Effect of dry and wet deposition of condensable vapors on SOA

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Motivation:

- Global SOA budget is uncertain: 12-1820 Tg/year (Goldstein and Galbally, 2007)
- Lots of effort put into studying formation processes, little into studying removals
- Removal of organic vapors rarely accounted for in 3D models

How significant is the loss of organic vapors to deposition ?

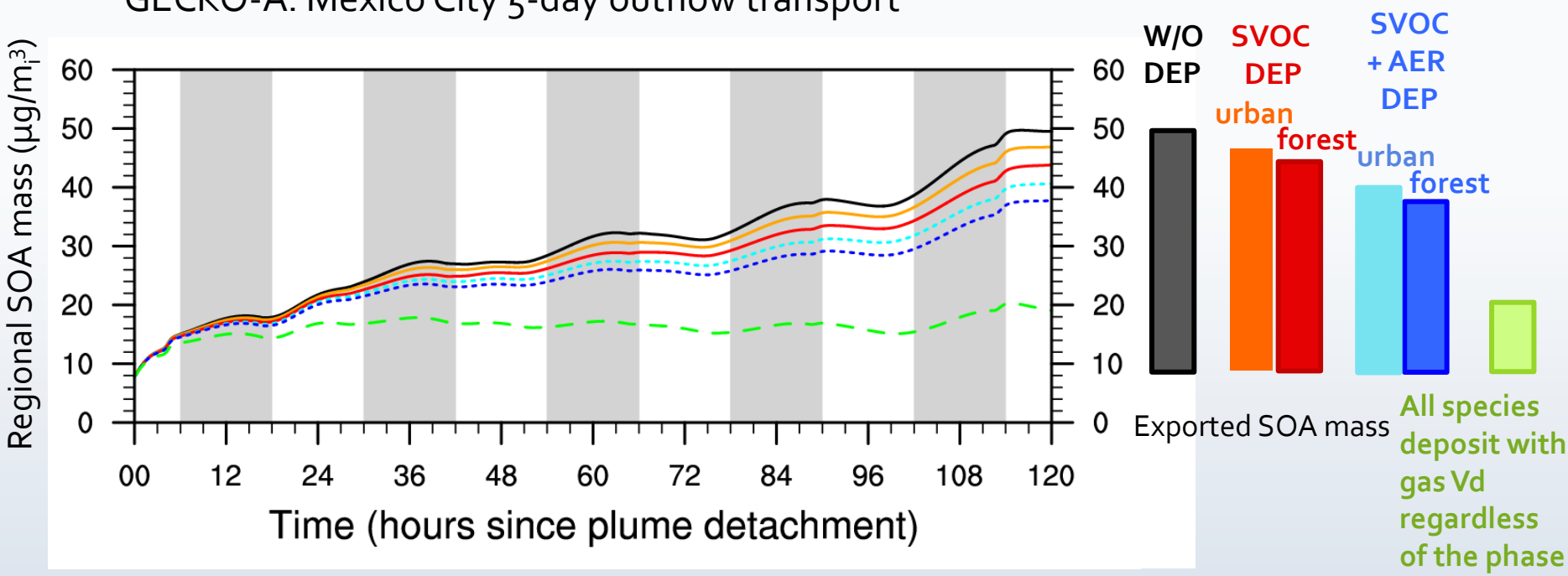
Does it affect regional SOA mass downwind of urban sources ?

DOE meeting Nov. 2013

Effect of dry dep. on anthropogenic organic vapors and SOA mass

Hodzic et al., GRL 2013

GECKO-A: Mexico City 5-day outflow transport



- Dry deposition removal of anthropogenic organic vapors (SVOCs) is **very small** over urban surfaces ~5%; over forested surfaces ~10% after 5days

- SVOC DEP is comparable to aerosol dry deposition that ranges from 5-10% (V_d assumed to be 0.05 cm/s urban to 0.1 cm/s forest)

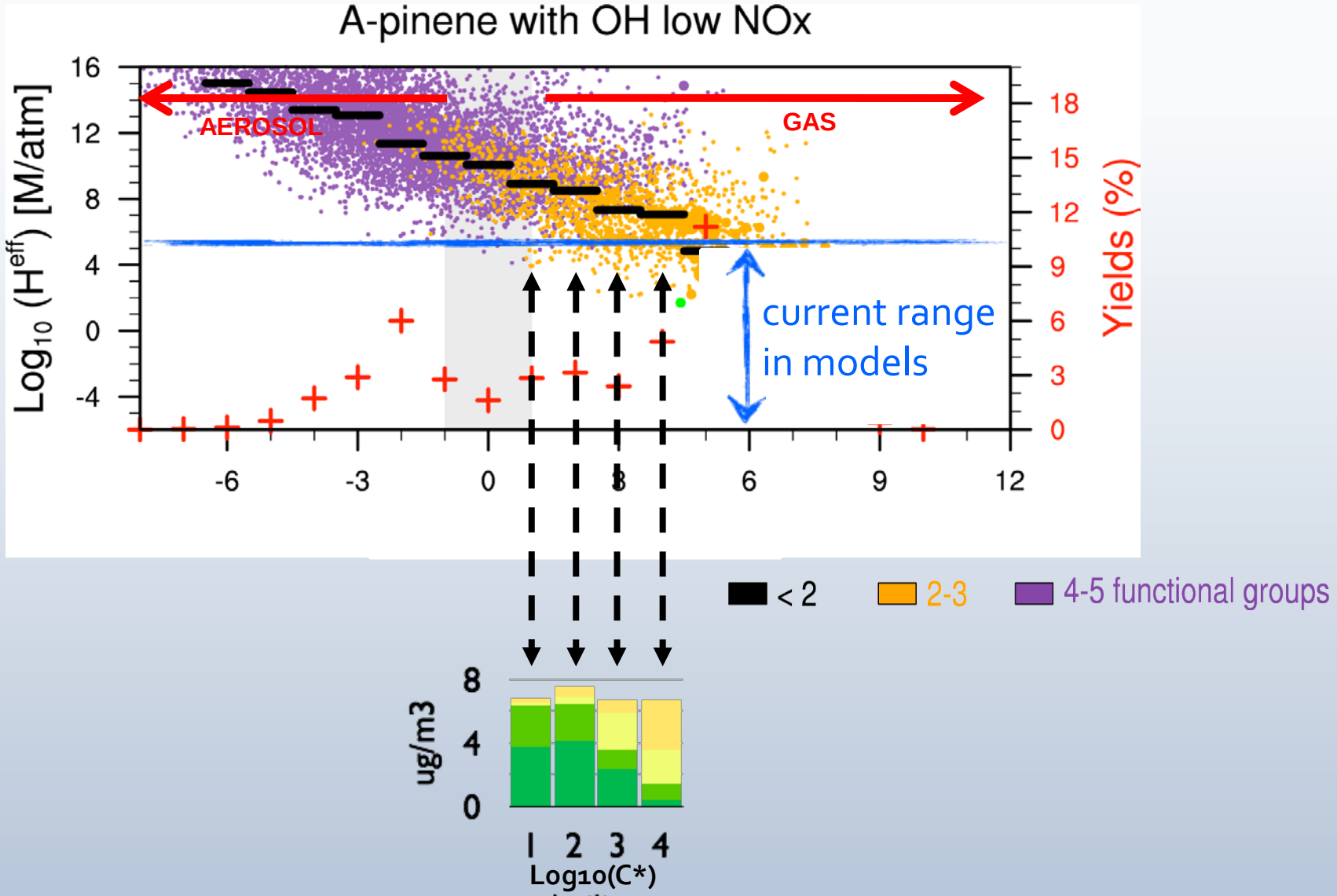
Implications ⇒

If gas-aerosol partitioning is wrong in models:
- direct consequence is a wrong SOA mass
- indirect effect is a too strong removal of organic vapors (>60%)

Using GECKO to derive Henry's coef. for VBS parameterizations

Hodzic et al., in prep

- Idealized GECKO-A simulations for various precursors



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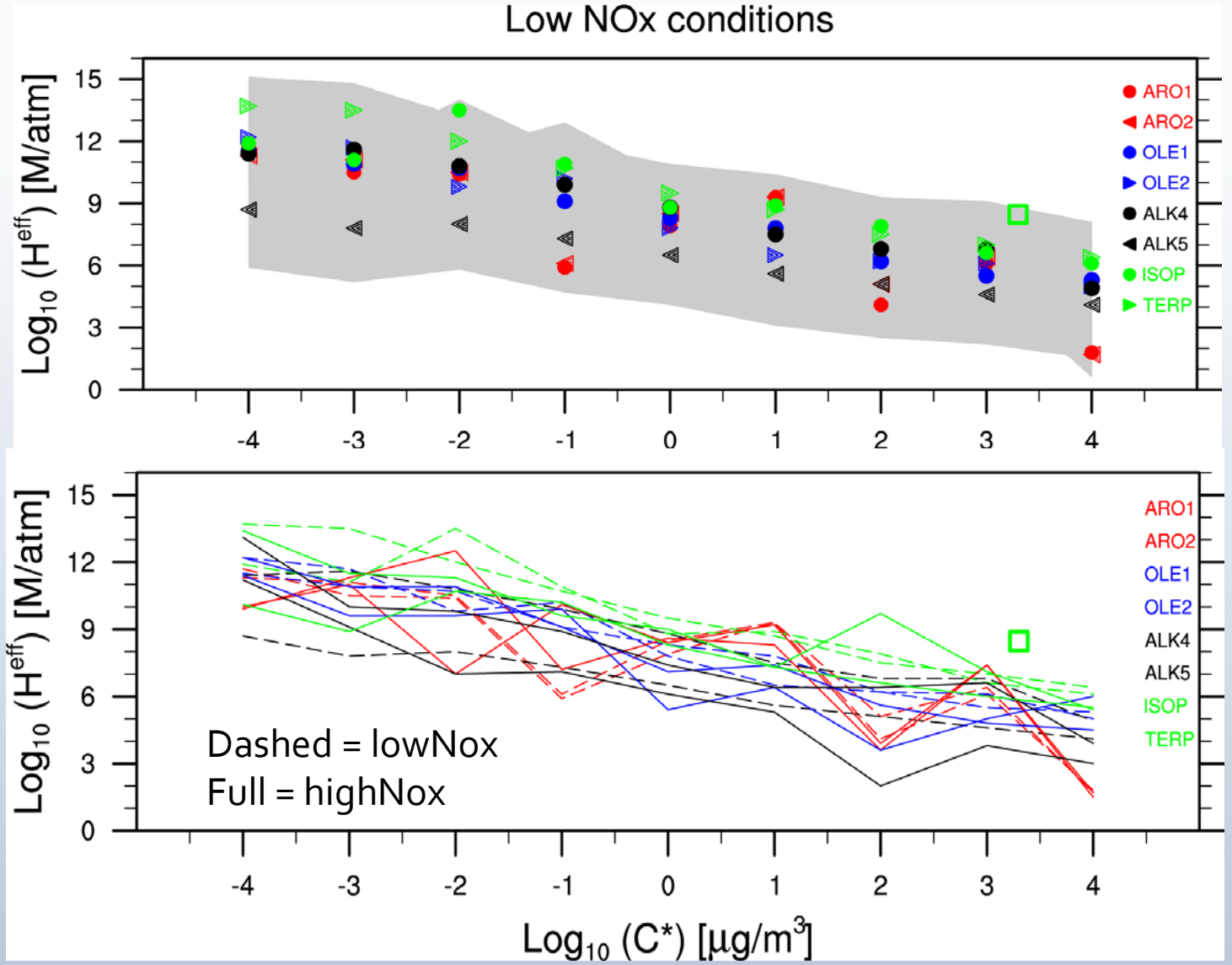


WRF-Chem simulations : surface SOA using 5-bins VBS

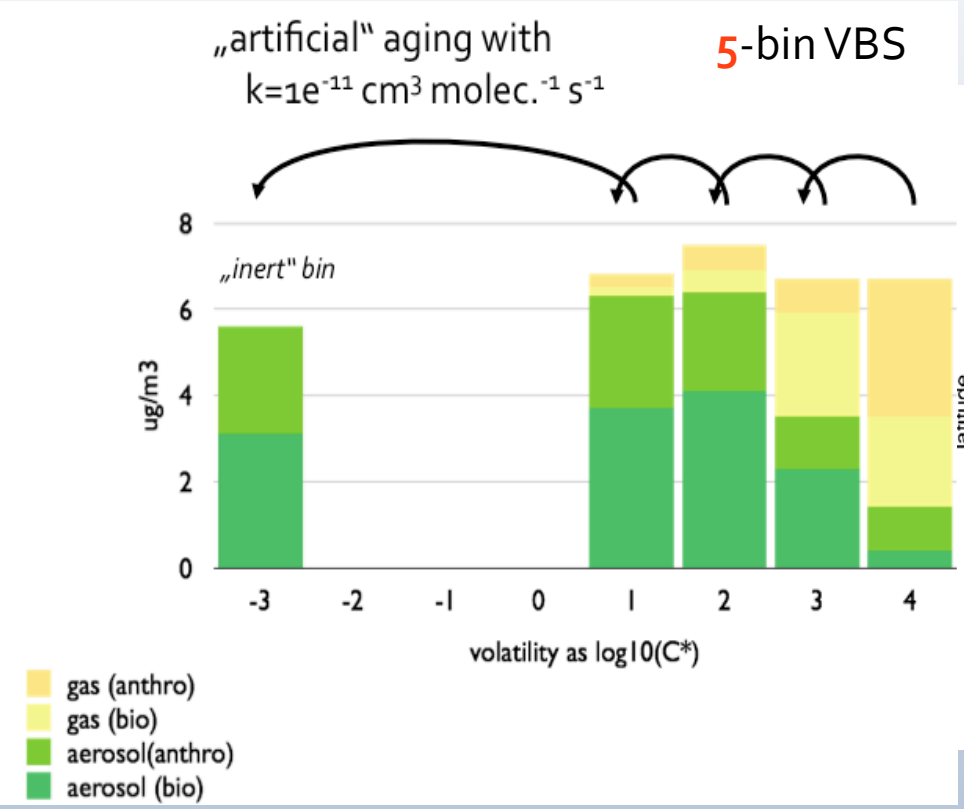
Knote, Hodzic et al., in prep.

36 km horizontal resolution; May 2010

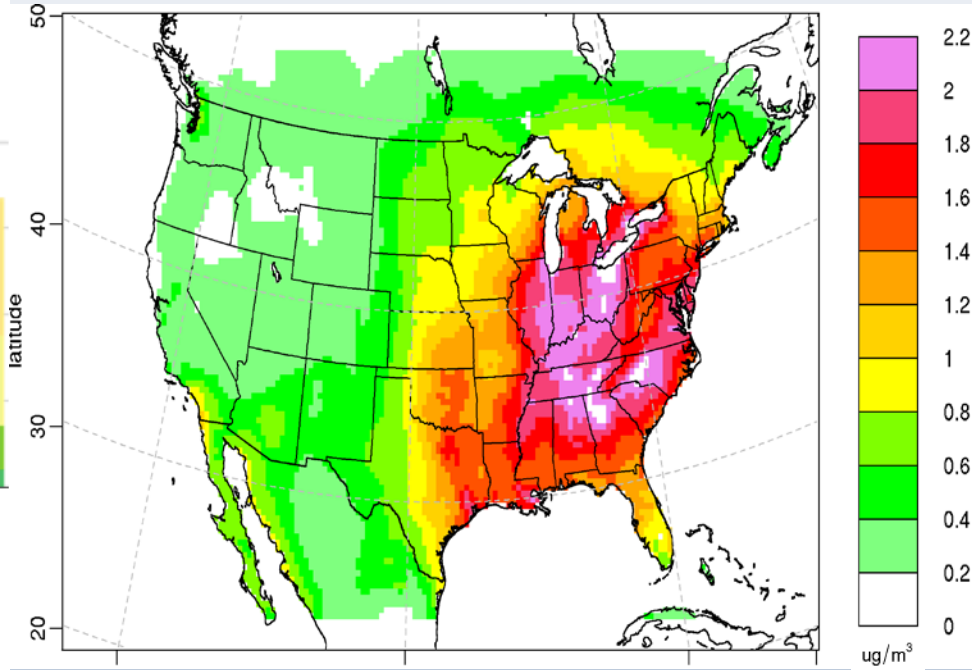
MOZART (extended) gas-phase chemistry ; MOSAIC 4 size bin aerosol scheme

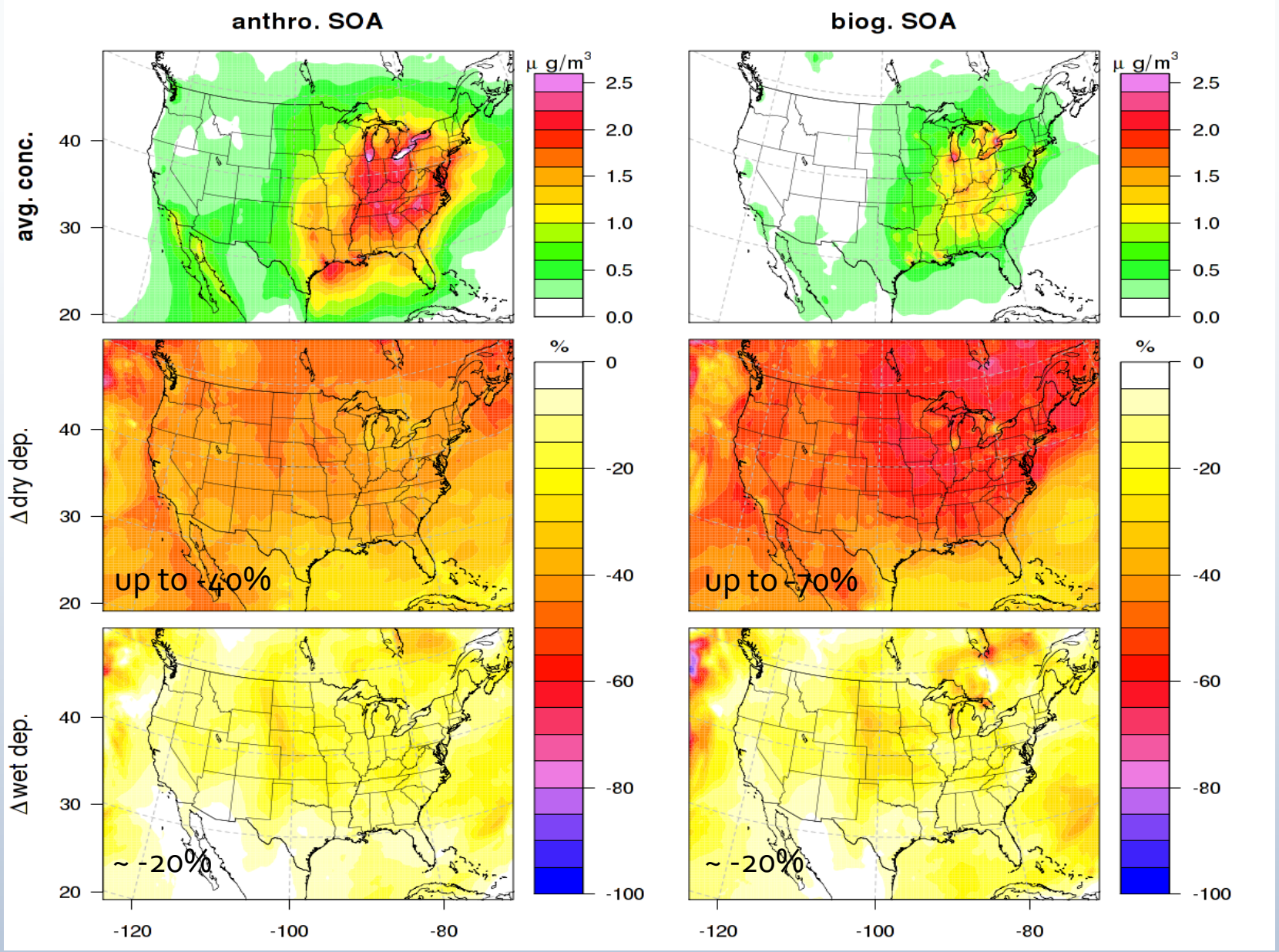
GFS meteorology; MACC/IFS-MOZART BC;

EPA NEI „2010" (2008 + updates) emissions



SOA surface concentrations (May 2010)



WRF-Chem simulations : avg. surface SOA May 2010

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