



20/05/2014

Planning: application on Belgium

FAIRMODE Oslo 29/4/2014

AURORA model

MODEL:

- » Eulerian CTM
- » Resolution: 1 -25 km (regional to urban)
- » Advection: Walcek scheme
- » Diffusion: Crank- Nicholson with damping of oscillations
- » Chemistry: gas phase CB5, aerosol/gas phase partitioning with ISORROPIA
- » Deposition: resistance analogy (Wesely)

INPUTS:

- » Meteorology: ECMWF/ ARPS (offline)
- » Emissions: EMEP refined top down using higher resolution surrogates +high resolution bottom-up for Belgium antropogenic emissions in Belgian and MEGAN biogenic emissions
- » Boundary conditions: AURORA, BELEUROS, LOTOS EUROS, TM5, CHIMERE, EMEP, EURAD, ...

AURORA model for Belgium

$\Delta x = \Delta y = 4 \text{ km}$ (73x67)

Δz : 17 layers:

top layer 1: 27 m above terrain

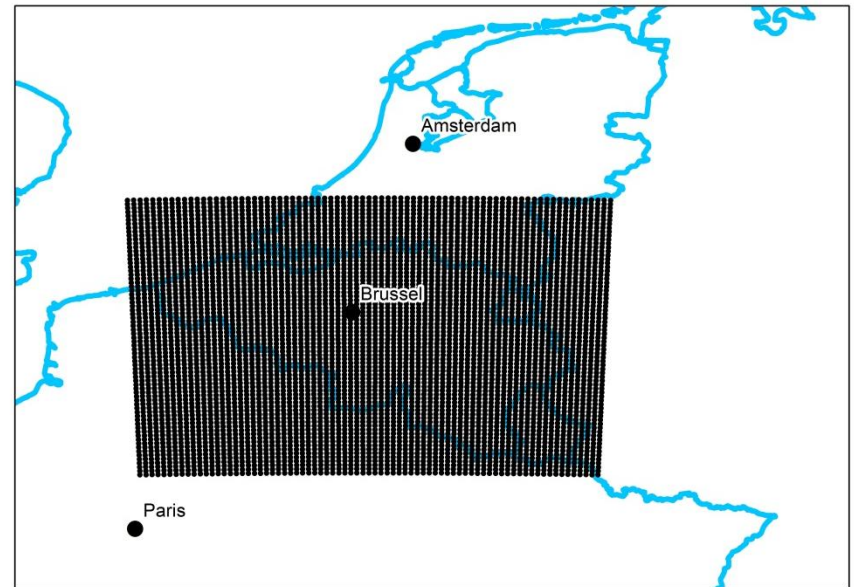
top layer 14: 3183 m above terrain

BC: BELEUROS 15 km resolution model

runs: January 2009

reference + 6 scenarios (-20%)

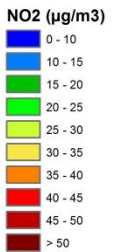
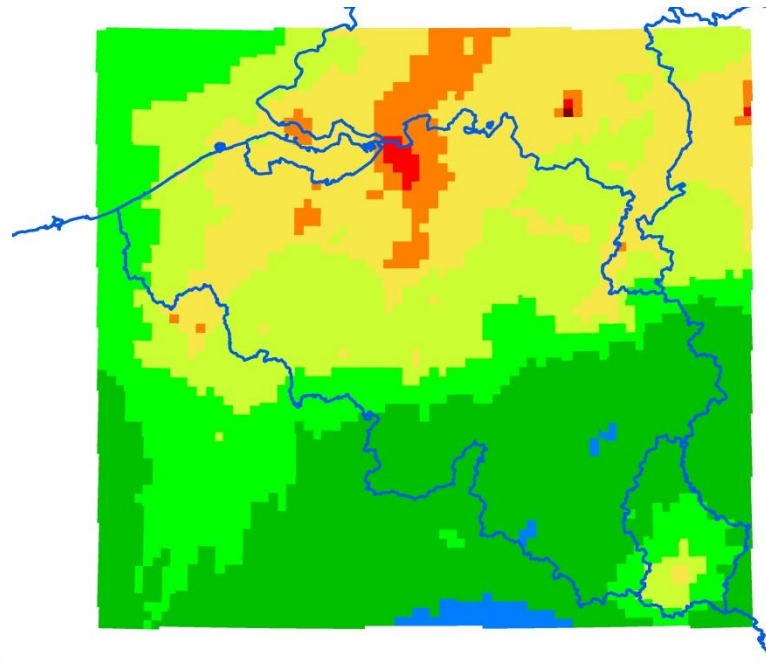
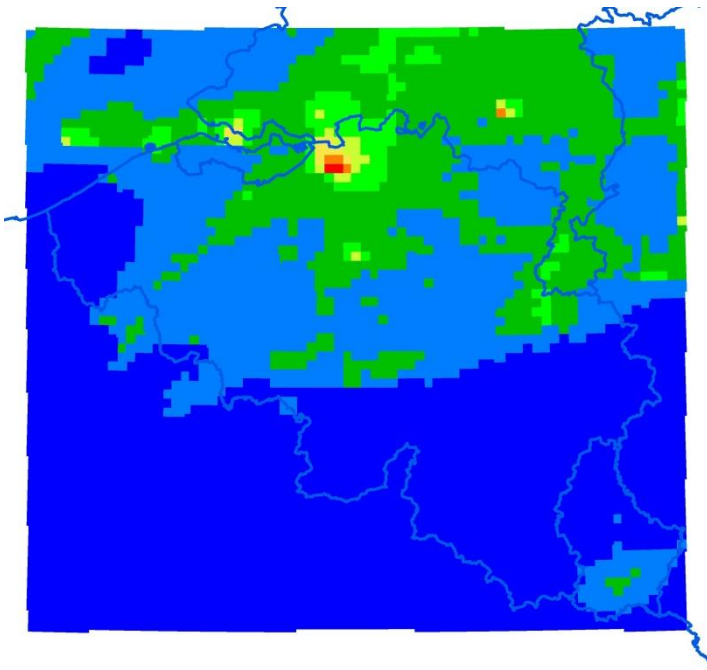
(+ July + scenarios (-50%))



NO2

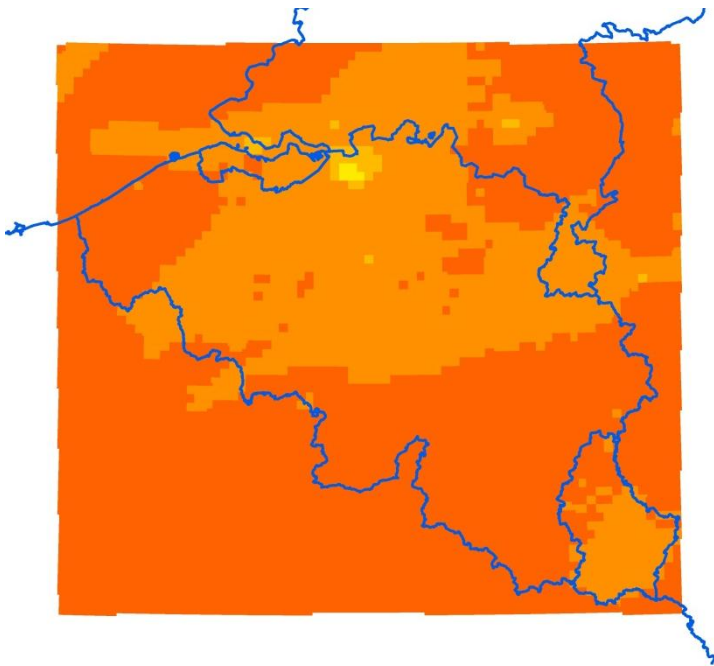
July, 2009

January, 2009

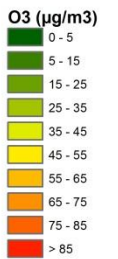
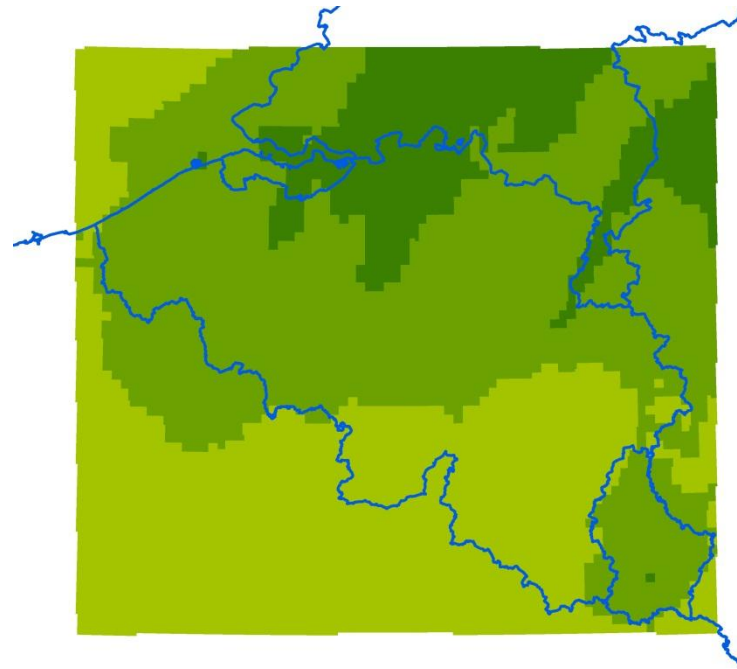


O3

July, 2009

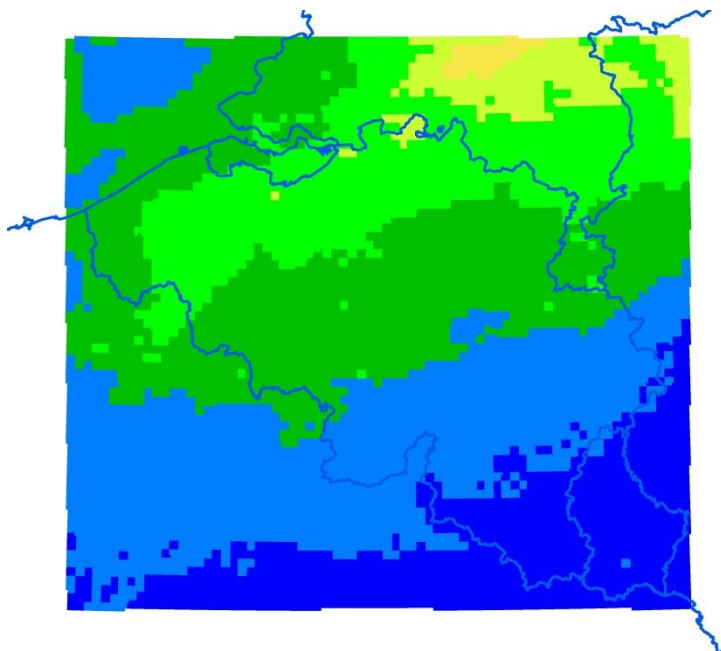


January, 2009

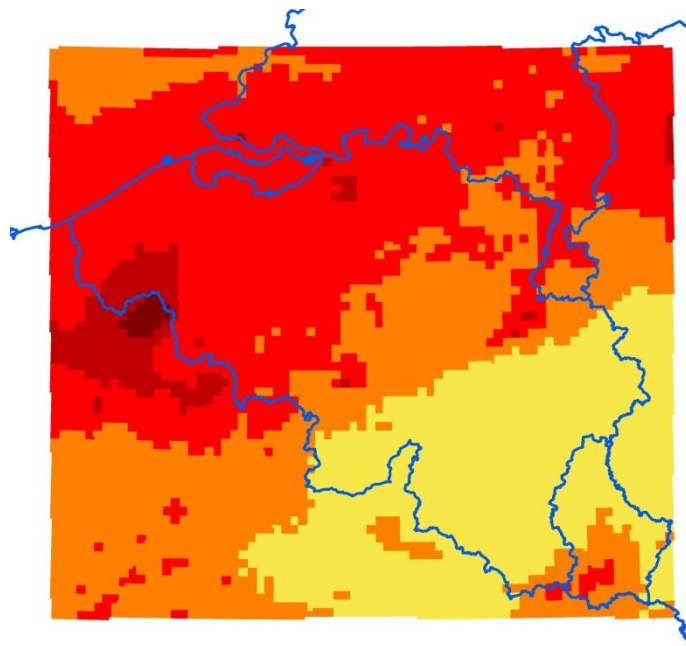


PM10

July, 2009



January, 2009



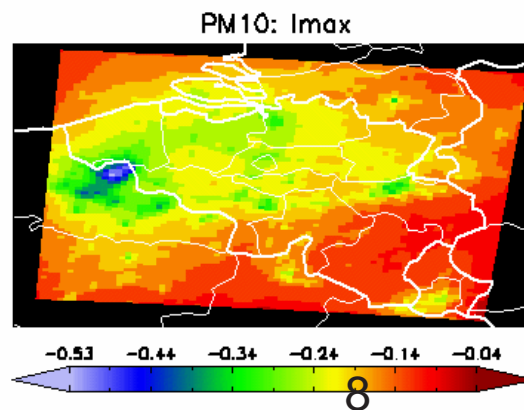
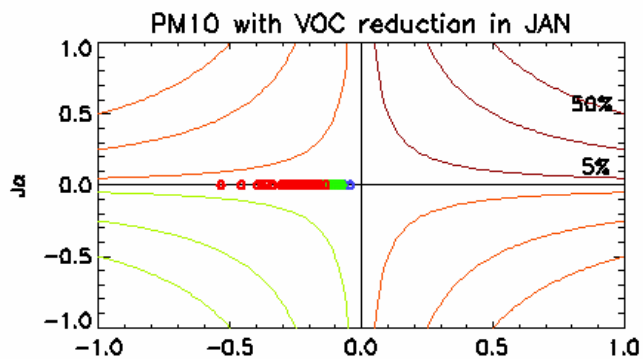
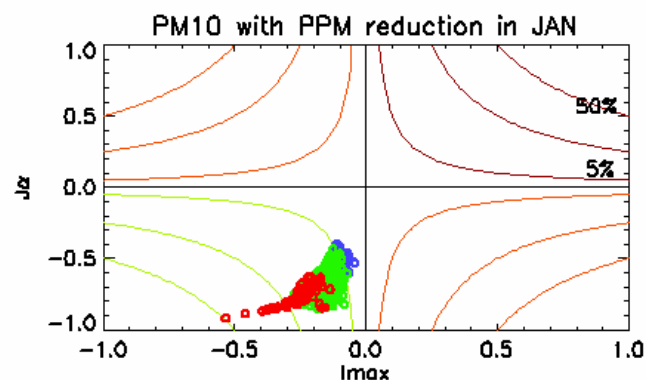
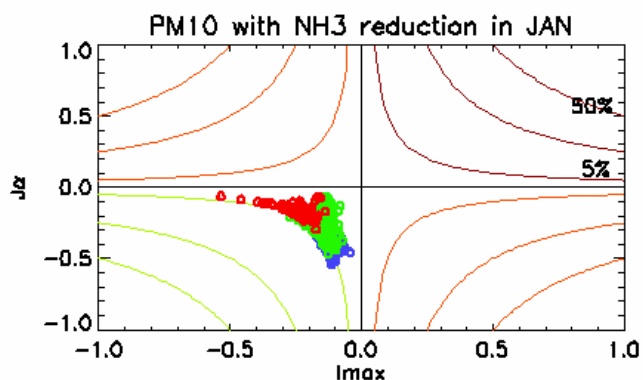
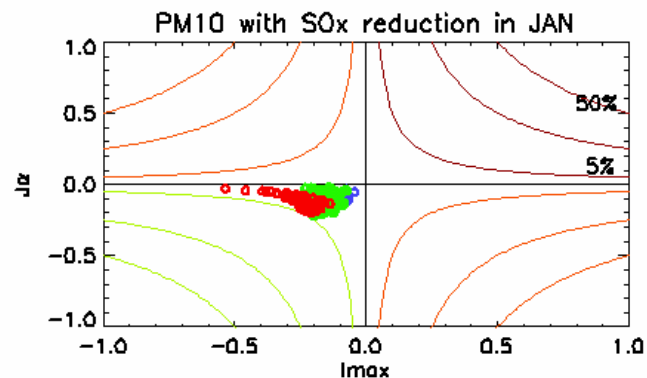
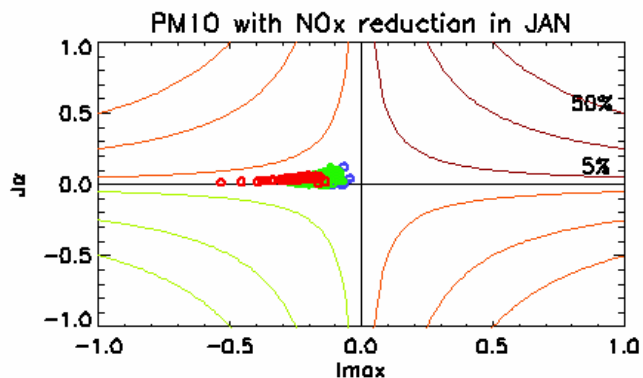
PM10 ($\mu\text{g}/\text{m}^3$)



Relative potency

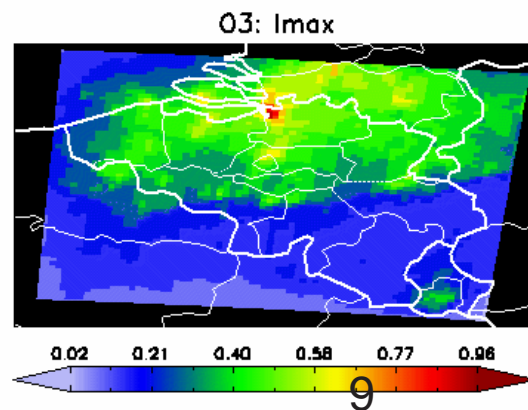
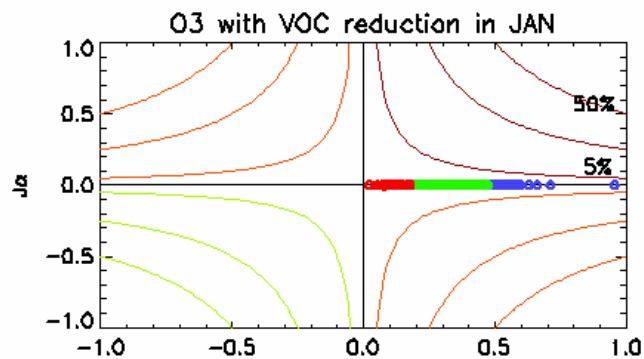
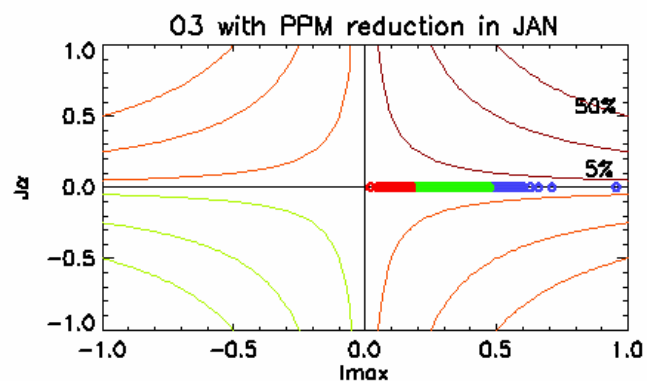
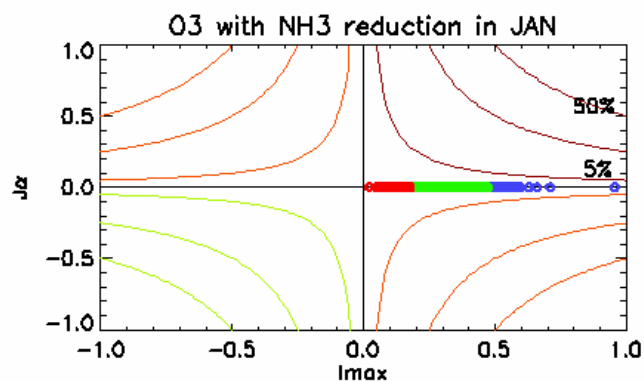
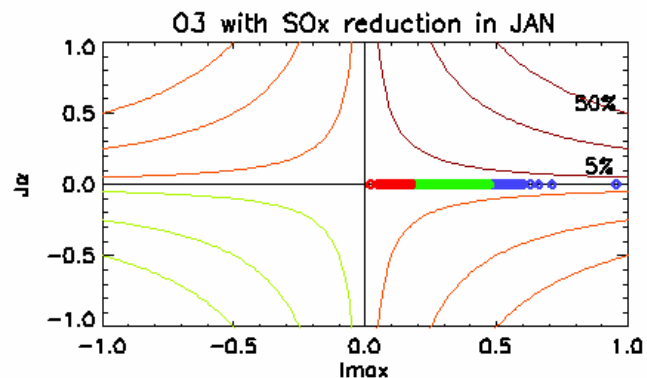
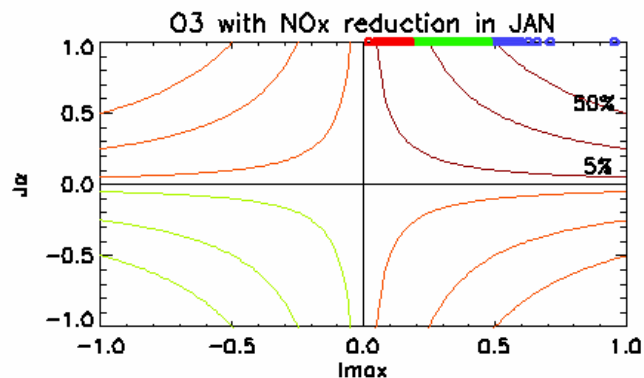
- —
- Results from tool
- Linearity (robustness) / species interdependency?
 - Time series for a single point (Brussels)
 - Averages over zones

PM10 -- BELGIUM AURORA JAN 2009



$n_x + n_y$ 0 0.2 0.8 1.
 PM10: 18.0828 19.6523 23.1928 37.6600

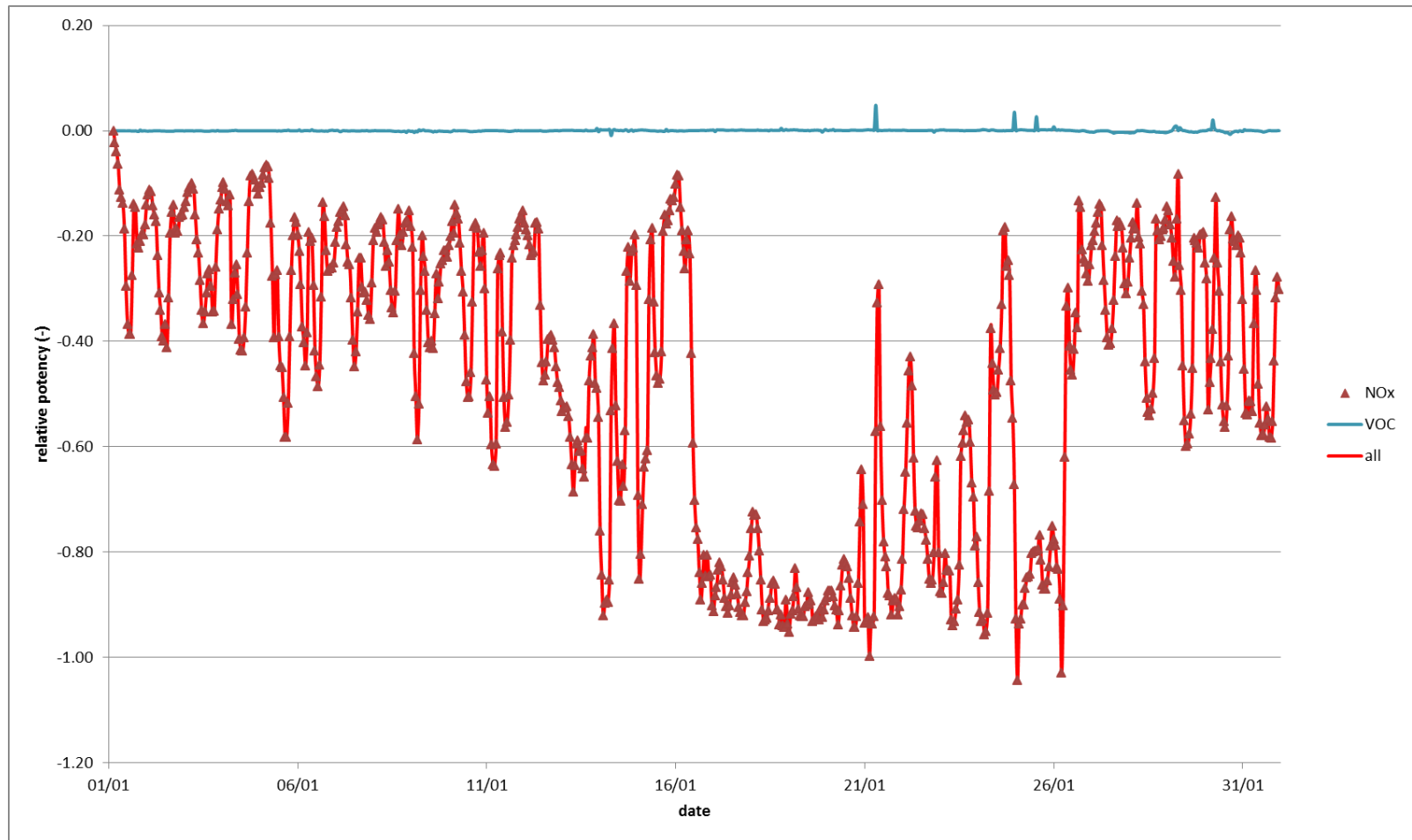
O3 -- BELGIUM AURORA JAN 2009



$n_x + n_y$ 0 0.2 0.8 1.
 O3: 11.8015 23.4952 34.8304 40.5729

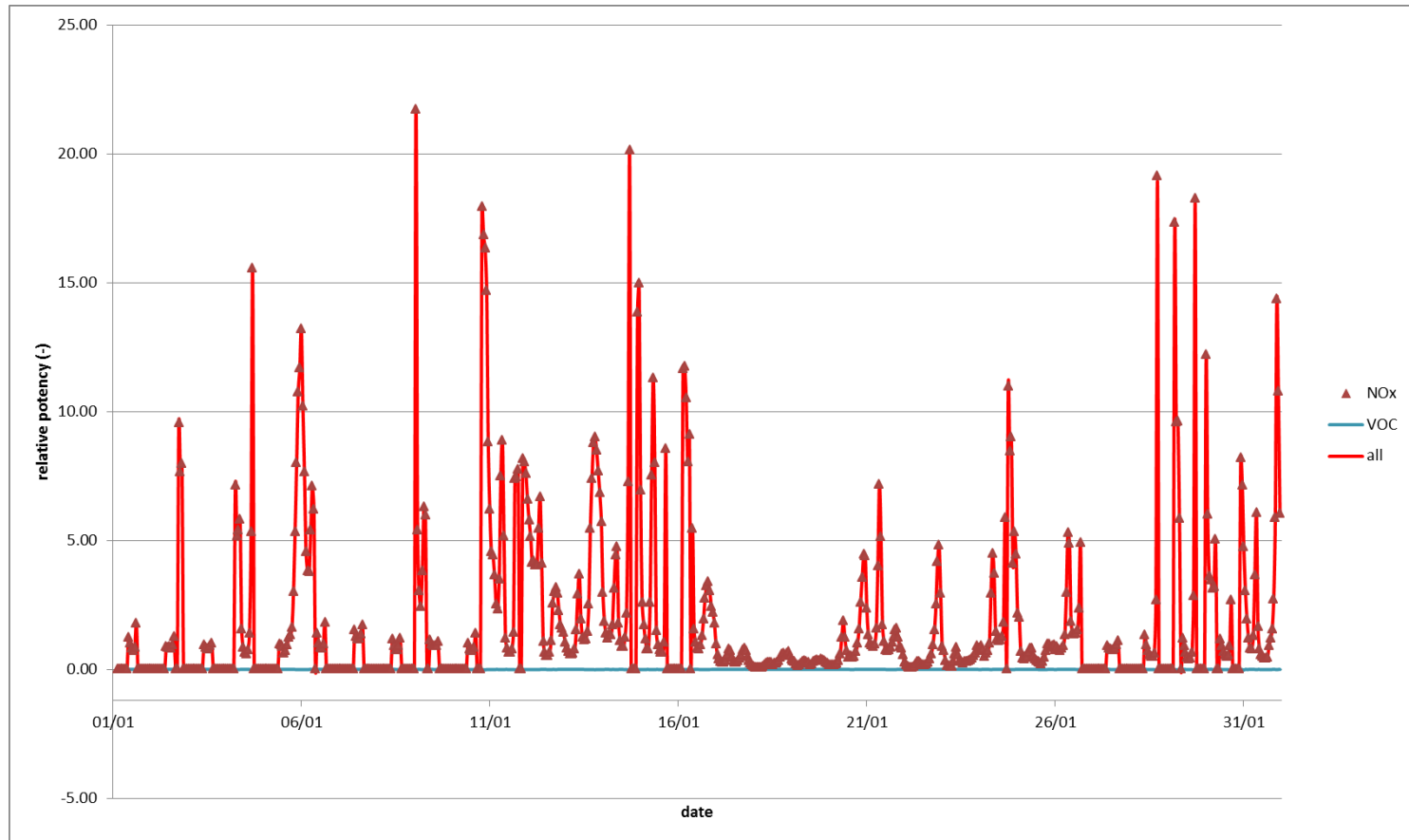
Relative potency: timeseries for a single point

NO2 (-20%)



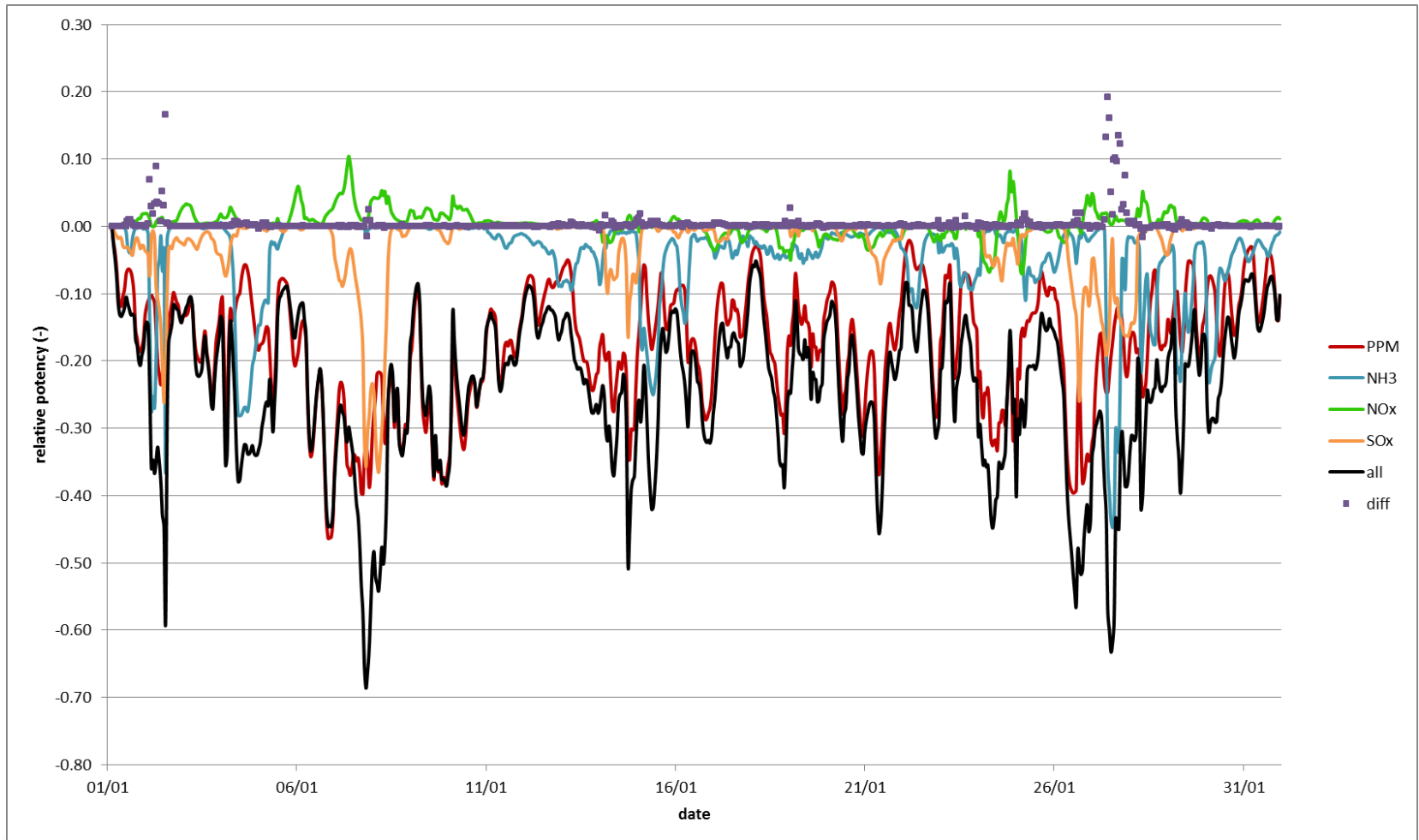
Relative potency: timeseries for a single point

O3 (-20%)

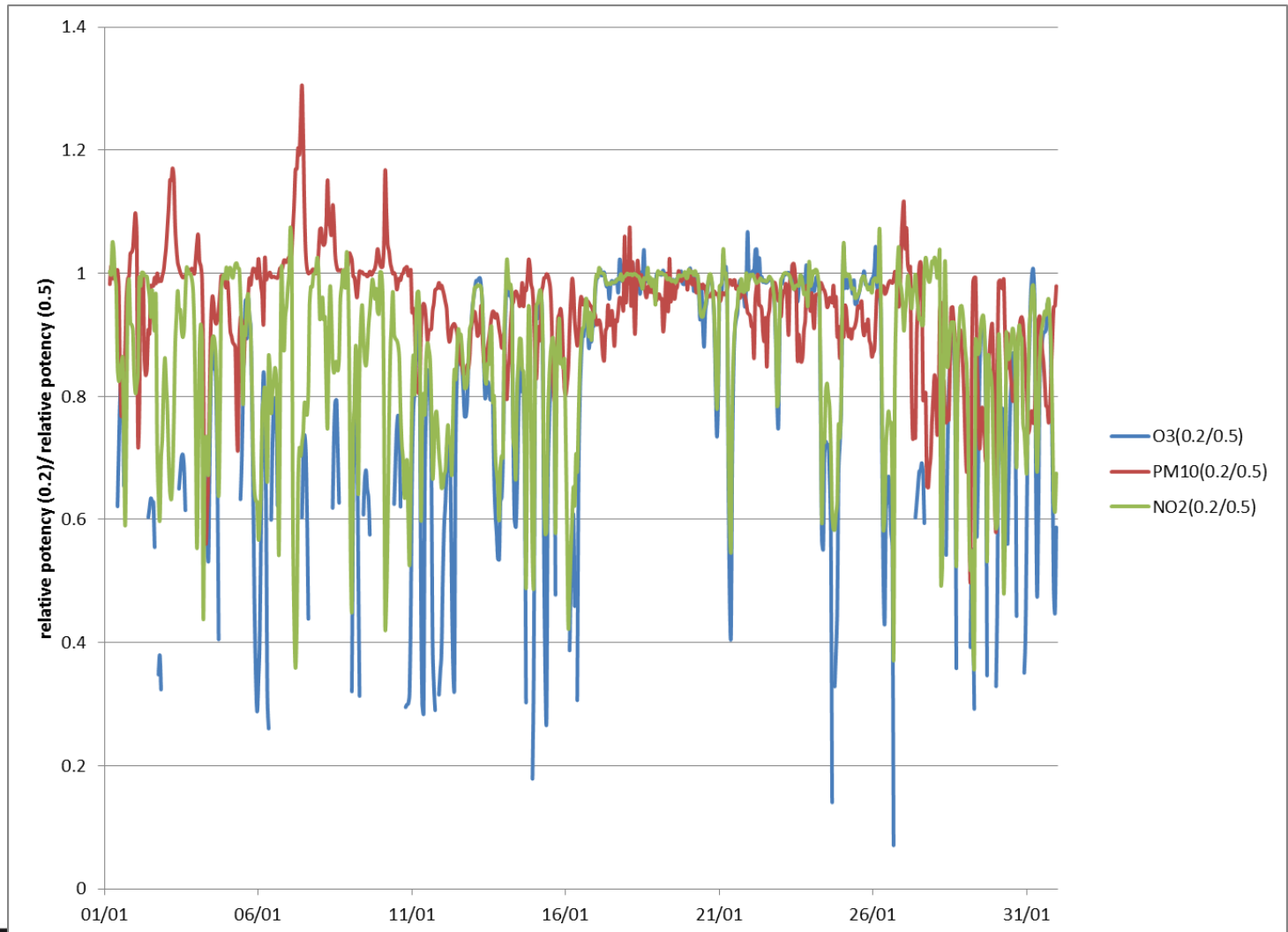


Relative potency: timeseries for a single point

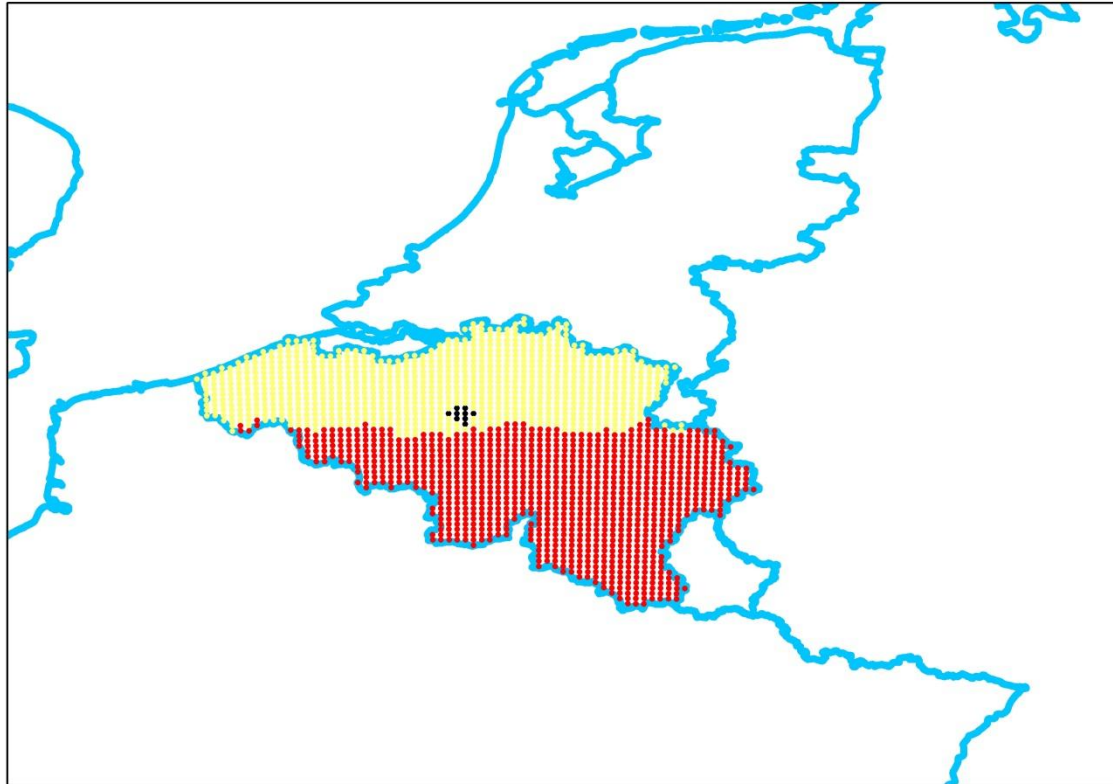
PM10 (-20%)



Relative potency: timeseries for a single point: effect choice α ?

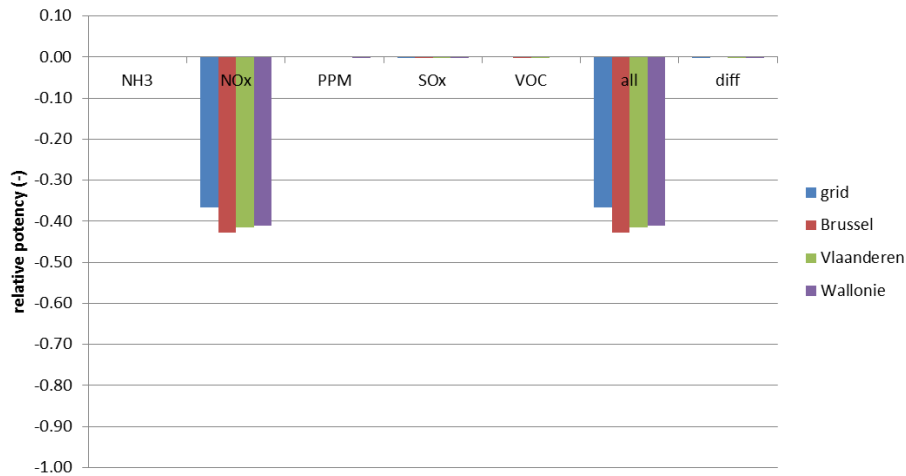


Relative potency: results for zones

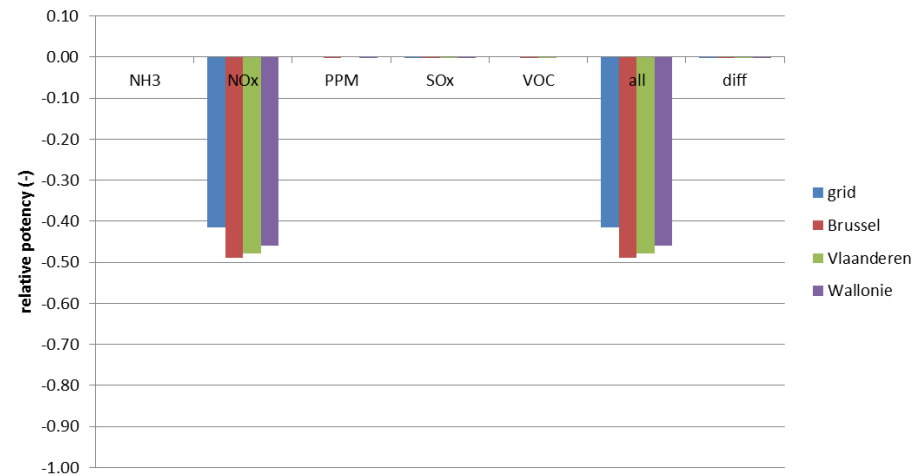


Relative potency: results for zones for NO2

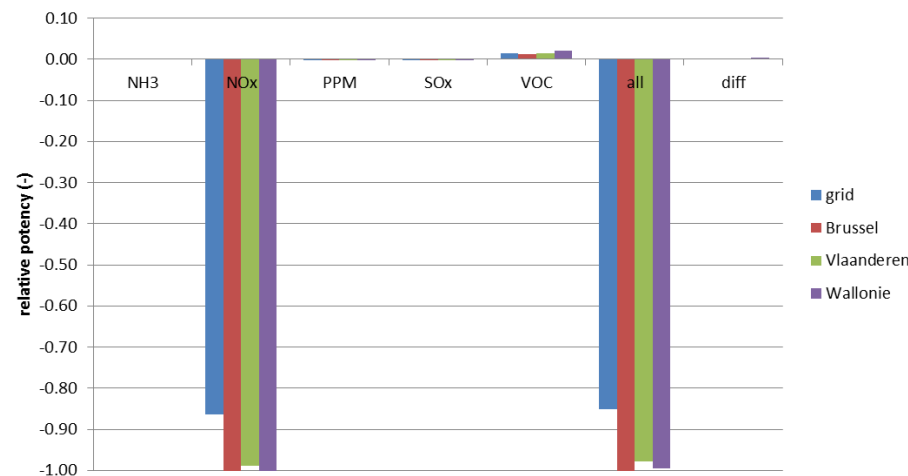
January -20%



January -50%

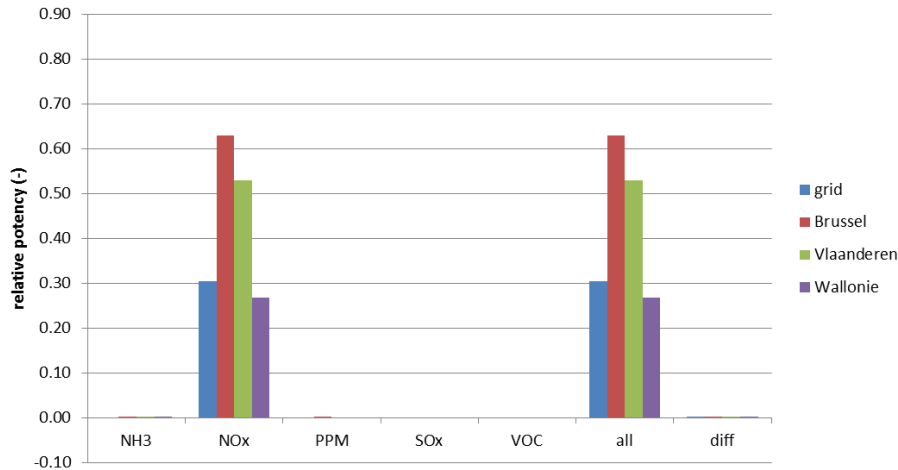


July -20%

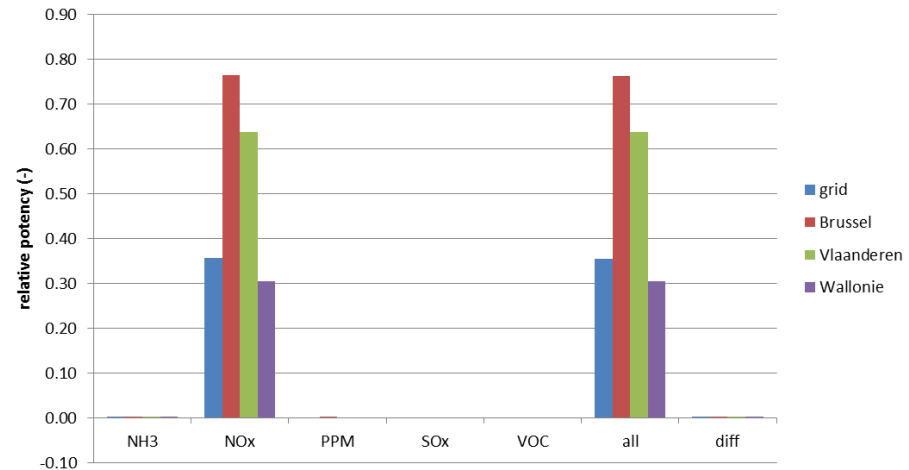


Relative potency: results for zones for O3

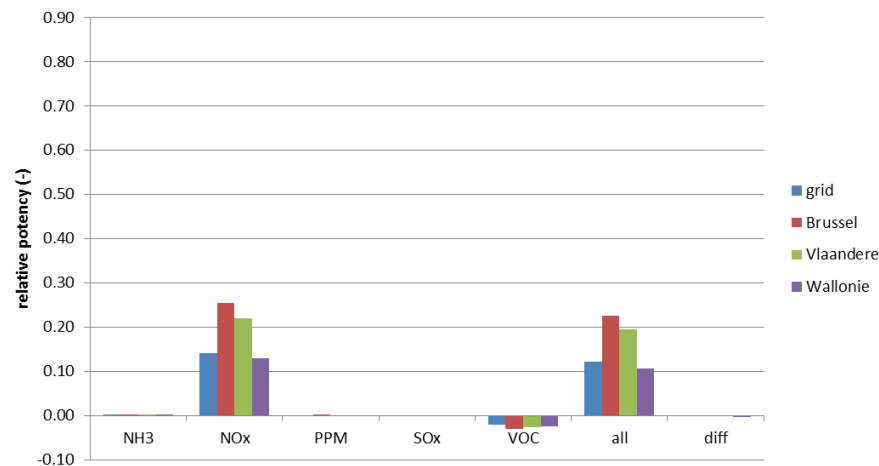
January -20%



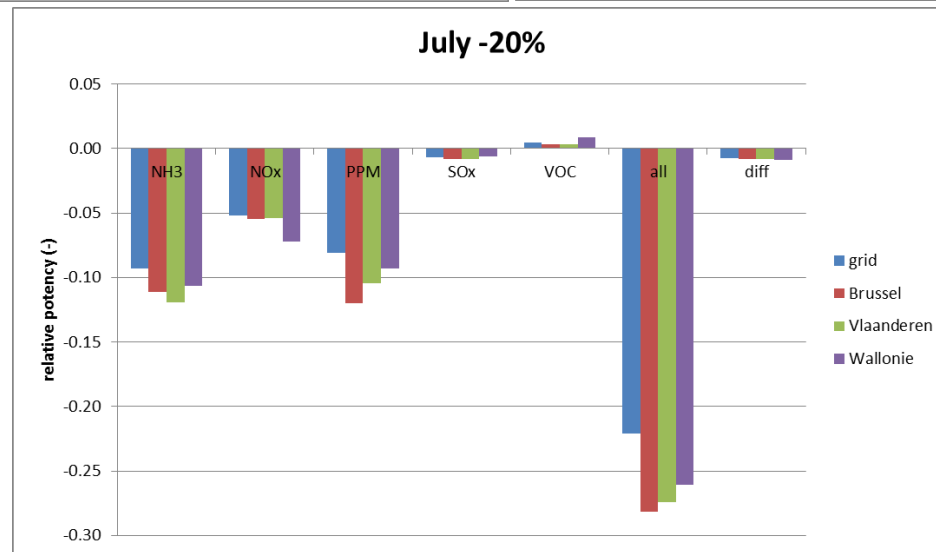
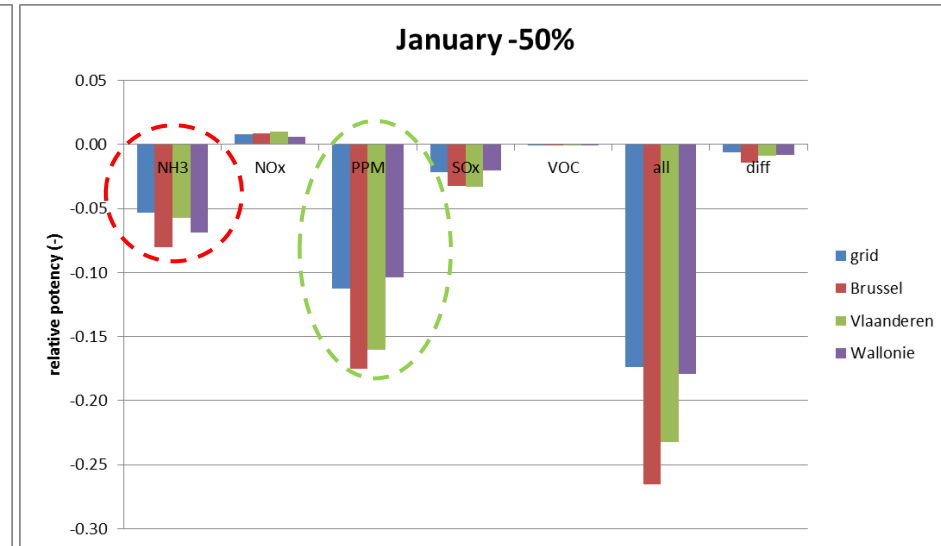
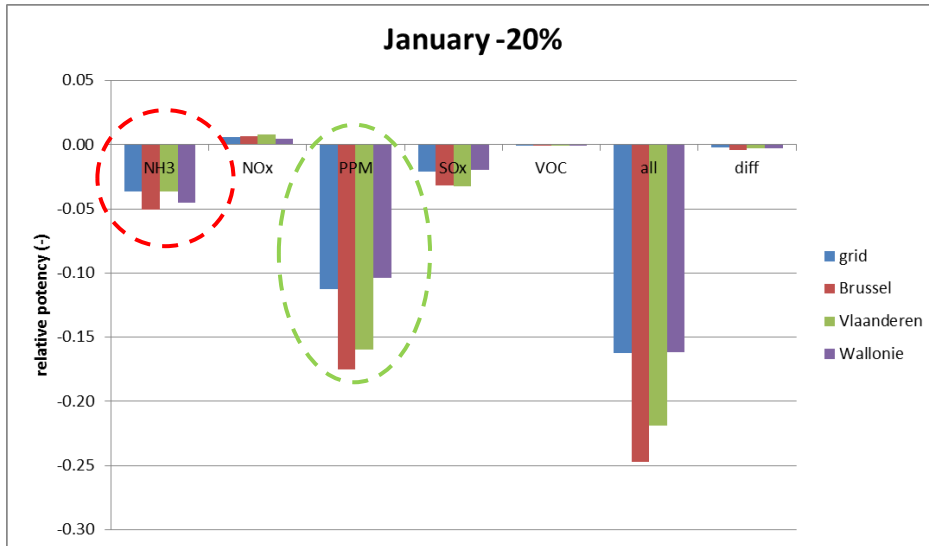
January -50%



July -20%



Relative potency: results for zones for PM10



1. Results depend on pollutant, time and place
...
2. There are non linearities and interdependencies between species ...