ISOPRENE SECONDARY ORGANIC AEROSOL

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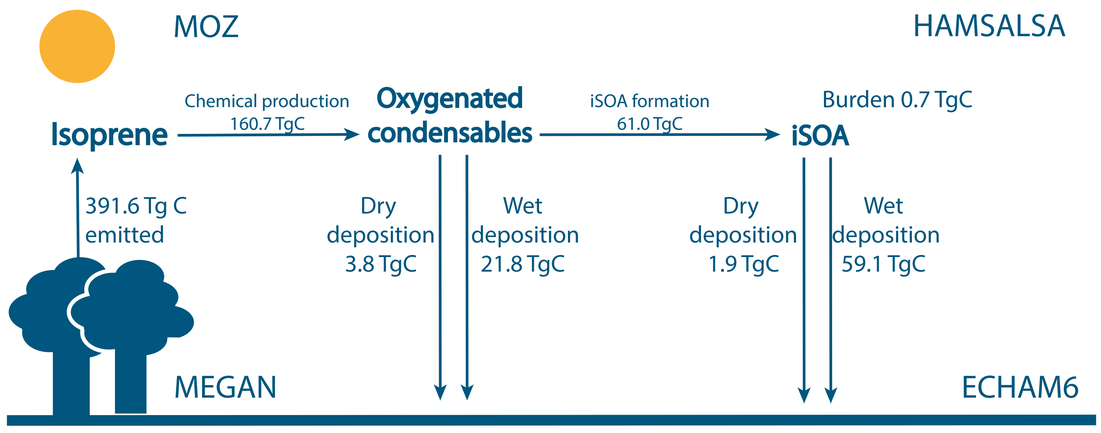
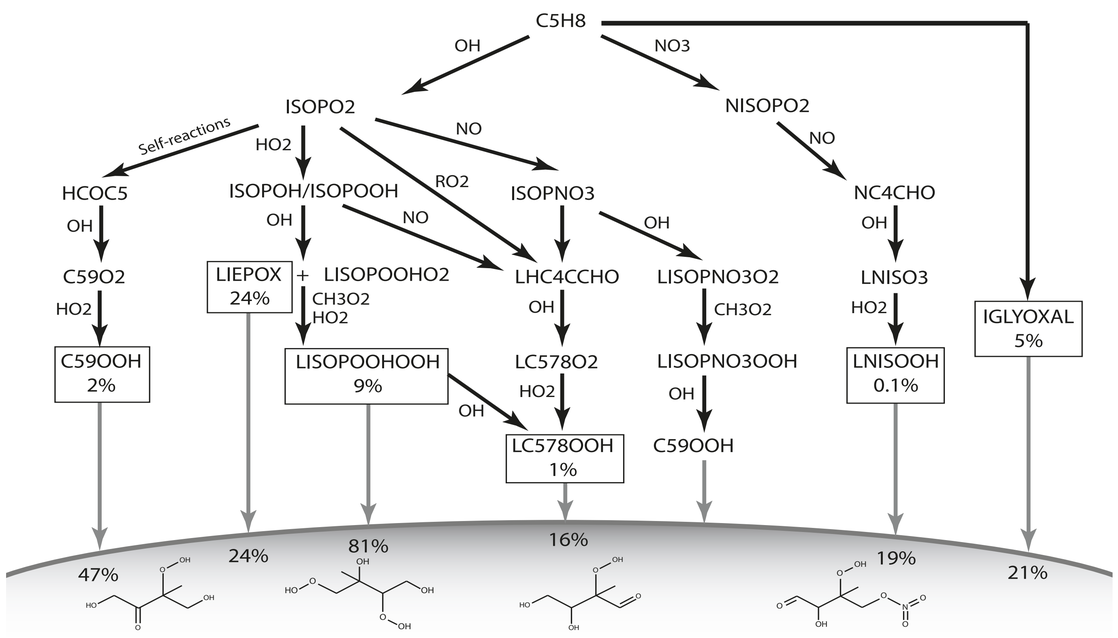
SUMMARY

Explicit chemical coupling of secondary organic aerosol (SOA) formation from isoprene in the chemistry climate model ECHAM-HAMMOZ resolves typical underestimation of SOA in isoprene-dominated regions and enables discussion of individual processes and uncertainities.

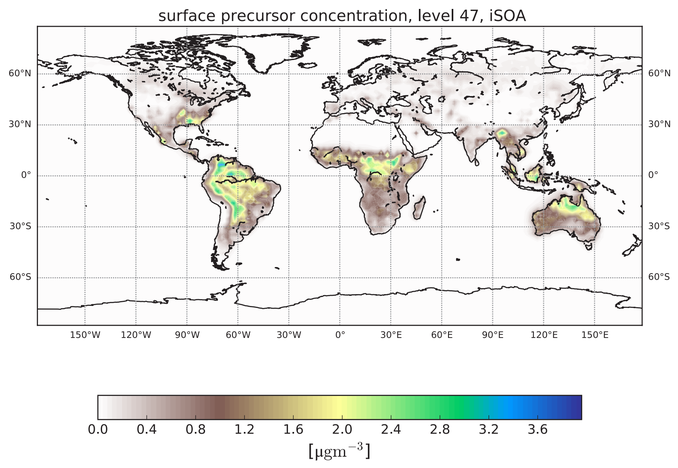


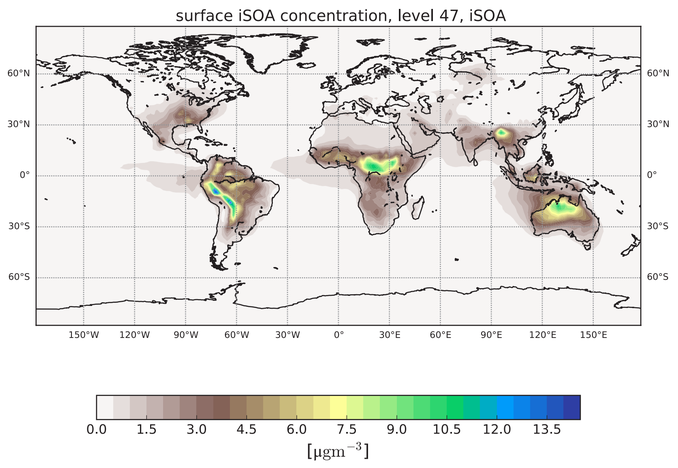
MODEL

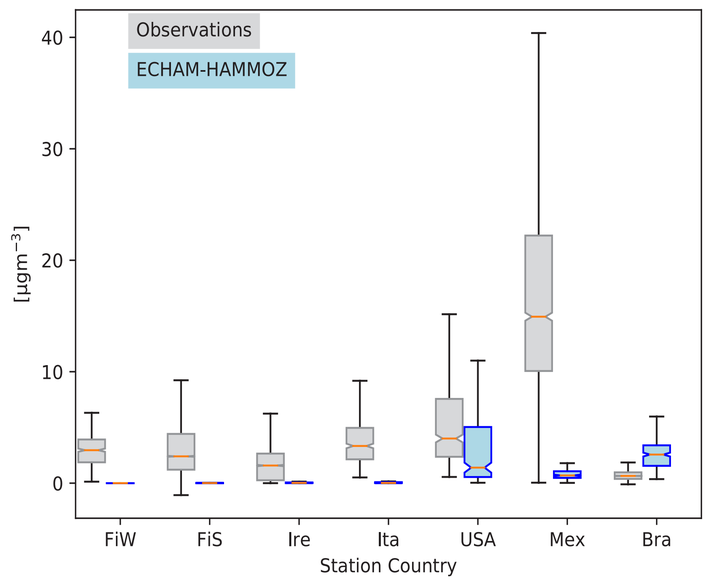


- Simplified scheme of relevant isoprene oxidation
- Boxes: reaction turnover
- Below curve: individual SOA yields

RESULTS





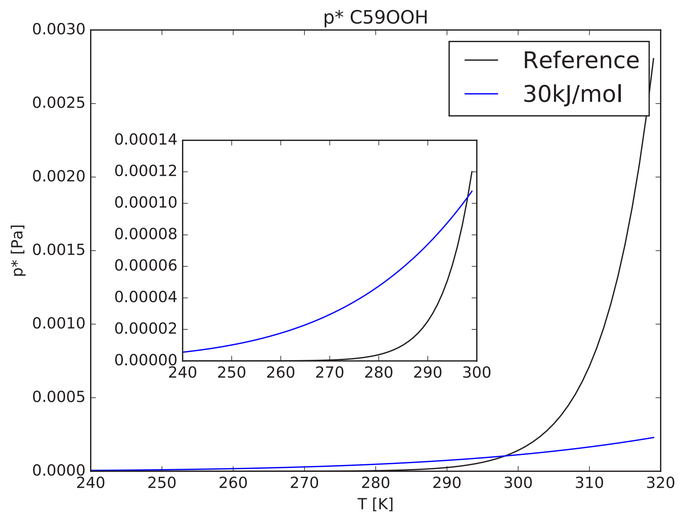


- Global precursor (left) and isoprene SOA (right) annual mean concentrations for surface in 2012
- Precursors are formed during day time
- iSOA is has a lifetime of around 4 days

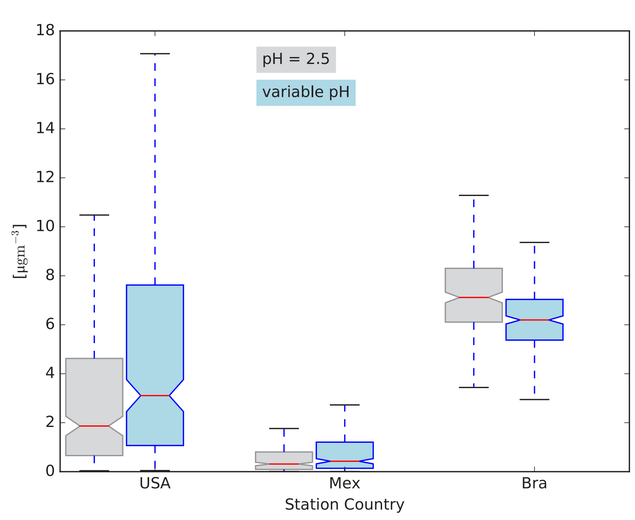
- Comparison to AMS ambient measurements
- Good agreement in isoprene-dominated regions (USA, Brazil)

DISCUSSION

- Sensitivity to evaporation enthalpy
- Fixed saturation vapor pressure
- ΔH_{ref}= 125 kJ/mol
- ΔH_{sen}= 30 kJ/mol



$$C_i^* = C_i^*(T_0)\frac{T_0}{T}\exp\left[\frac{\Delta H_{vap}}{R}\left(\frac{1}{T_0}-\frac{1}{T}\right)\right]$$



- Impact of pH IEPOX uptake
- Reactive uptake as function of pH
- Enhancement in Mexico, USA
- Suppression in Brazil

- Strong modifications on shape of function do not impact model results due to low volatility

- Explicit coupling allows process understanding
- Additional missing loss processes are on the agenda