Results of the Call for Dynamic Modelling Data

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of the
ICP Modelling & Mapping

at the

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What were NFCs asked to provide?
(with respect to DynMod)

- Output of dynamic model (of choice)
- for any number of sites (ecosystems) of choice
- for 7 chemical variables:
  [Al], [Bc], pH, [ANC], bsat, C:N, [N]
- for 9 years:
  1980(10)2010 & 2020(10)2050 & 2100
- for 14 N and S deposition scenarios
  (from 2020 onwards)

... resulting in quite a lot of numbers
N and S deposition scenarios:

Until 2010: Historic deposition path of N and S
2010-2020: Linear interpolation to resp. scenario
2020-2100: Scenario values (constant over time)
12 NFCs submitted DynMod data (ca. 680,000 sites)

- Models used: **VSD**, SMART2/MOVE, ForSAFE(-Veg), MAGIC
  (some NFCs used more than one model)

<table>
<thead>
<tr>
<th>Country</th>
<th># of sites</th>
<th>EUNIS classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT*</td>
<td>496</td>
<td>G</td>
</tr>
<tr>
<td>BE*</td>
<td>1,725</td>
<td>G</td>
</tr>
<tr>
<td>CH³</td>
<td>260</td>
<td>G</td>
</tr>
<tr>
<td>DE*</td>
<td>97,729</td>
<td>G</td>
</tr>
<tr>
<td>FR*</td>
<td>3,987</td>
<td>D,E,G</td>
</tr>
<tr>
<td>GB⁺</td>
<td>236,744</td>
<td>C,D,E,F,G</td>
</tr>
<tr>
<td>IE*</td>
<td>30,983</td>
<td>E,F,G</td>
</tr>
<tr>
<td>NL⁺</td>
<td>117,565</td>
<td>A,B,[C,]D,E,F,G</td>
</tr>
<tr>
<td>NO</td>
<td>2,304</td>
<td>C</td>
</tr>
<tr>
<td>PL*</td>
<td>158,746</td>
<td>D,E,F,G</td>
</tr>
<tr>
<td>SE</td>
<td>18,094</td>
<td>C, G</td>
</tr>
<tr>
<td>SI⁺</td>
<td>12,692</td>
<td>F, G</td>
</tr>
</tbody>
</table>

**G: Forests**
F: Heathland, scrub, tundra
E: Grasslands etc.
D: Mires, bogs, fens
C: Surface waters (C1, C2)
B: Coastal habitats
A: Marine habitats

* VSD;⁺ VSD+other model
Some Results:

Problem: How (and what!) to aggregate/summarise graphically (or in tables) to convey “the message” with one dimension (=time) more …

Examples:

- Percentile traces
- Non-violation traces
- CDFs
- Windmill plots
- Maps

Note: These seemingly simple plots require quite elaborate data handling …
Percentile traces (or trails):

Time development of the 7 percentiles (area-weighted) of a variable (here [N] leaching) for CLE (red) and MFR (blue) scenarios [5%, 10, 25, 50% 75 90 95%]
[N] (eq/m^3) ALL ecosystems
C:N ratio (g/g) ALL ecosystems
base saturation ALL ecosystems
Non-violation traces:

Curves show percentage of ecosystem area *not violating the given limit* for the CLE (red) and MFR (blue) scenario.
Here: [ANC] in lakes above 0, 20 and 50 meq/m³, resp

*Curve high: good ... (% ‘safe’)*)

![Graph showing non-violation traces for CLE and MFR scenarios.](image)
CDFs for selected years:

Curves show CDFs of variable for 1980, 2030 and 2100 for the CLE and MFR scenario for selected years
Here: [N] (in eq/m³)
Coordination Centre for Effects, CCE-Workshop, Berne, 21-23 April 2008

N (eq/m3): ALL ecosystems

1980
CLE-2030
CLE-2100
MFR-2030
MFR-2100
C:N ratio: ALL ecosystems
... other ways of displaying/summarizing data:

- Windmill plots
- Maps
- ...

But also as **Tables**:

- boring put more ‘precise’
- used in IAM e.g. for exceedances/ exceeded areas
Potential Use of DynMod Results in IAM

Given DynMod results allow interpolation for any given N and S-deposition scenario (if not too far from CLE) and thus quick analyses of chemical values and their violation for any scenario.

Question: Is interpolation good enough?

A few checks …
Case 1:
Given: ‘Random’ scenario deposition R01
Wanted: Al/Bc in 2040 (in DE)
Horizontal axis:
Exact values for:
Red: scenario S10
Green: S11
Blue: S13

Vertical axis:
Interpolated values
Case 2:
Given: ‘Random’ scenario deposition R02
Wanted: [N] in 2050 (in DE)
Horizontal axis:
Exact values for:
Red: scenario S07
Green: S08
Blue: S14

Vertical axis:
Interpolated values
Same scenario, but [Al] in SE in 2030

Horizontal axis:
Exact values for:
Red: scenario S07
Green: S08
Blue: S14

Vertical axis:
Interpolated values

[Al]; 2030
SE
interpolated
exact
What can these data be used for?

- Study the time development of different chemical variables (relevant for impacts) under different (pre-specified) scenarios

- Interpolate response at every site for any given (reasonable) N and S deposition scenario:
  Fast enough to allow repeated scenario assessment
  (and present them, e.g. in form of country summaries …)

- Estimate other quantities, such as target loads or delay times
  Started (tested for EU-DB) but needs more work …

*With these data DynMod output can used flexibly for work under LRTAP Convention and EU without compromising a countries peculiarities …*