O_3 GCN: University of Birmingham – Bill Bloss

Key interests for today :

- **Chemical mechanisms: VOC oxidation and ozone formation**
- ***in situ* measurement of chemical ozone production**

Other ozone-relevant activity at Birmingham :

- Personal Exposure [Juana-Mari Delgado-Saborit, Roy Harrison]
- Street Canyon Chemistry / Dynamics; Green Infrastructure [Rob MacKenzie, Xiaoming Cai]
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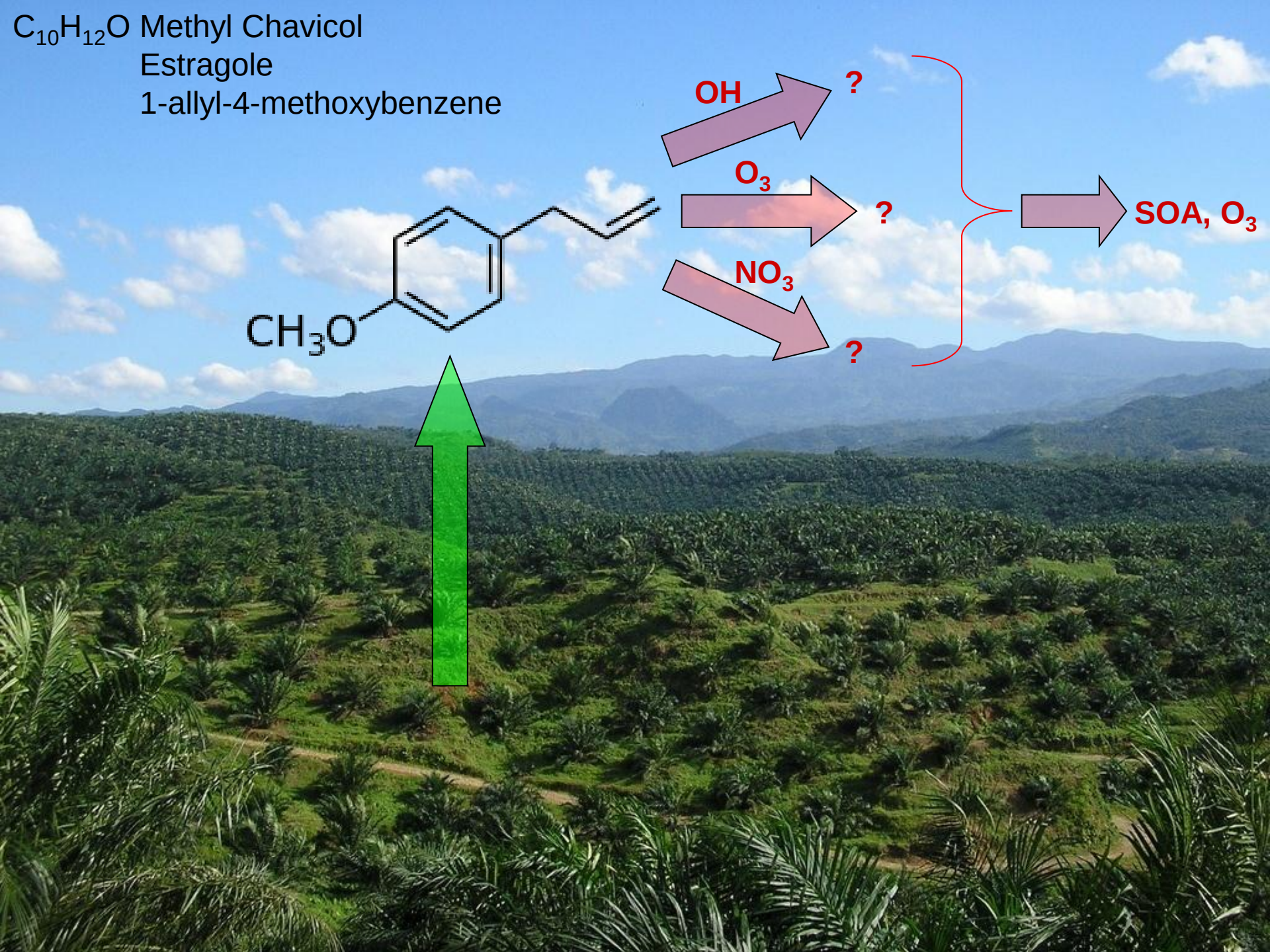
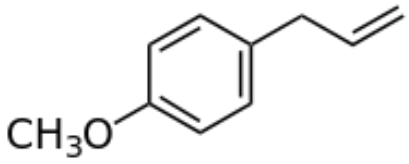

$C_{10}H_{12}O$ Methyl Chavicol
Estragole
1-allyl-4-methoxybenzene
CH_3O
OH
?
O_3
?
NO_3
?
SOA, O_3

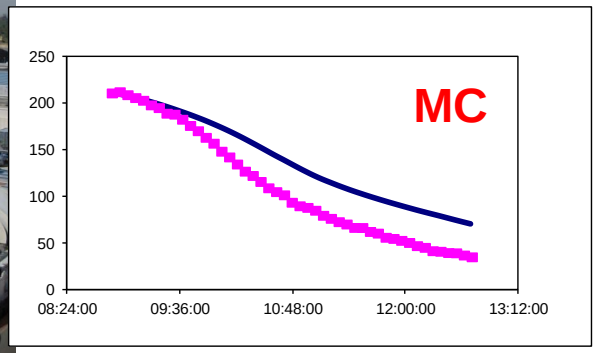
Chamber studies of VOC oxidation

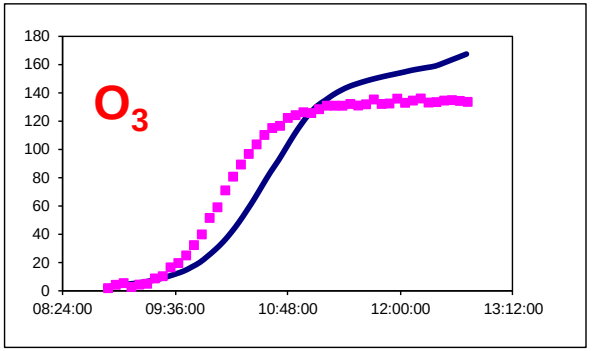
- Simulation chambers used to mimic ambient atmospheric processing

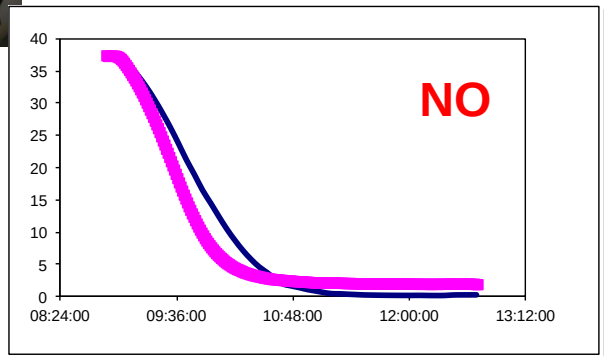
- Data quantify ozone, SOA production; used to derive atmospheric oxidation mechanisms

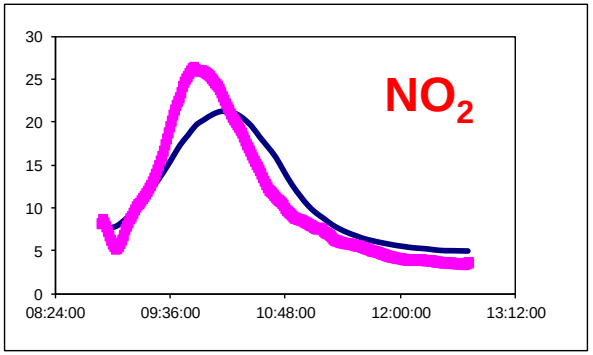
Andrew Rickard: University of York / NCAS











Model

Measurement

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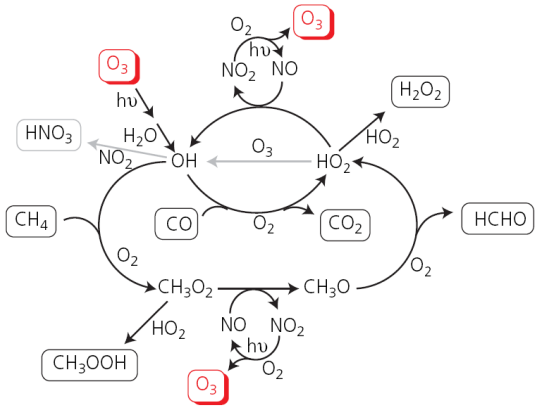
Measurement of *in situ* Ozone Production Rate

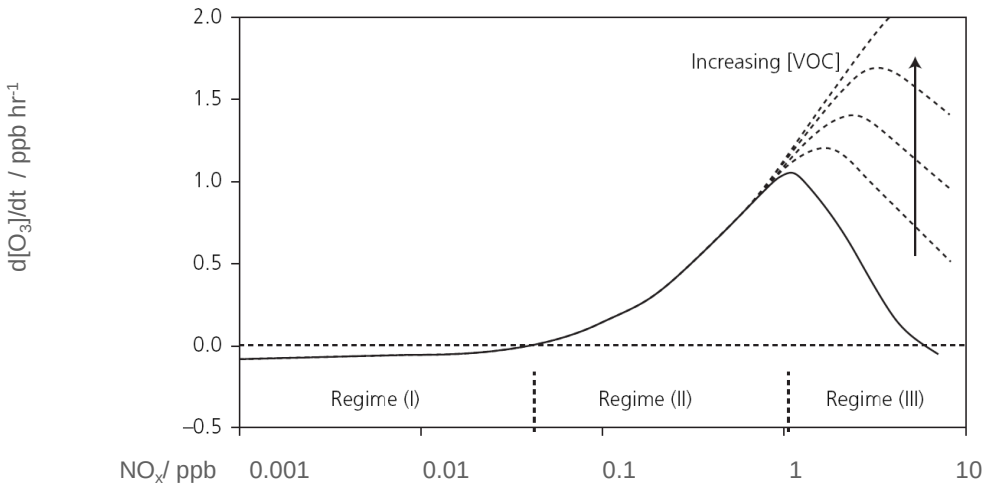
- Key AQ metric, previously only accessible via models, but…

…hard to calculate as limitations on Emissions / Meteorology / Measurements / Chemistry

$$\frac{\partial[O_3]}{\partial t} = \underbrace{p_{O_3} - l_{O_3}}_{P(O_3)} \underbrace{-\frac{v}{H}[O_3]}_{SD} + \underbrace{u_i \frac{\partial[O_3]}{\partial x_i}}_{A}$$

- Aim here is to measure the local net chemical ozone production term : $P(O_3)$ above

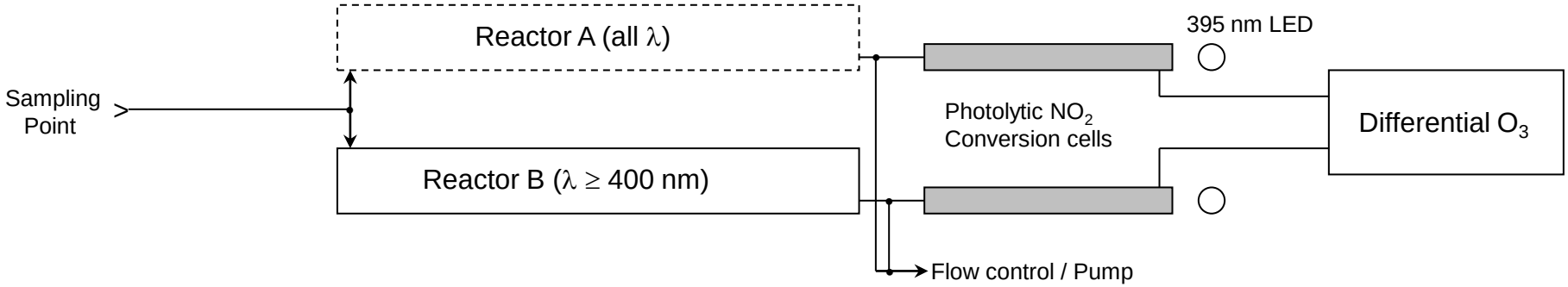


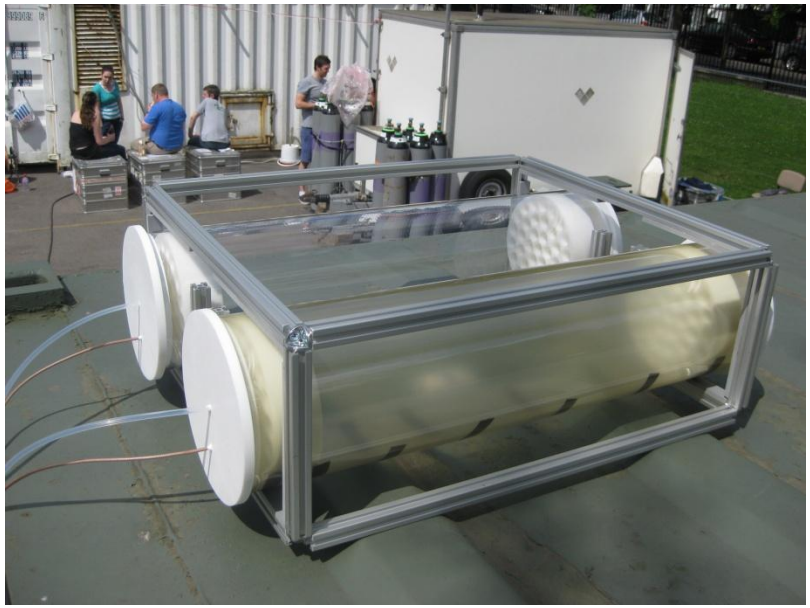


Figures from Royal Soc Report, Fowler et al., 2008

Measurement of *in situ* Ozone Production Rate

- *Instrument development supported by NERC Technology Proof-of-Concept award*





$$NO + O_3 \rightarrow NO + O_2$$
$$NO_2 + hv \rightarrow NO + O \rightarrow\rightarrow NO + O_3$$

$$NO_x = NO + NO_2$$
$$O_X = NO_2 + O_3$$

We measure $\boldsymbol{d[O_x]/dt}$

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