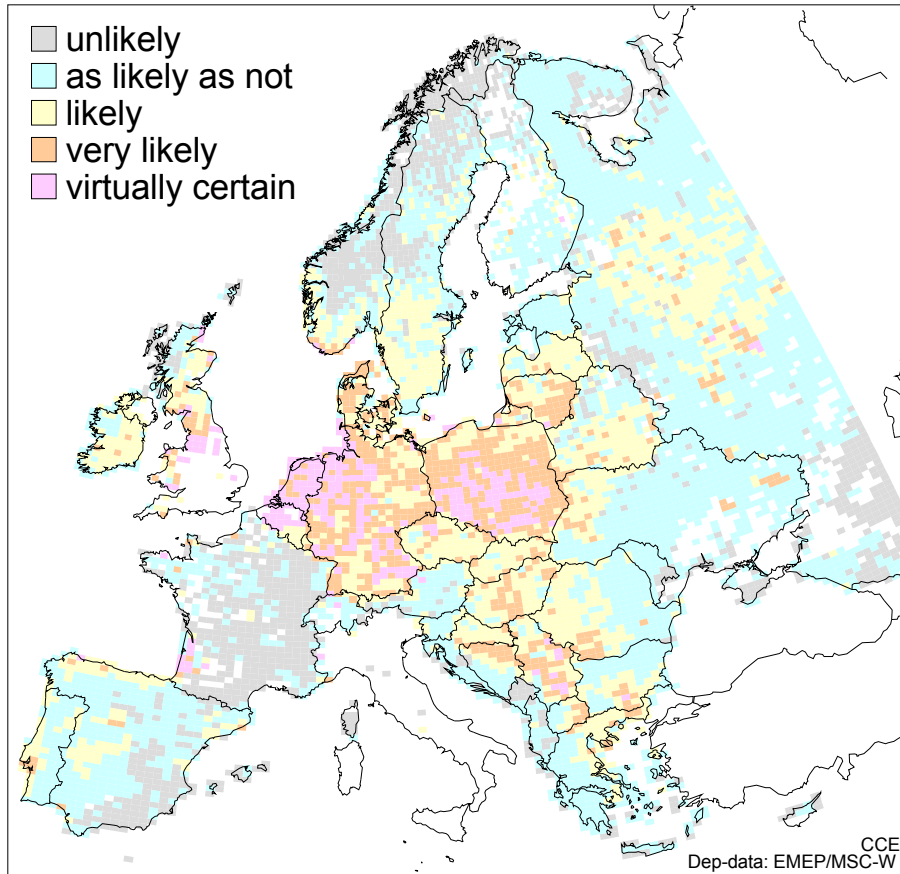


Source: Fig. 25.5 in: De Vries W, Hettelingh J-P, Posch M (eds), 2015.
Critical Loads and Dynamic Risk Assessments: Nitrogen, Acidity and Metals in Terrestrial and Aquatic Ecosystems.
 Environmental Pollution Series Vol. 25, Springer Science+Business Media, Dordrecht, xxviii+662 pp.; I
 SBN 978-94-017-9507-4; DOI: [10.1007/978-94-017-9508-1](https://doi.org/10.1007/978-94-017-9508-1)

CL_{aci} VS. CL_{bio}

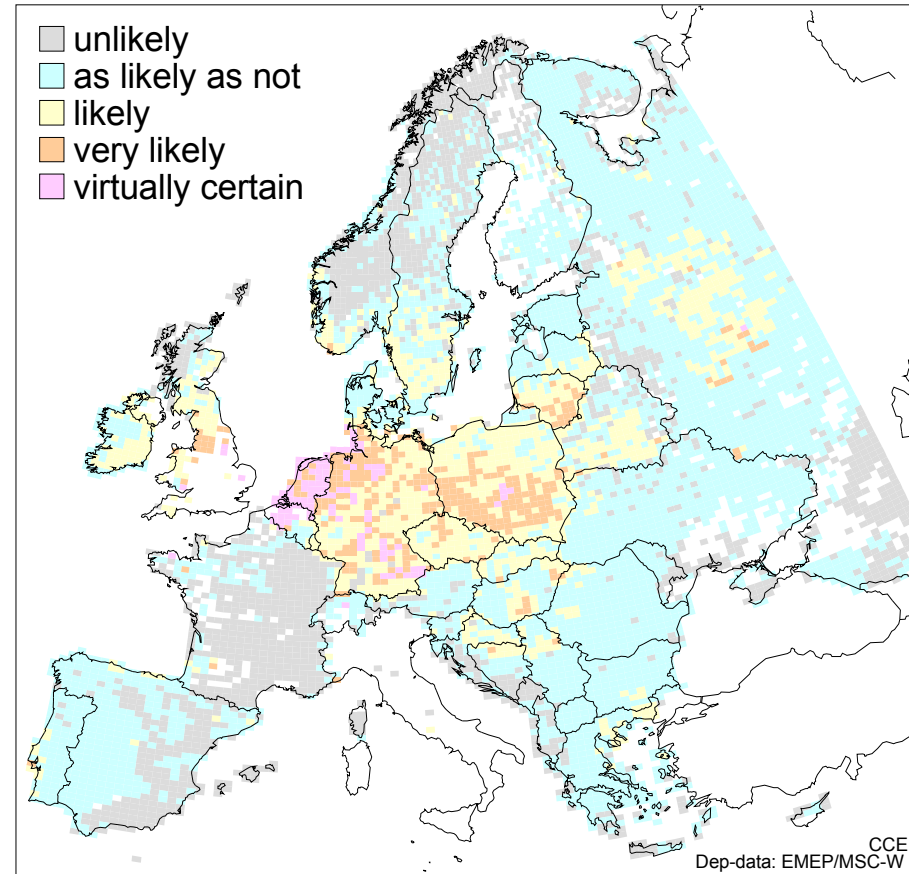
CL_{aci} vs. CL_{bio}

REF-2005



CL_{aci} vs. CL_{bio}

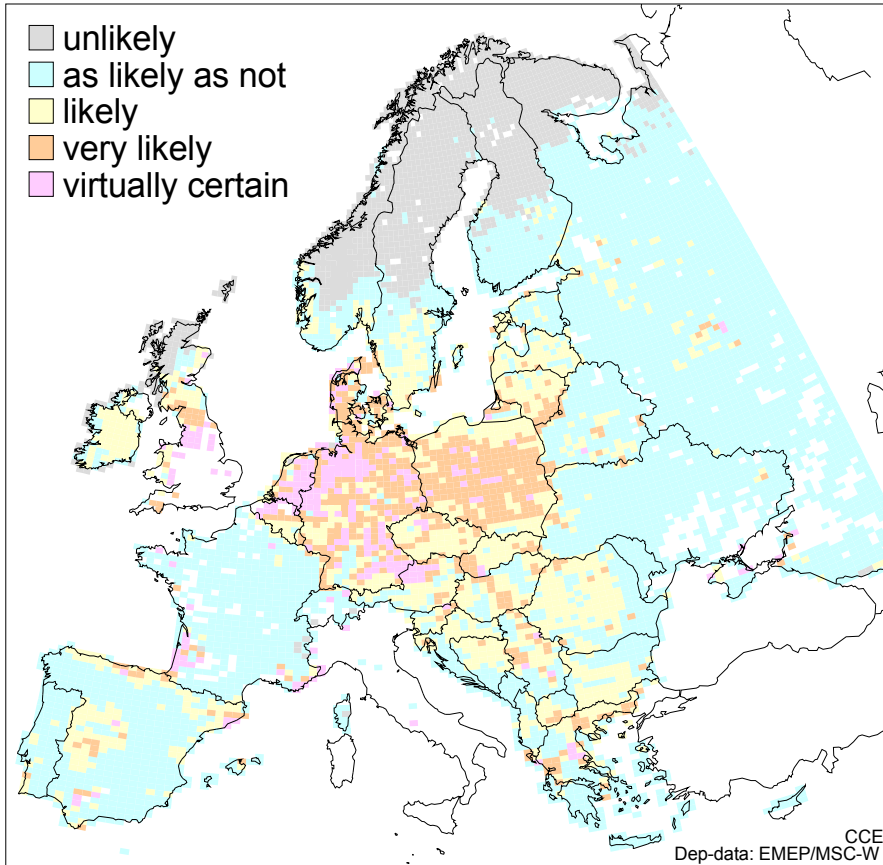
REF-2020



CL_{eut}N vs. CLN_{max}

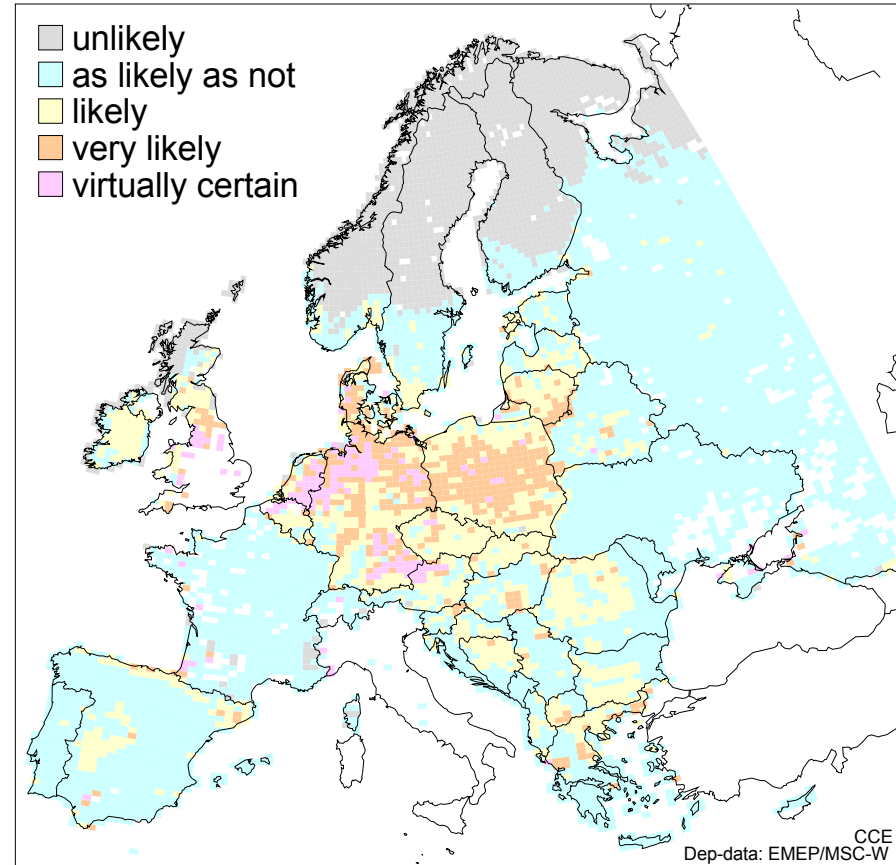
CL_{eut}N vs. CLN_{max}

REF-2005



CL_{eut}N vs. CLN_{max}

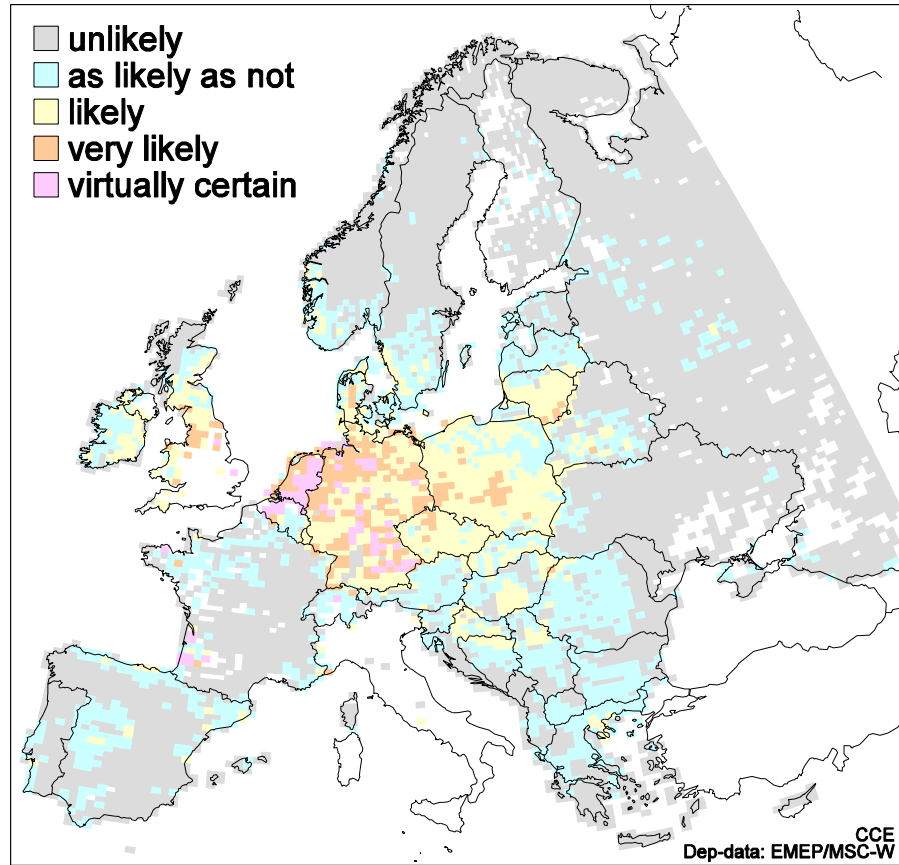
REF-2020



CL_{max}N vs. CLN_{max}

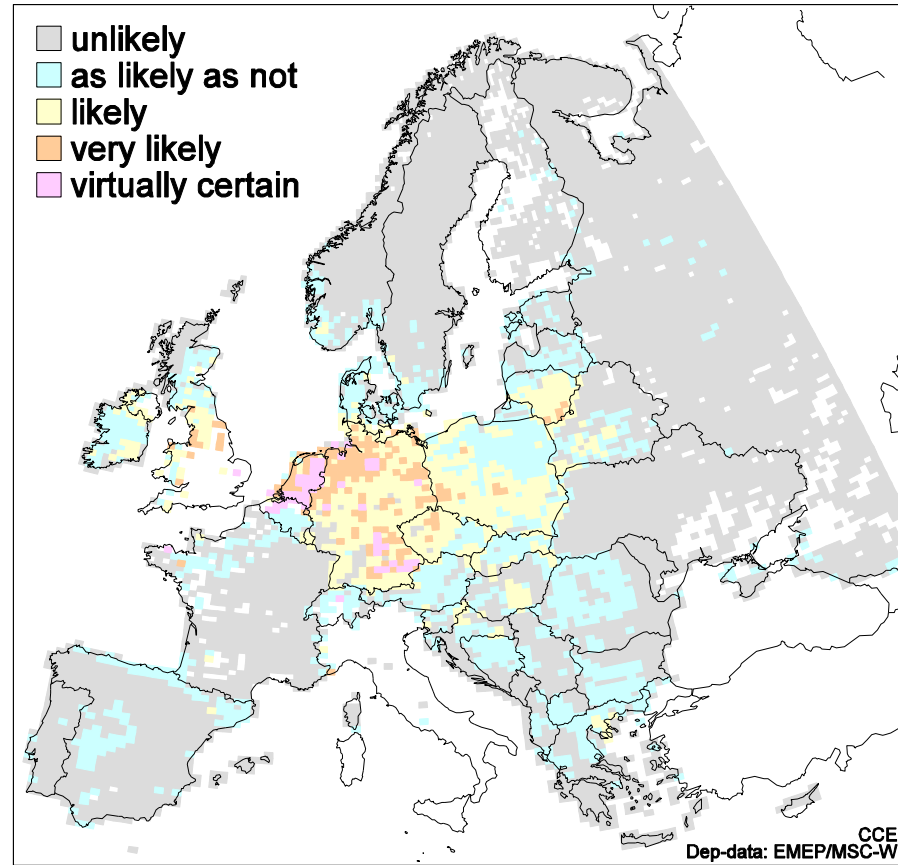
CLmaxN vs. CLNmax

REF-2005



CLmaxN vs. CLNmax

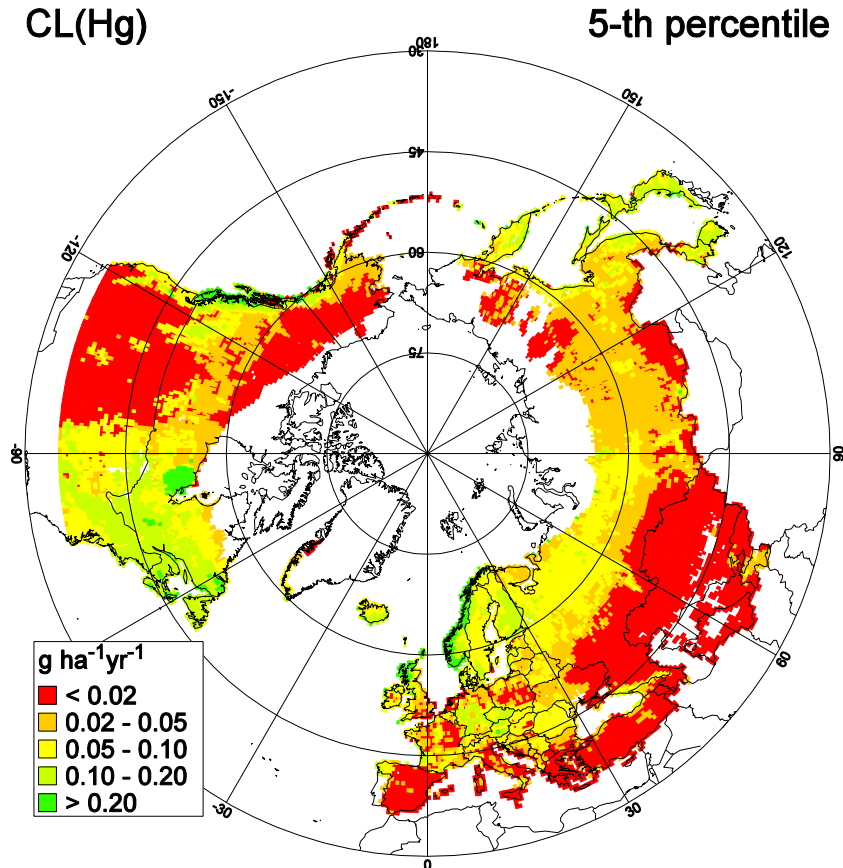
REF-2020



... and now for something completely different:

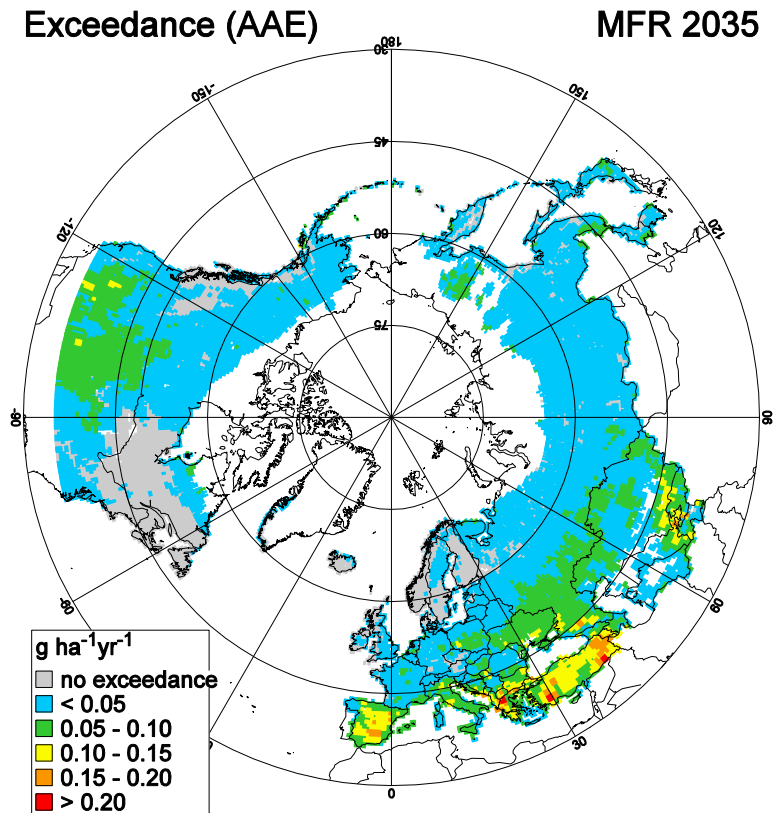
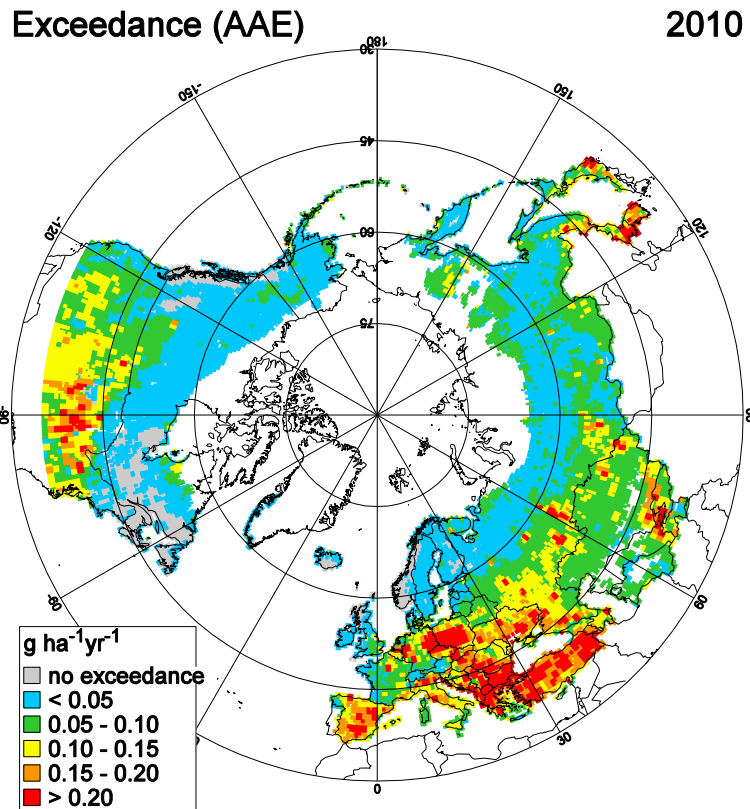
Hemispheric CLs of Mercury (Hg) ...

- At the HTAP/AMAP meeting in Feb 2016
- Instigated by O. Travnikov (EMEP/MSC-East)
- we (CCE+friends) produced CLs of Hg for the northern Northern Hemisphere
- [no money involved ...]



Exceedances

... using Hg-depositions modelled by EMEP/MSC-East



... to be documented (no money involved!)

Conclusions

- The geographical pattern of sensitive ecosystems (i.e. with low “classical” critical loads) in Europe does not change significantly between the databases of 2015 and 2017
- Area at risk of **acidification** (exceedances of Cl_{aci}) in **2005** and **2020** covers **10%** and **5%**, resp., of ecosystem area
- Area at risk of **eutrophication** (exceedances of Cl_{eut}) in **2005** and **2020** covers **67 %** and **59 %**, resp., of ecosystem area
- [Area at risk of change of biodiversity (exceedance of CL_{bio}) in 2005 and 2020 cover 19 % and 17 %, resp.]
- Areas where the likelihood of exceedances ranges from “likely” to “virtually certain” seem to be located in western-central Europe, irrespective of whether the risk of acidification, eutrophication or loss of biodiversity is addressed.

Suggested Recommendations:

- The TFIAM recommends to the WGE that it requests the ICP M&M National Focal Centres (NFCs):
 - To continue the NFC-work into 2018, regarding the CCE call for data on biodiversity critical loads 2015-2017, results of which were reported at the 33rd session of the TF on M&M (Wallingford, 4-6 April 2017);
 - To report NFC-results to the 34th session of the Task Force on M&M to be held in April 2018 for review by the 4th joint meeting of the EMEP-SB and WGE (September 2018);
 - To maintain and digitally safeguard the NFC-data on critical loads of biodiversity until these can be submitted to a new Programme Centre of the ICP M&M, to be established by the EB in the coming workplan period of the LRTAP Convention.

Finally

After 26 years of financing (most of) the CCE, the Dutch government stopped with that at end of 2016 ...

CCE Tasks 2017 financed from savings ...

... and with a little help from our friends:

Acknowledgements:

“In support of final CCE tasks to be performed in 2017, as noted by the Executive Body at its 36th Session (Geneva, 15-16 Dec 2016), the National Institute for Public Health and the Environment (RIVM) gratefully acknowledges additional funds provided by:

- Germany
- Norway
- Sweden
- Switzerland
- The Nordic Council of Ministers (NMR)

Thank You! 😊

Comments? 😐

Questions? 😞

Further information:

CCE Final Report 2017 (in autumn)

www.wge-cce.org (till end of 2017?)

www.icpmapping.org (till ...)