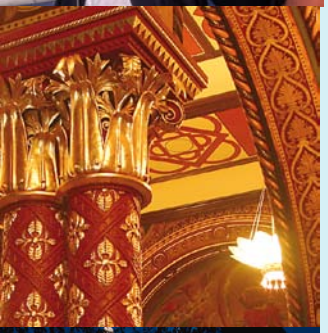


St George's University of London

KING'S College LONDON

OZONE WORK AT KING'S COLLEGE LONDON, MRC-HPA CENTRE FOR ENVIRONMENT AND HEALTH

Dr Heather Walton, Professor Frank Kelly, Dr Ian Mudway, Dr Sean Beevers, Dr David Carslaw, Professor Martin Williams, Dr Gary Fuller, Professor Ross Anderson, Dr Richard Atkinson (St. George's), and others....

1st May 2013

www.environment-health.ac.uk

MRC-HPA Centre for Environment & Health

Imperial College London | MRC Medical Research Council | Health Protection Agency | KING'S College LONDON

Ozone models comparison

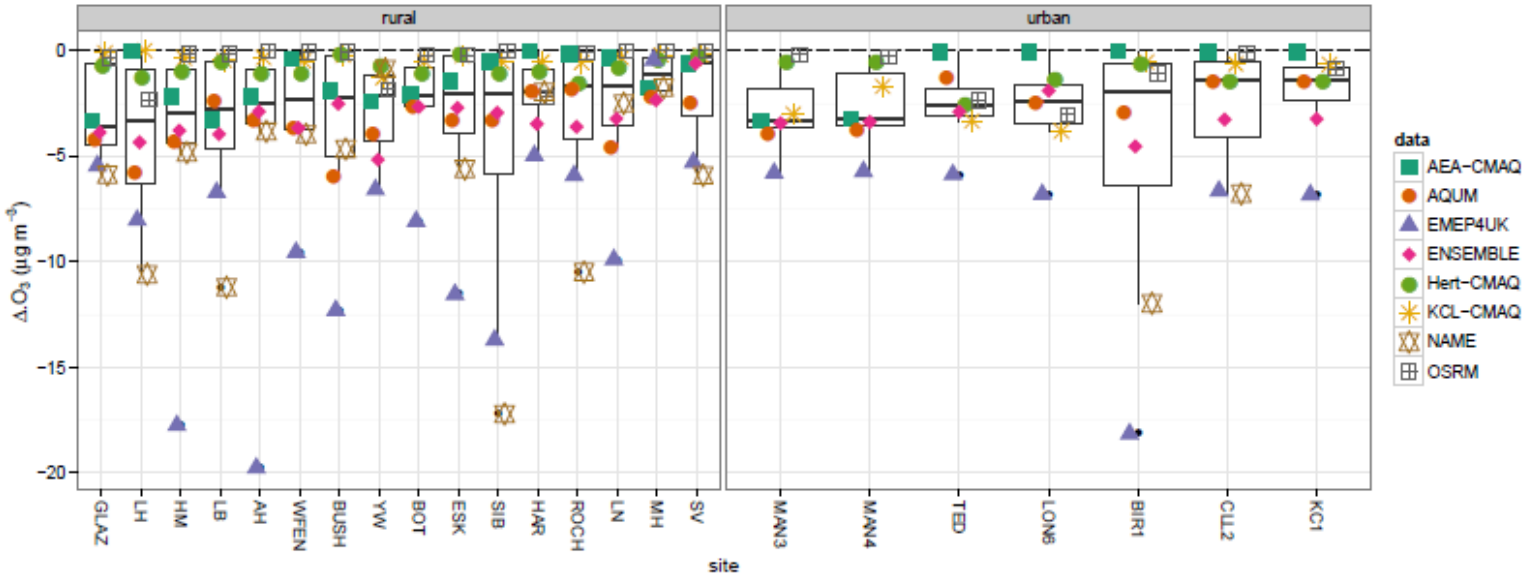
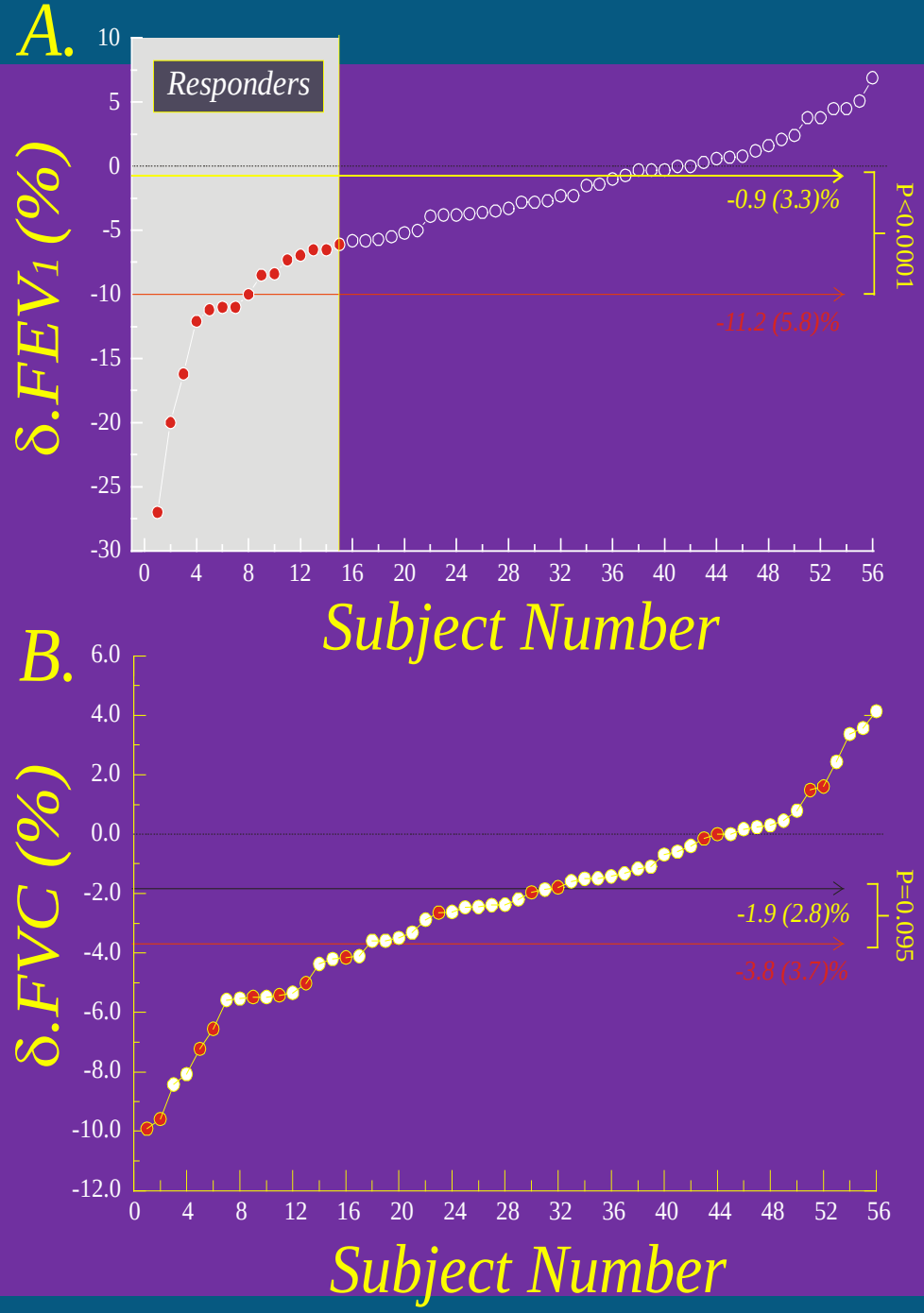
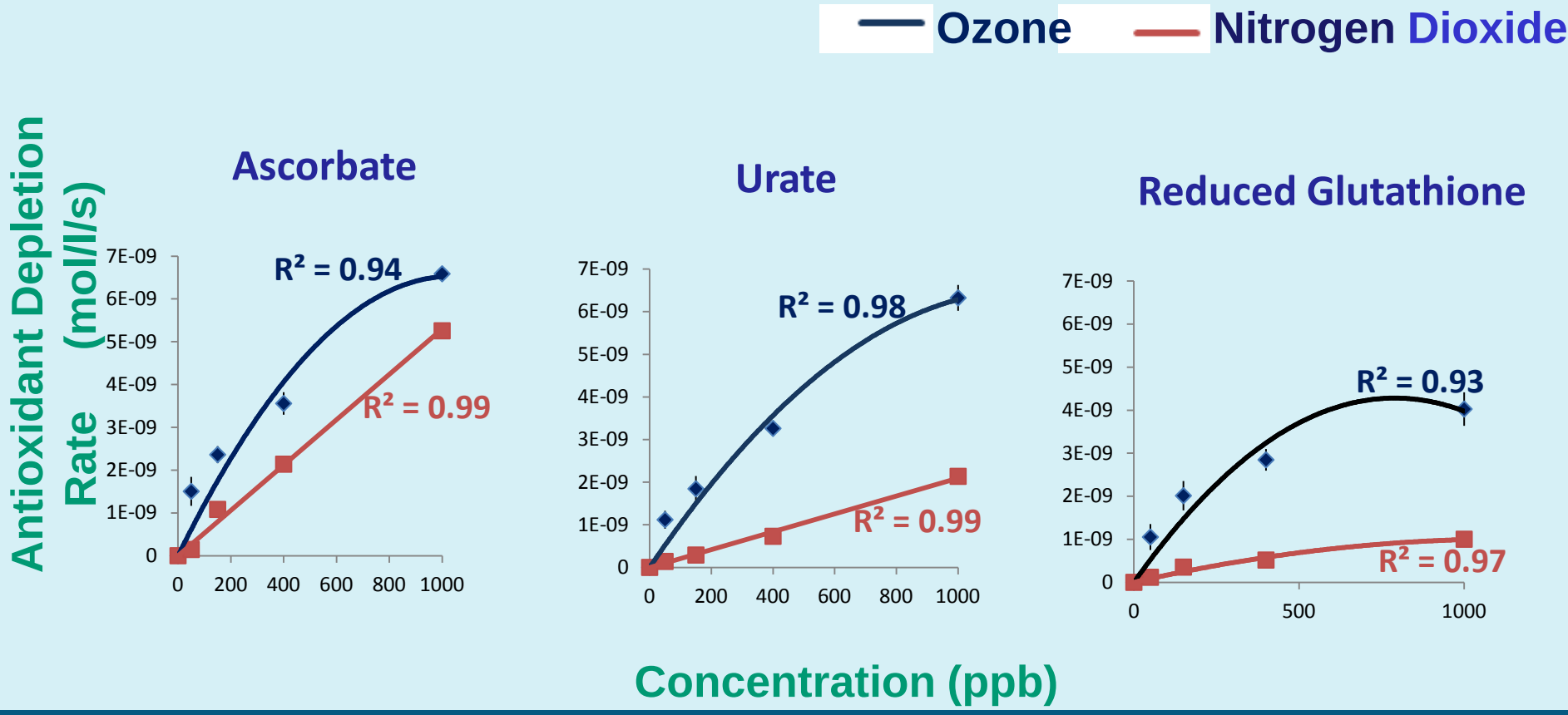


FIGURE 4.10: Model predictions of maximum daily mean O_3 concentration for Scenario S4. Negative values show a *reduction* (improvement) in O_3 concentration. The box and whisker plots help to show where the distribution is centred.

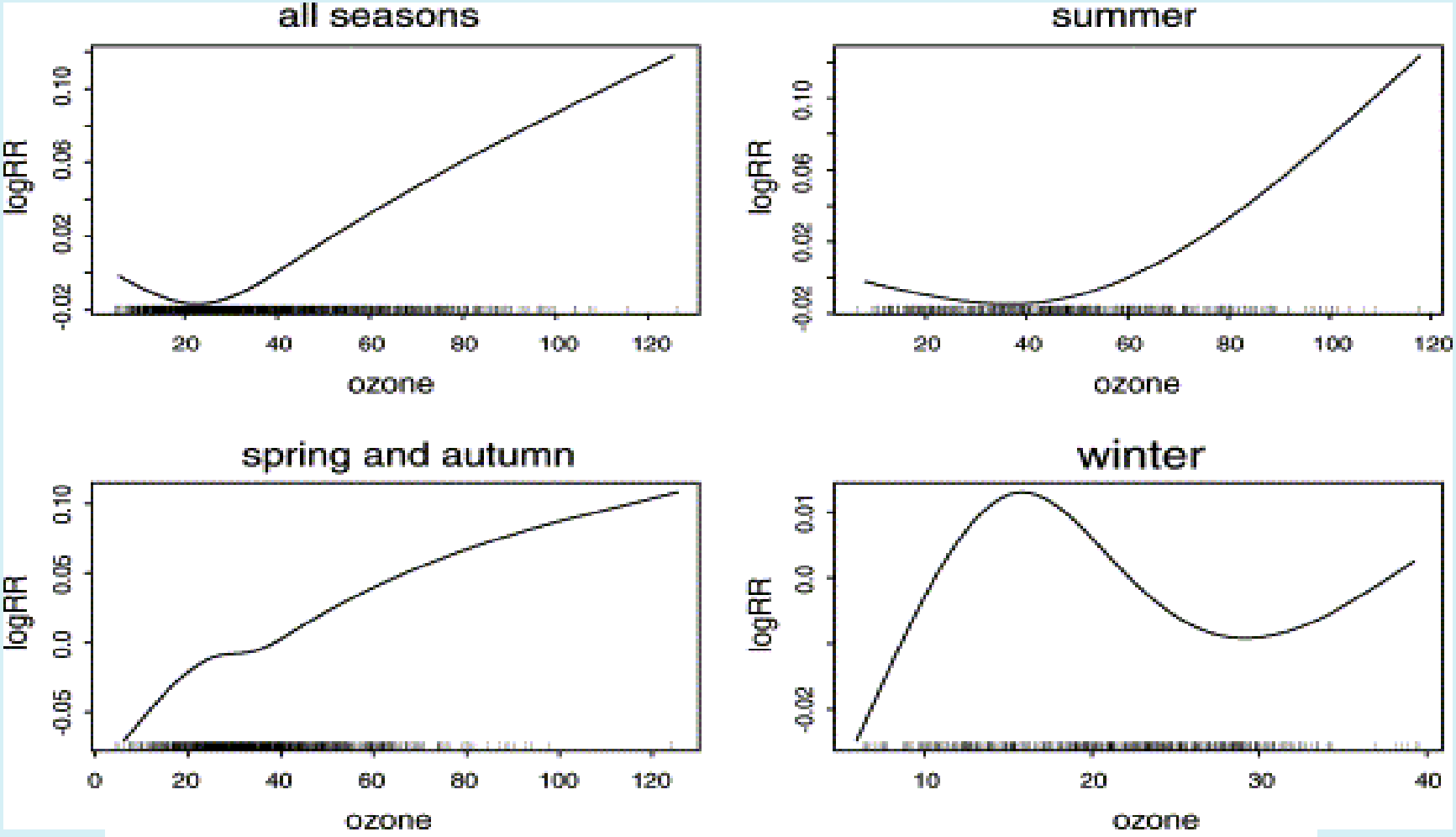


Inter-individual responses to ozone

Quantification of the Antioxidant Depletion Capacity of Ozone and Nitrogen Dioxide in the Same Respiratory Tract Lining Fluid Model



Relationships for 1 hour max ozone (ppb) and mortality in Seoul by season S-Y Kim et al (2004)



Relative risk of death as a smooth function of previous day concentration of 24 hour ave ozone (µg/m^3) (two-pollutant model with TSP) (Hoek et al 1997)

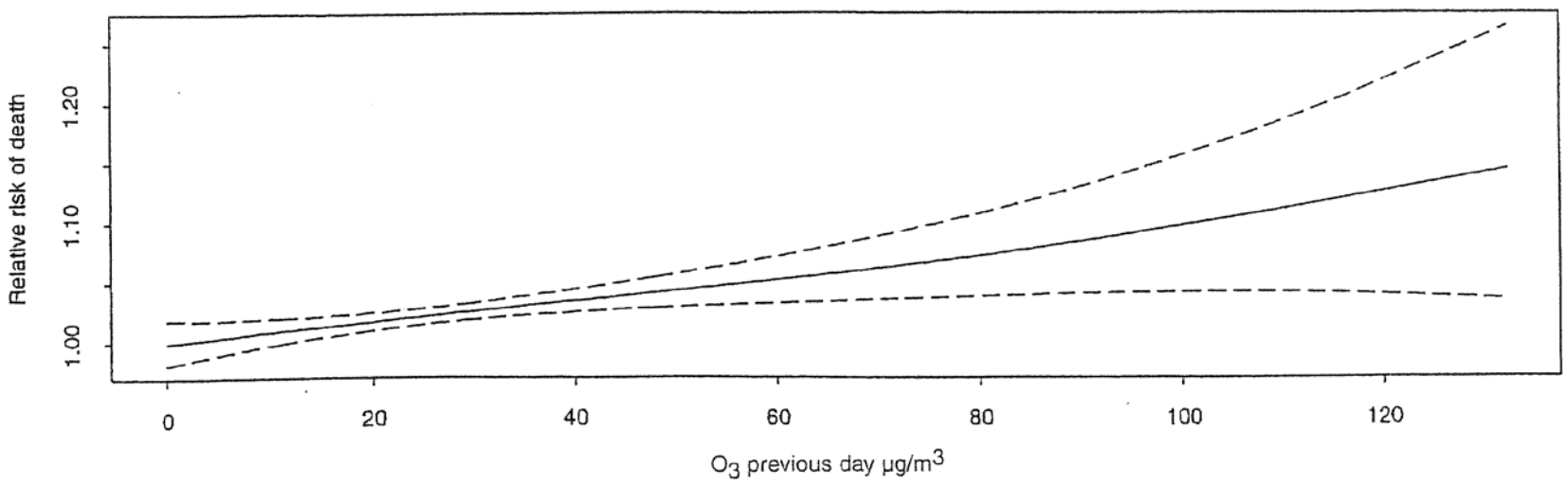
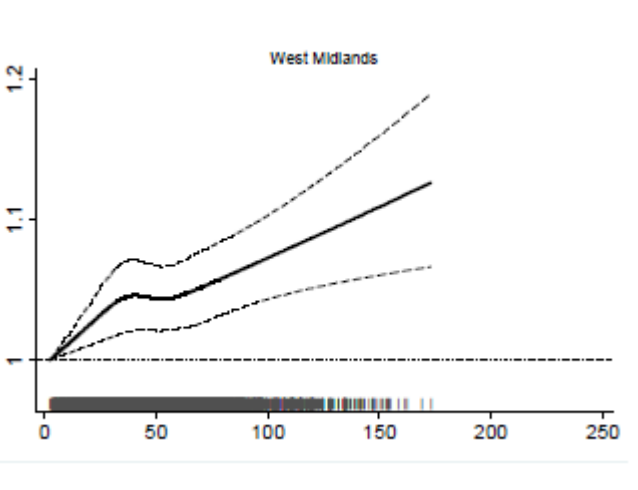
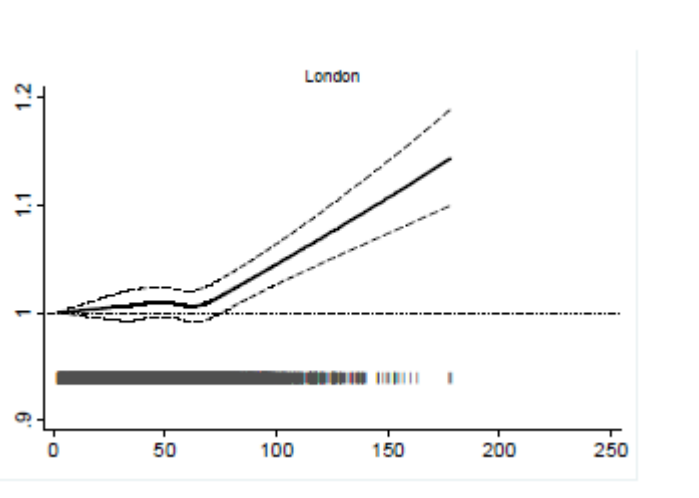


Fig. 1. Relative risk of death as a smooth function of previous-day concentration of total suspended particulates and ozone, adjusted for confounders (two-pollutant model). The solid line is the predicted relative risk, using a smoothing spline with two degrees of freedom; the dashed line is the 90% confidence interval.

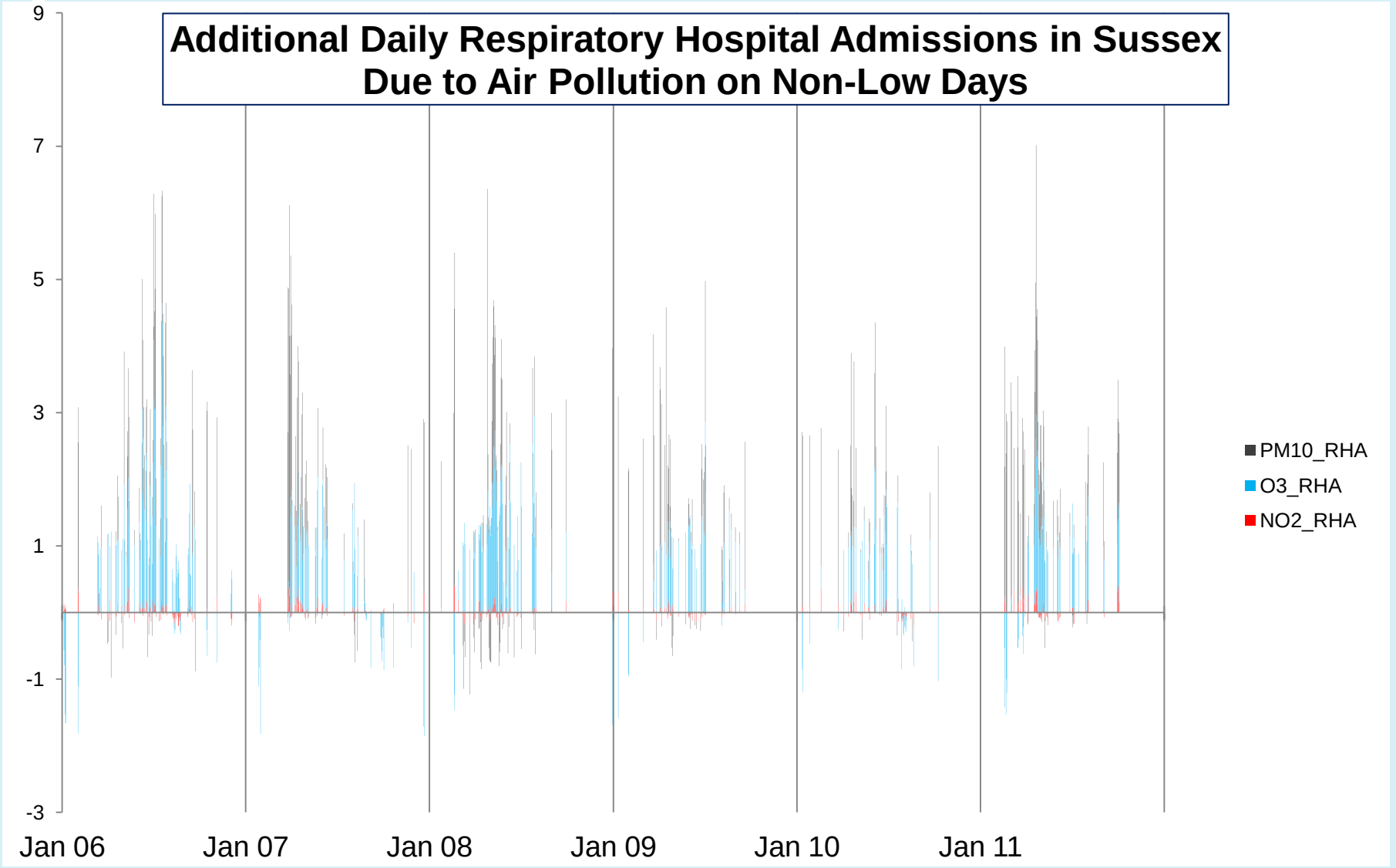
What is it about London? Threshold for ozone and mortality
Atkinson et al (2012) EHP 120:1411-1417 (Supplementary material)

RR





Daily max 8 hr mean ozone $\mu g/m^3$


Additional Daily Respiratory Hospital Admissions in Sussex
Due to Air Pollution on Non-Low Days
9
7
5
3
1
-1
-3
Jan 06
Jan 07
Jan 08
Jan 09
Jan 10
Jan 11
PM10_RHA
O3_RHA
NO2_RHA

Long-term exposure to ozone Jerrett et al (2009) NEJM 360:1085-95

Respiratory mortality (per 10 ppb Apr-Sept average daily 1 hr max ozone (US cities))

Single pollutant	Adjusted for $PM_{2.5}$
1.027 (1.007–1.046)	1.040 (1.013–1.067)

All-cause mortality, stratified by temperature but no adjustment for $PM_{2.5}$

External temperature (°C)‡¶		
<23.3	24	0.96 (0.90–1.01)
>23.3 to <25.4	29	0.97 (0.87–1.08)
>25.4 to <28.7	22	1.04 (0.92–1.16)
>28.7	25	1.05 (1.03–1.08)

WHO REVIHAAP OZONE (1)

Effects from **long-term exposures** now recognised

WHO should consider an **AQG for long-term exposures**

Long term exposures determined by **global emissions** (mainly of **methane**)

EC should analyse impacts of **current policies on long-term ozone** concentrations

WHO REVIHAAP Ozone (2)

EC should then consider wider **outreach** – via HTAP?

Contingent on this, **EU** could consider a **TV for long-term exposures**

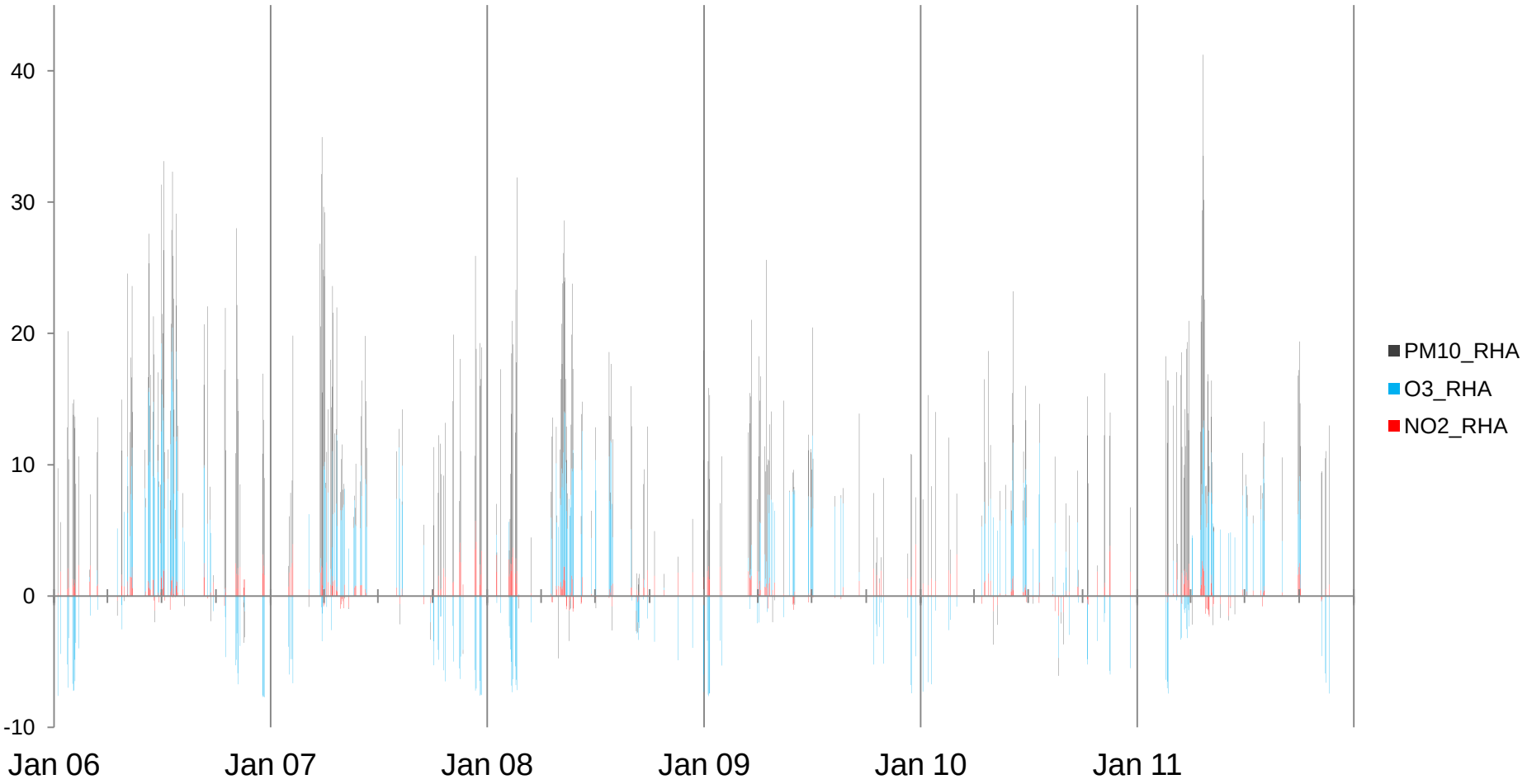
Can't quantify threshold but if exists, it is <45ppb max hourly mean

Recommend carrying out HIA with SOMO35 and **SOMO10**

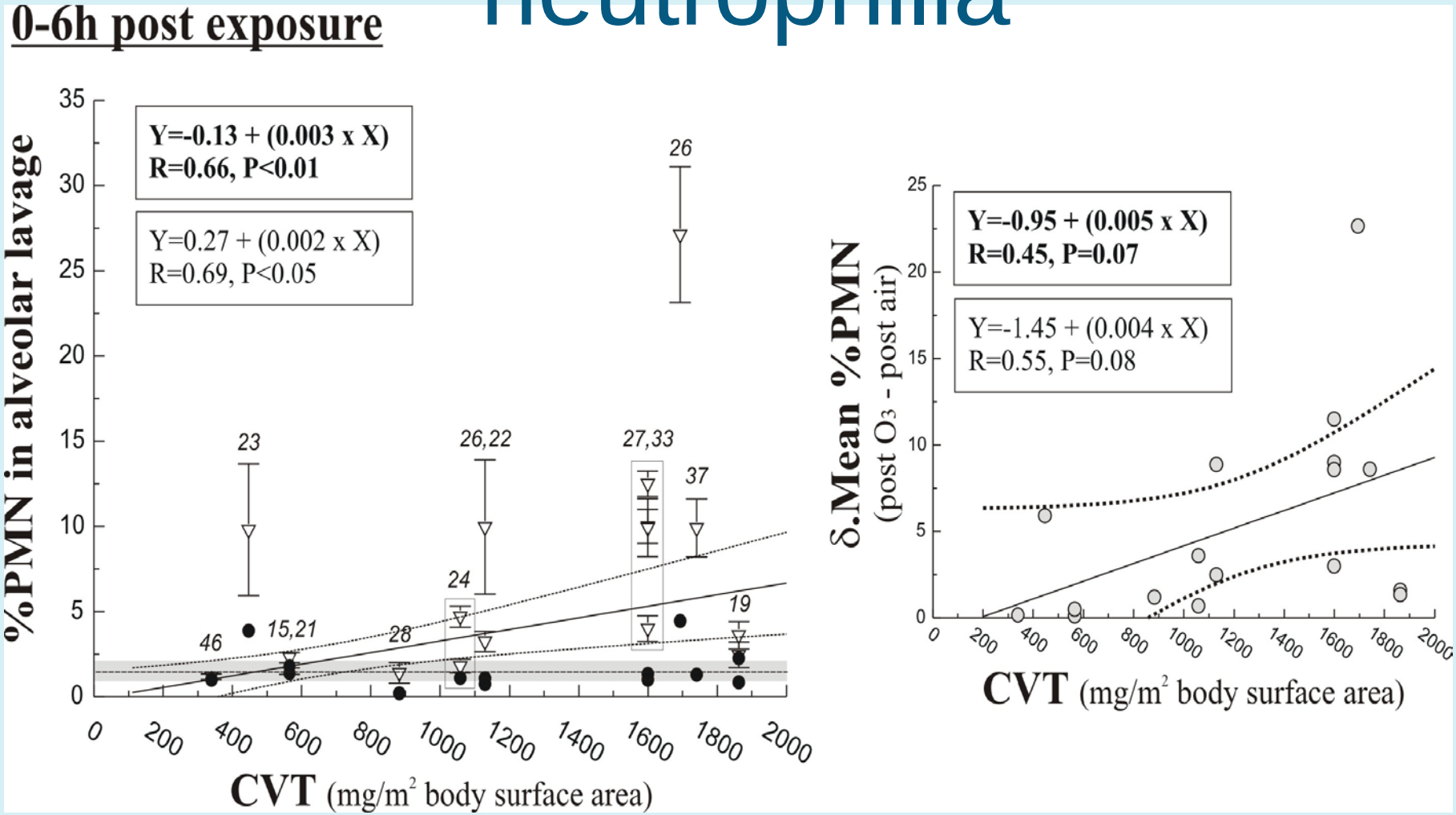
1. If EU signs up to reducing VOCs by around 30% and NOx by around 50% by 2020 (Gothenburg Protocol) where on the globe will the next reductions most effectively come from in terms of minimising SOMO35 and SOMO10? More from the EU, North America or Asia?
2. Ditto in terms of effects on plants.
3. What causes the spring increase in ozone in the UK and Europe? How much might be biogenic as plants wake up in the spring?

Background slides in case of questions not used

Additional Daily Respiratory Hospital Admissions in London Due to Air Pollution on Non-Low Days



Meta-analysis of ozone-induced neutrophilia



Mudway & Kelly, AJRCCM, 2004

Ozone is a global problem