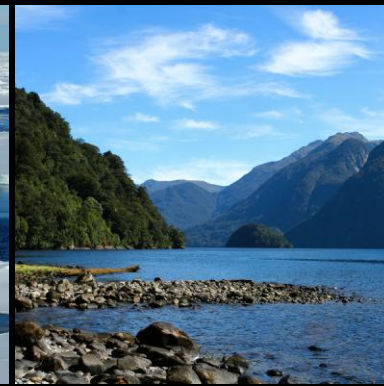


UKEAP

Precip-Net, NO₂-Net update



Acid rain network: What is it for?

- To measure rain composition

What are the data used for?

As input to the Concentration Based Estimates of Deposition (CBED)

Validate long range transport models

Provide inputs to effects community

Provides temporal trends

Why was network set up?



Purpose:

1. To provide concentration fields for deposition estimates
2. Trend assessment

31 long running sites

7 acid water monitoring sites

+ 2 wet only collectors

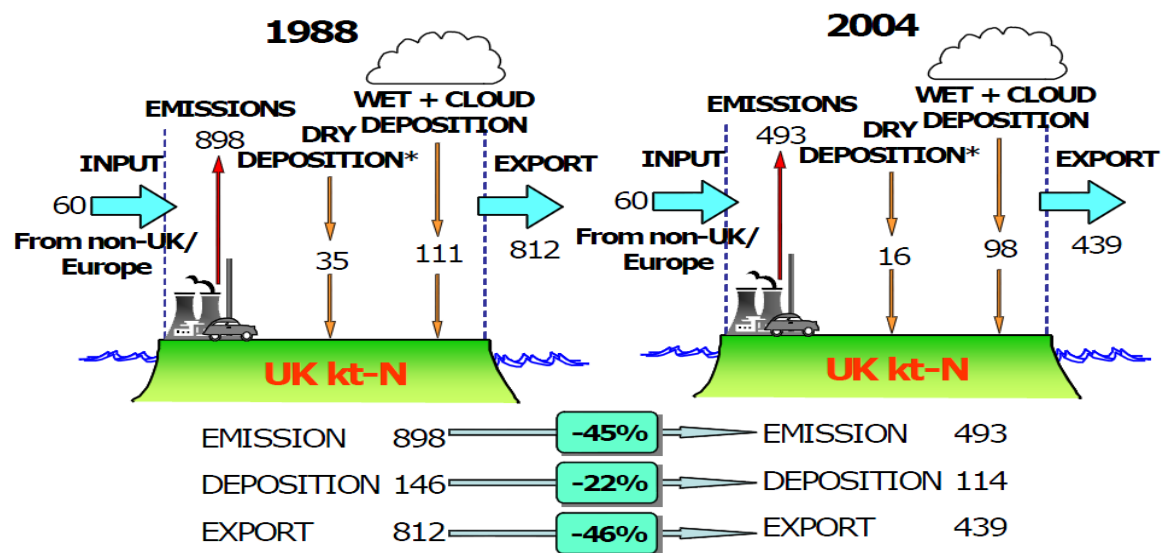


Objectives for Concentration Based Estimates of Deposition

Develop and improve methods for estimating wet and dry deposition

Produce high resolution maps of wet and dry deposition

Carry 'budget analysis':



*NO_x only

www.defra.gov.uk

Defra deposition model evaluation analysis – Phase 1

David Carslaw
King's College London

Version: 15th April 2011

Non-sea salt sulphate evaluation

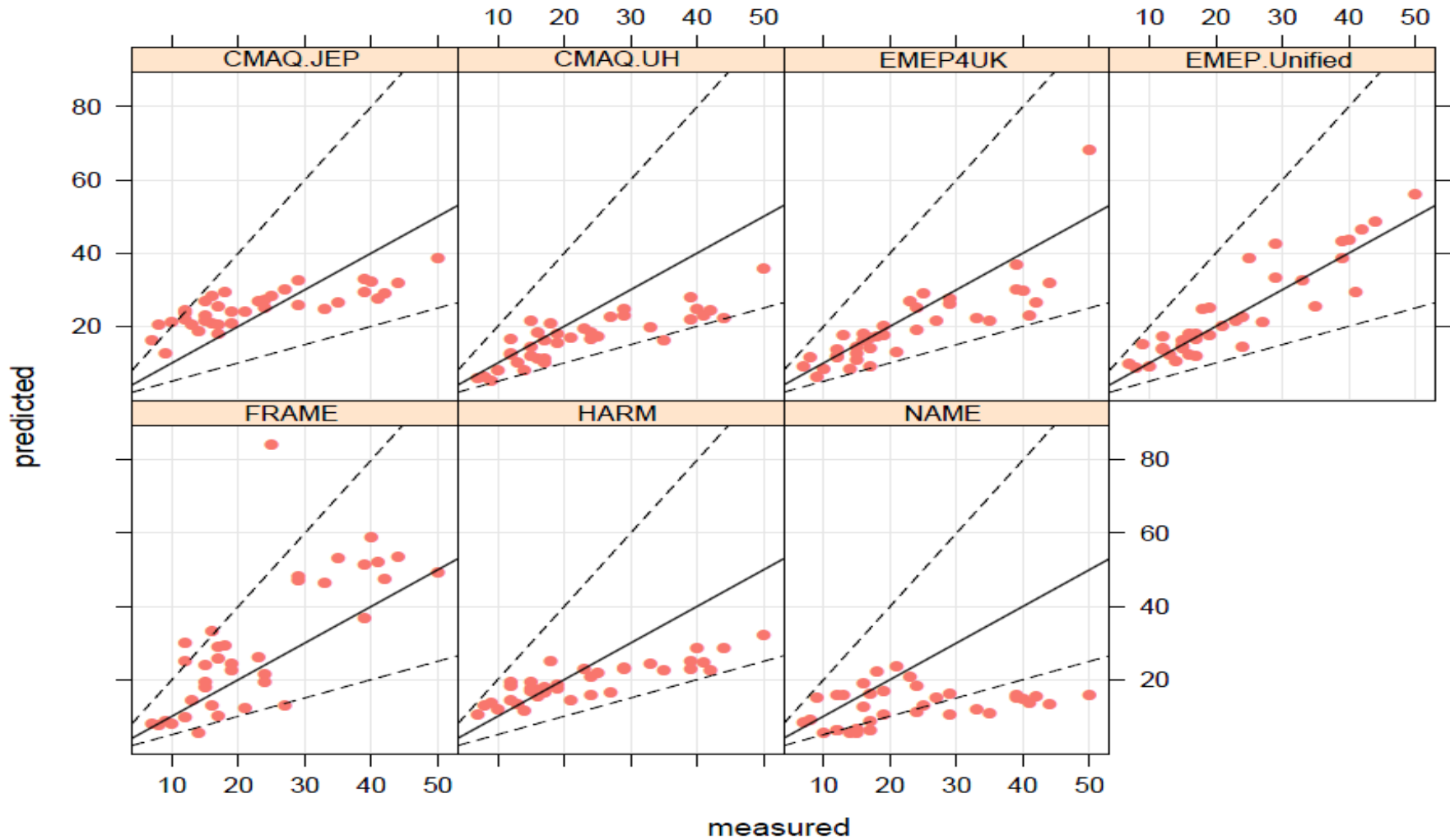


Figure 57: Measured versus predicted annual mean non-sea salt SO_4 in precipitation concentrations.

Nitrate evaluation

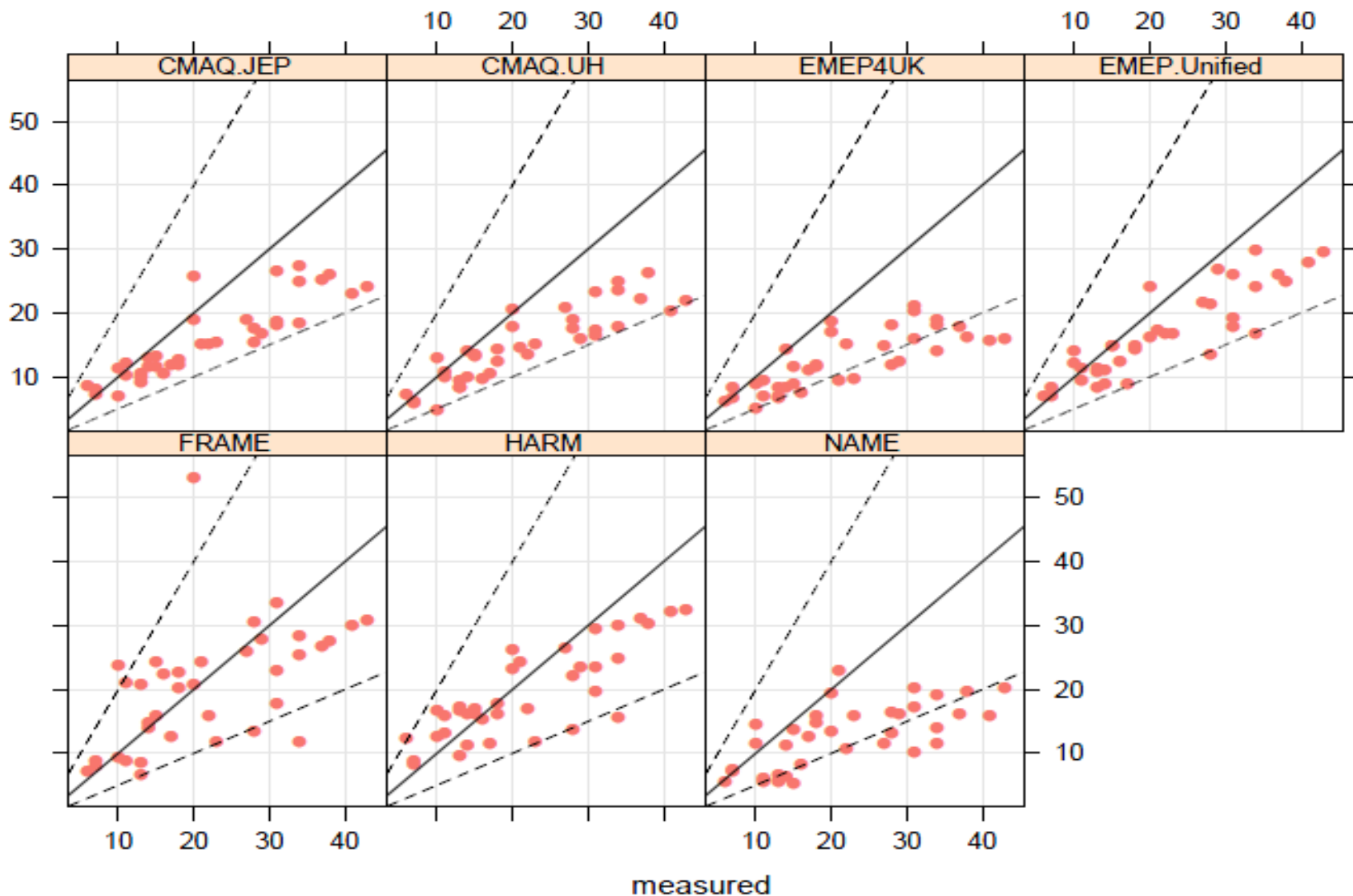


Figure 65: Measured versus predicted annual mean nitrate in precipitation concentrations.

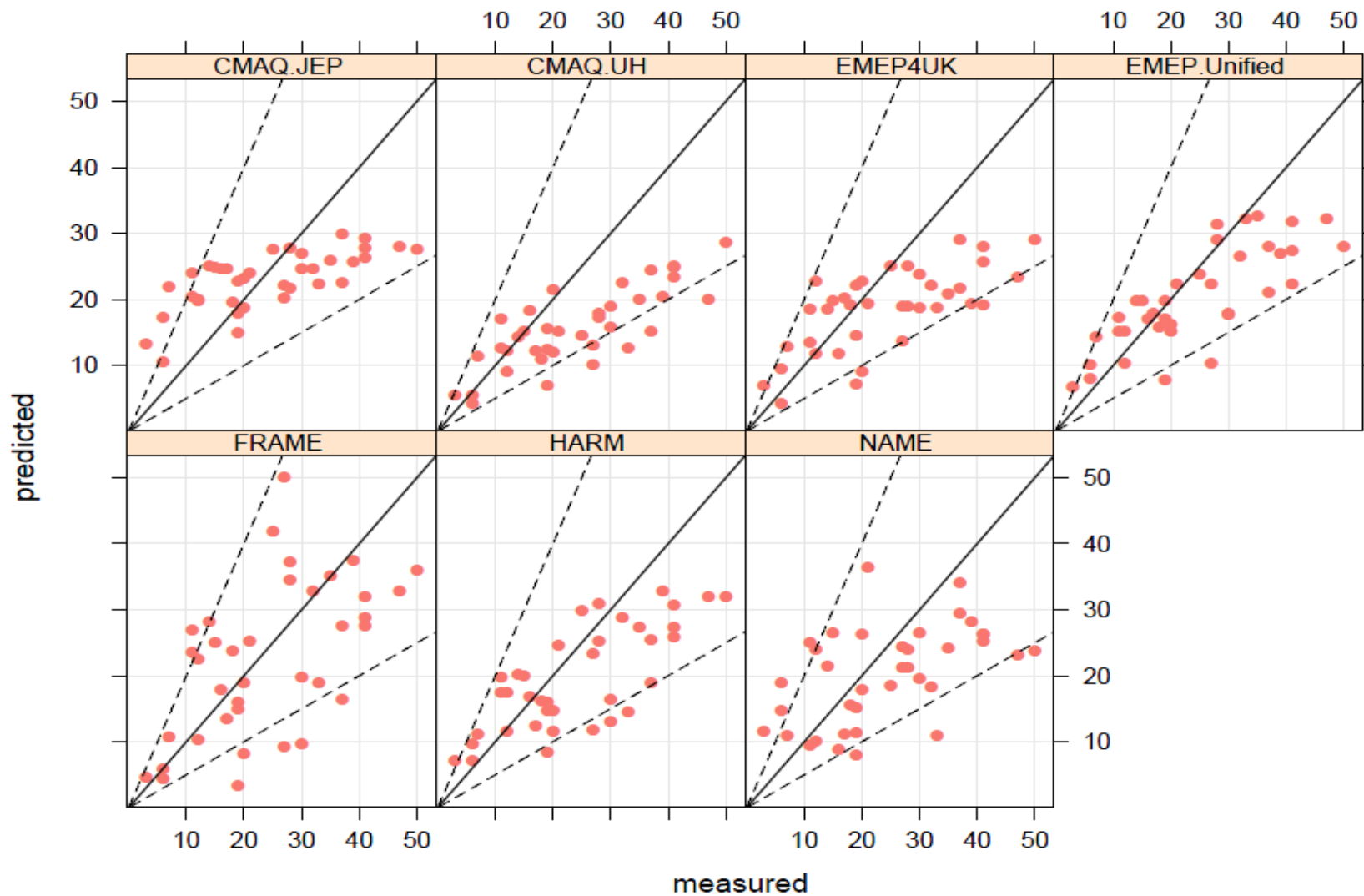


Figure 73: Measured versus predicted annual mean ammonium in precipitation concentrations.



This report relates changes in deposition to changes in water chemistry

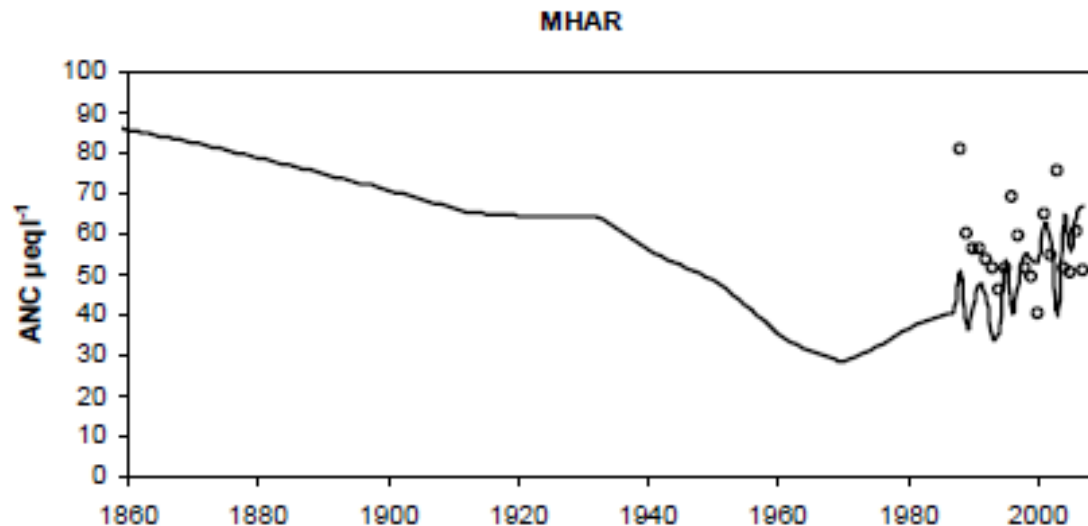
Recovery of lakes and streams in the UK from the effects of acid rain
UK Acid Waters Monitoring Network 20 Year Interpretative Report

Eds. M. Kernan, R.W. Battarbee, C. J. Curtis, D. T. Monteith & E. M. Shilland

July 2010

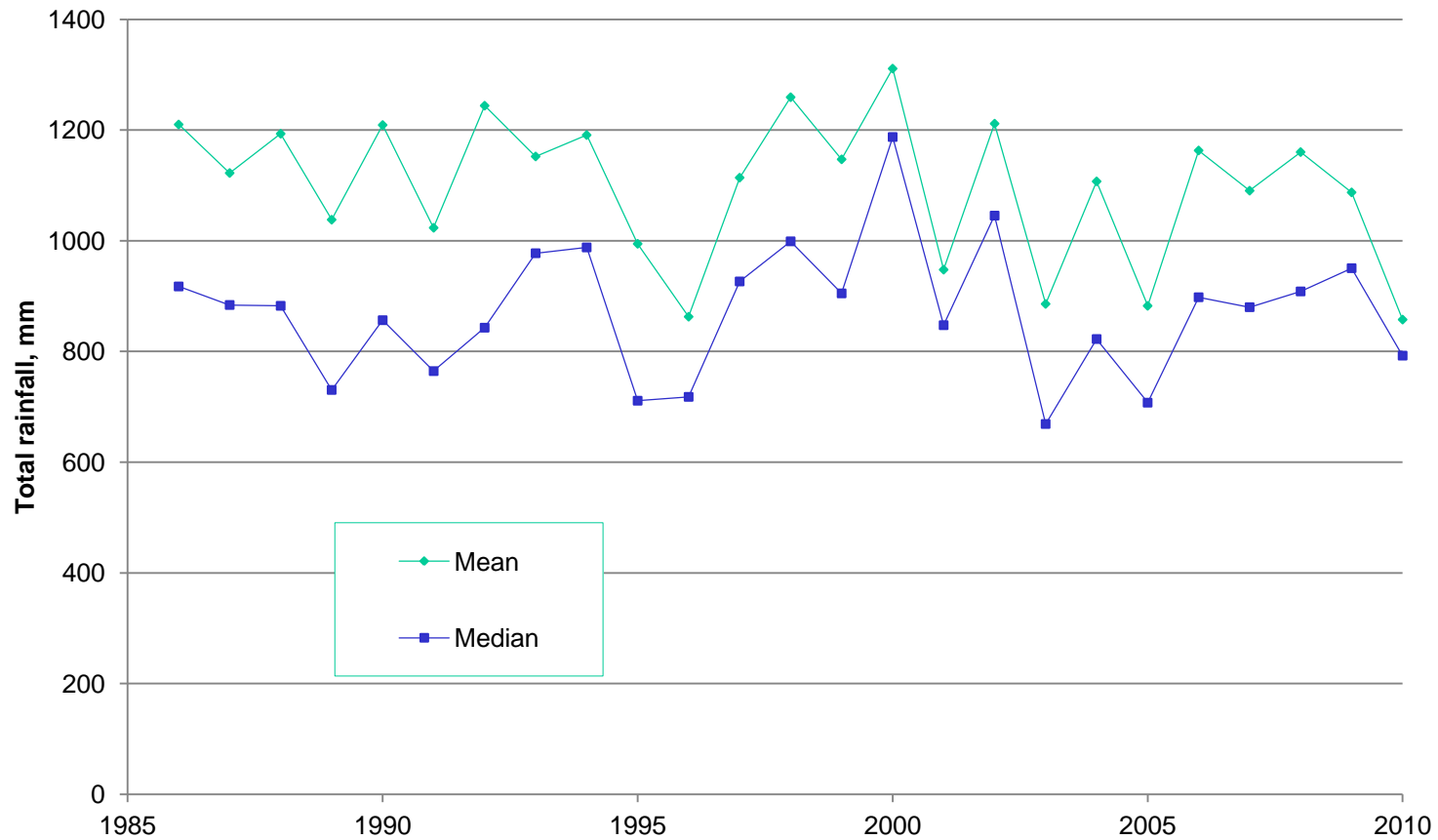
Provides inputs for MAGIC model. This model provides chemical reference conditions in terms of acid neutralising capacity, pH and soil base saturation.

Main point – recovery is underway



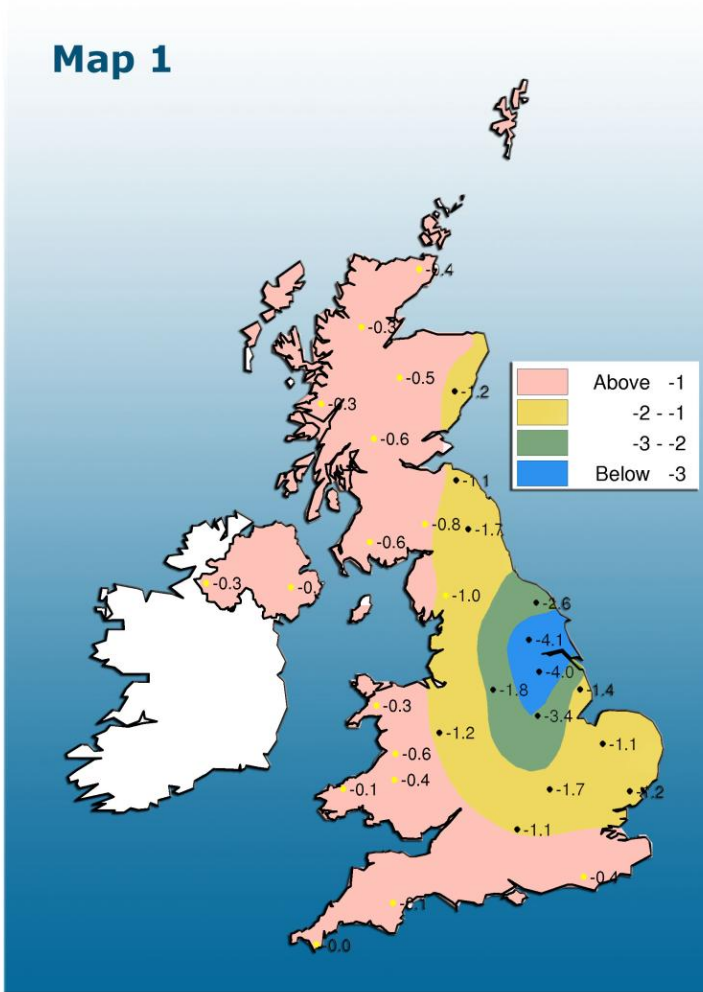
What has happened rainwater amounts?

Average amounts over 25 year period



Spatial trends – Hydrogen ion

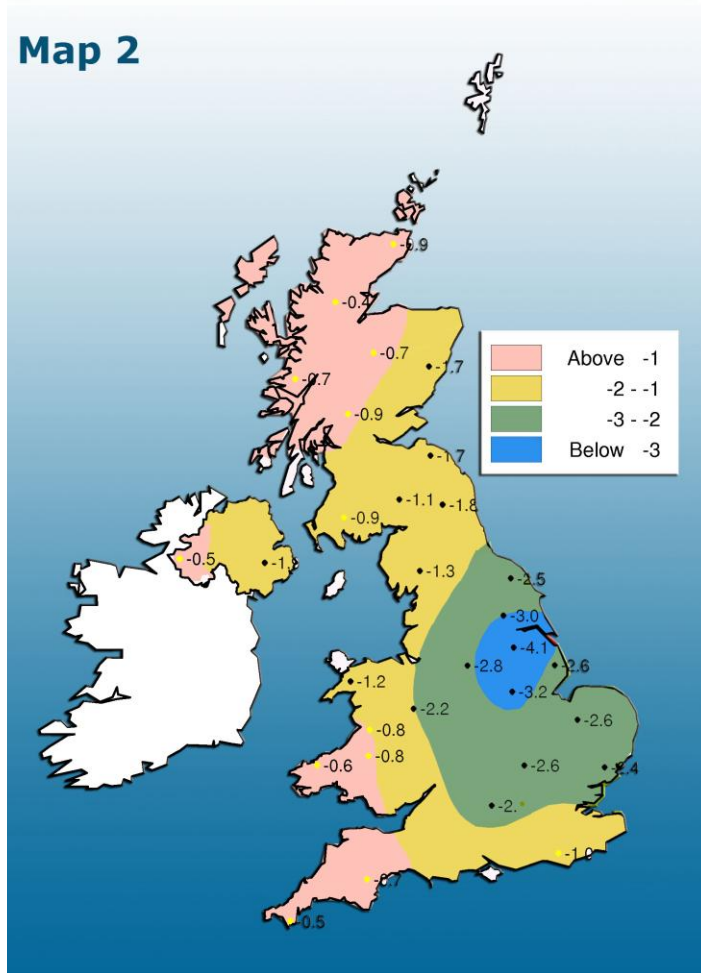
Map 1



Change in concentration
from 1986 to 2007
 $\mu\text{eq l}^{-1} \text{ year}^{-1}$

Spatial trends – Non sea-salt sulphur

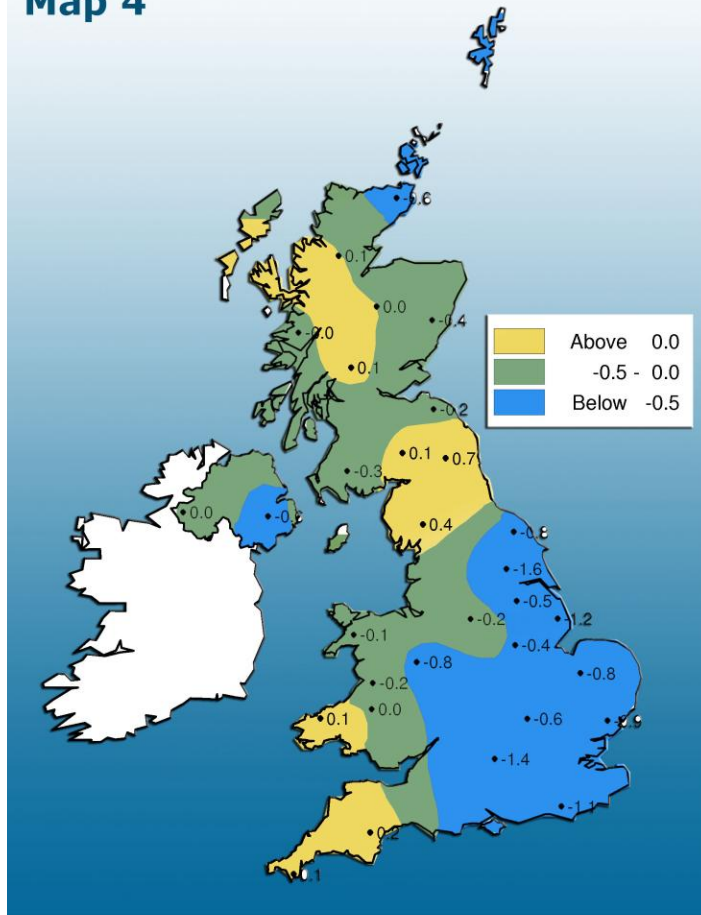
Map 2



Change in concentration
from 1986 to 2007
 $\mu\text{eq l}^{-1} \text{ year}^{-1}$

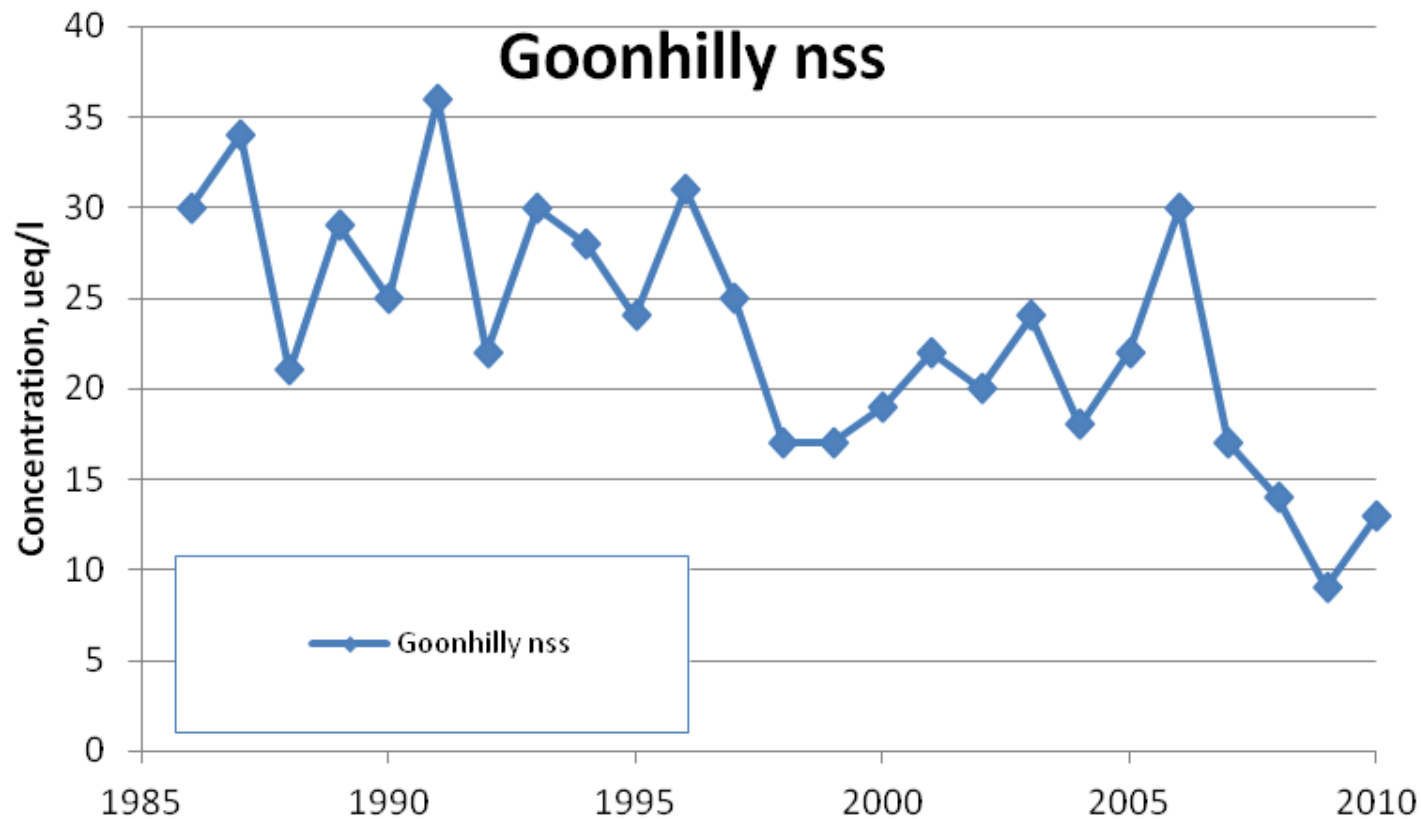
Spatial trends - Ammonium

Map 4

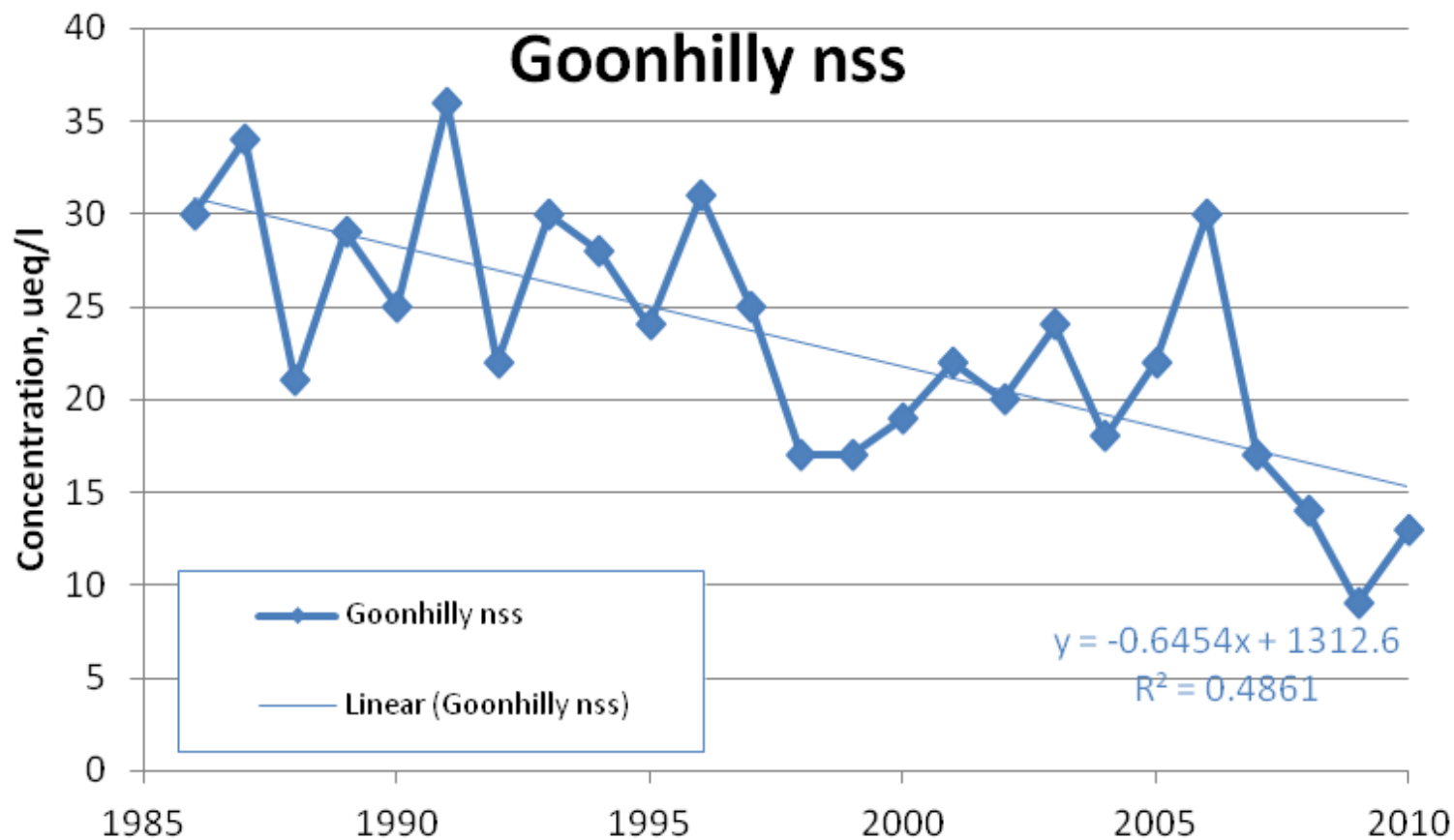


Change in concentration
from 1986 to 2007
 $\mu\text{eq l}^{-1} \text{ year}^{-1}$

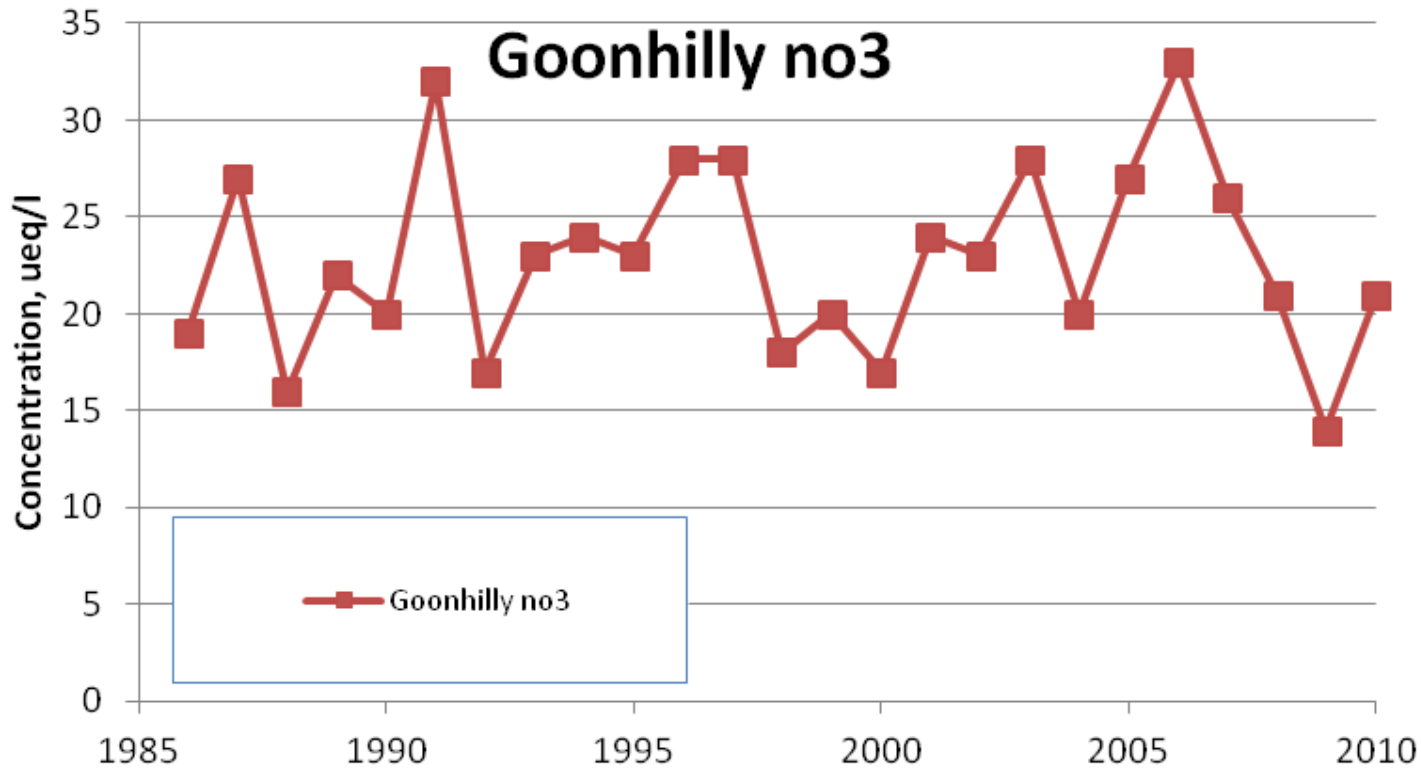
Temporal trend - Goonhilly



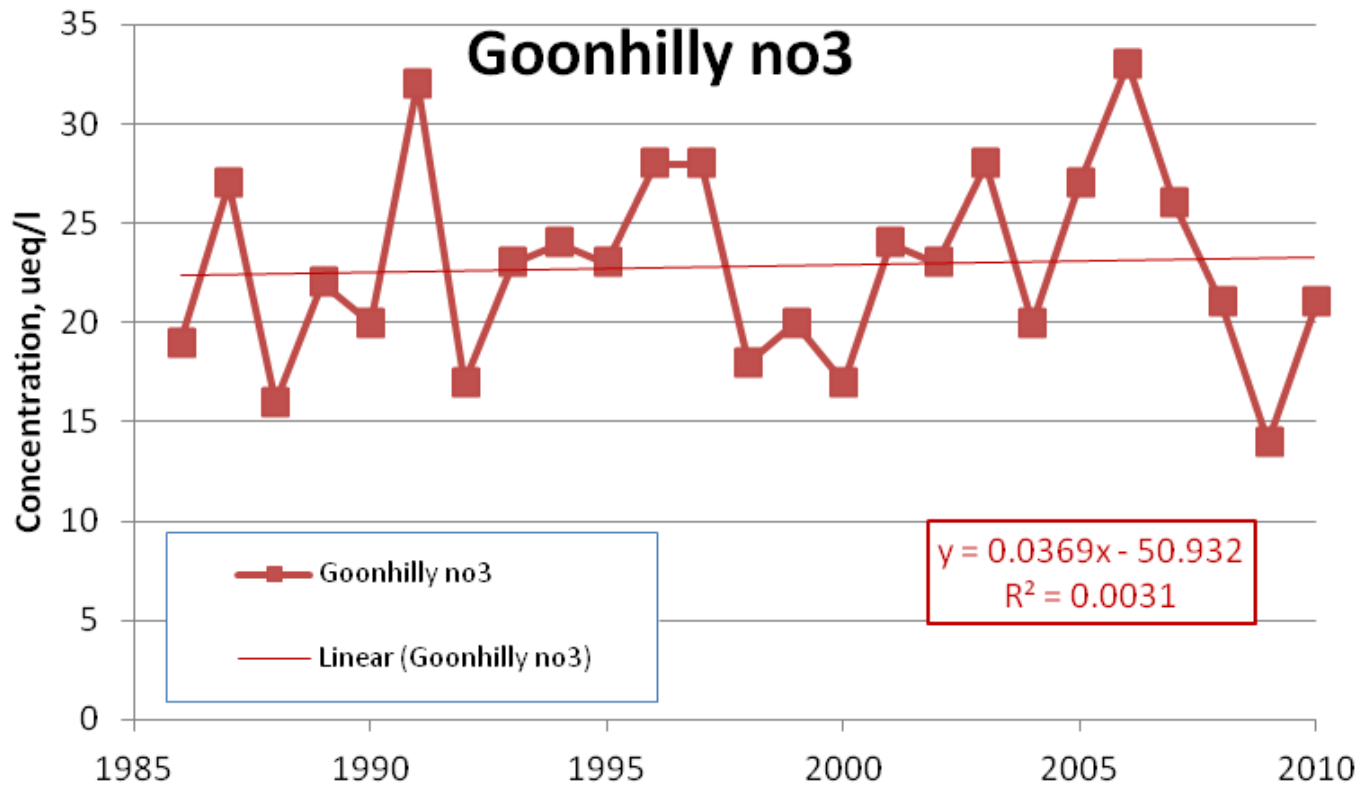
Temporal trend - Goonhilly



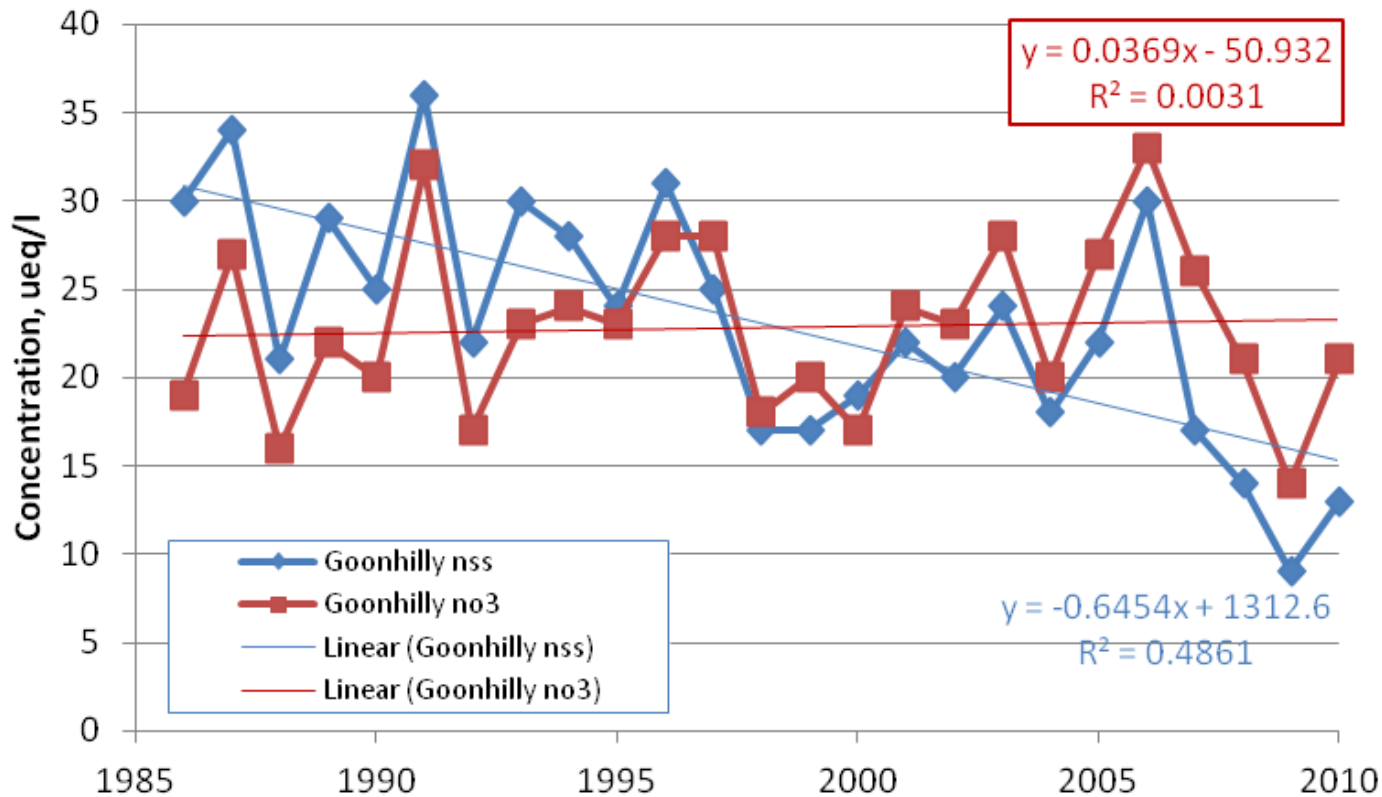
Temporal trend - Goonhilly



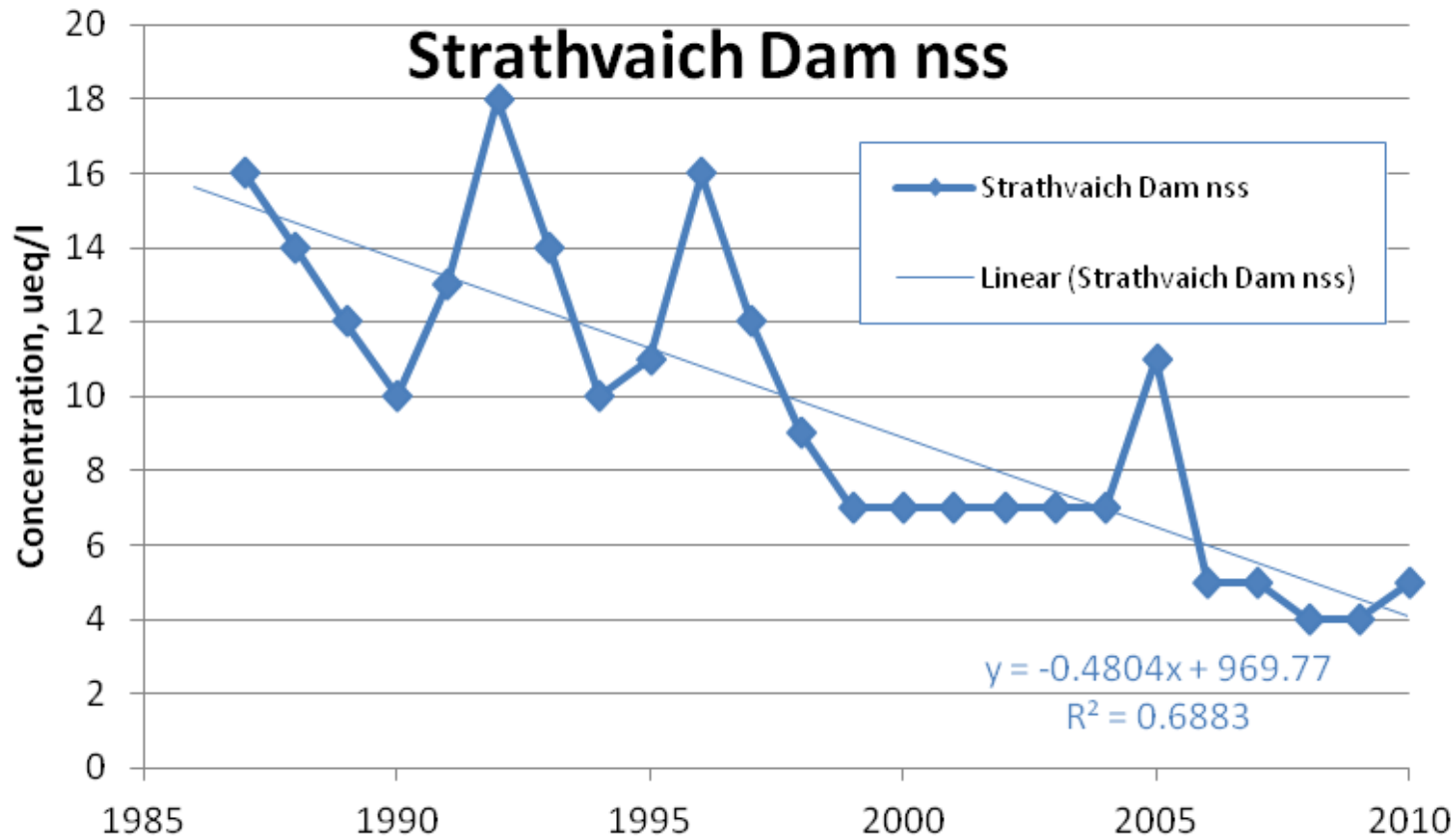
Temporal trend - Goonhilly



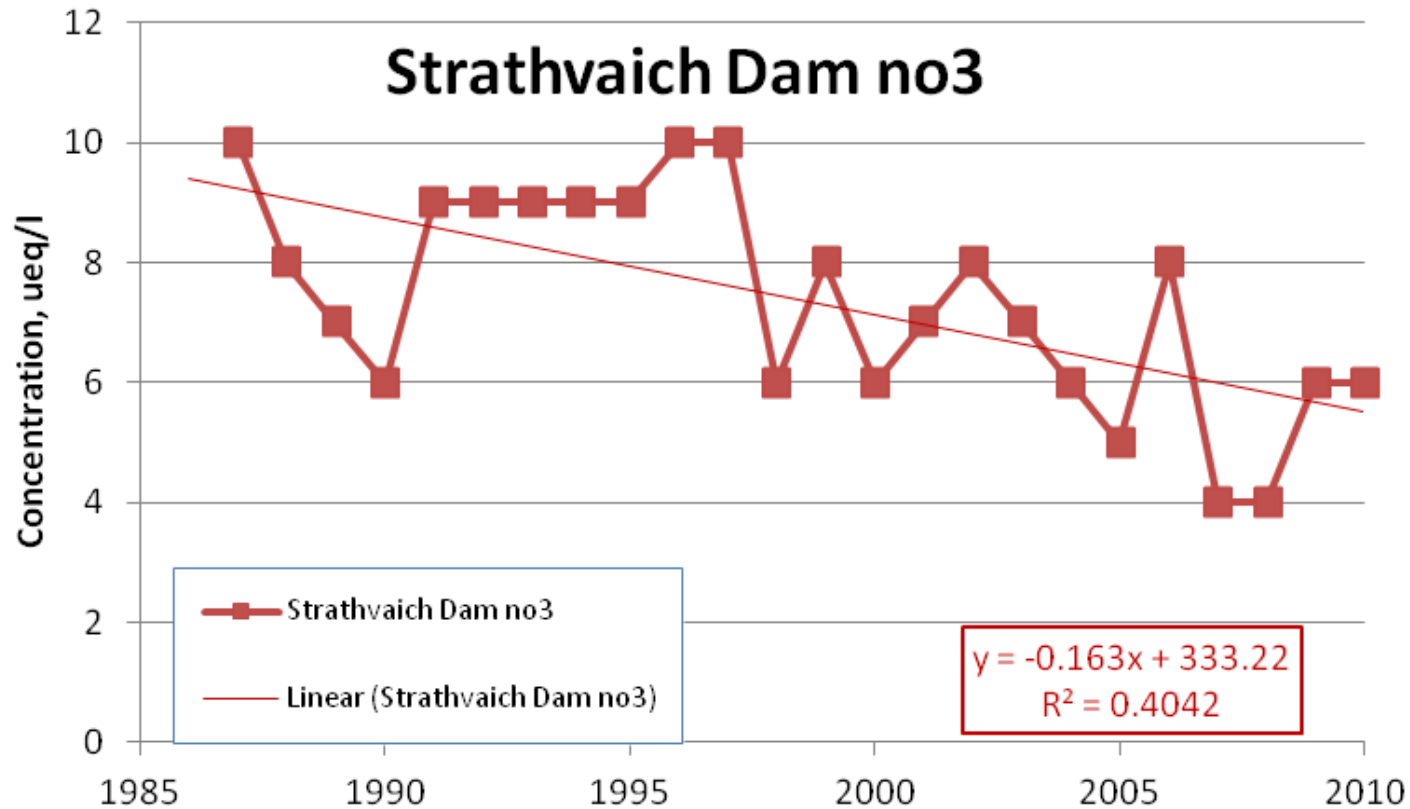
Temporal trend - Goonhilly



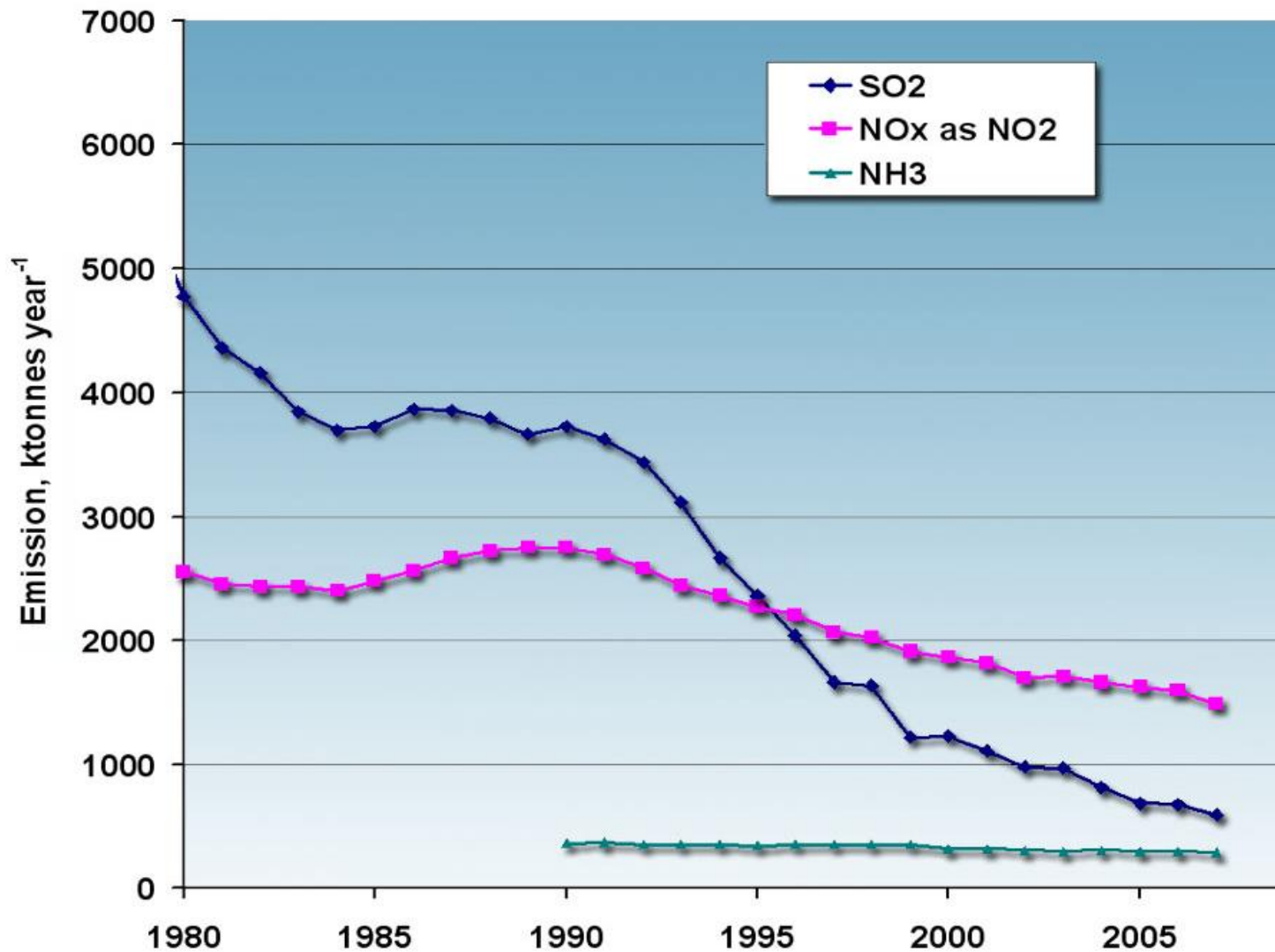
Temporal trend – Strathvaich Dam



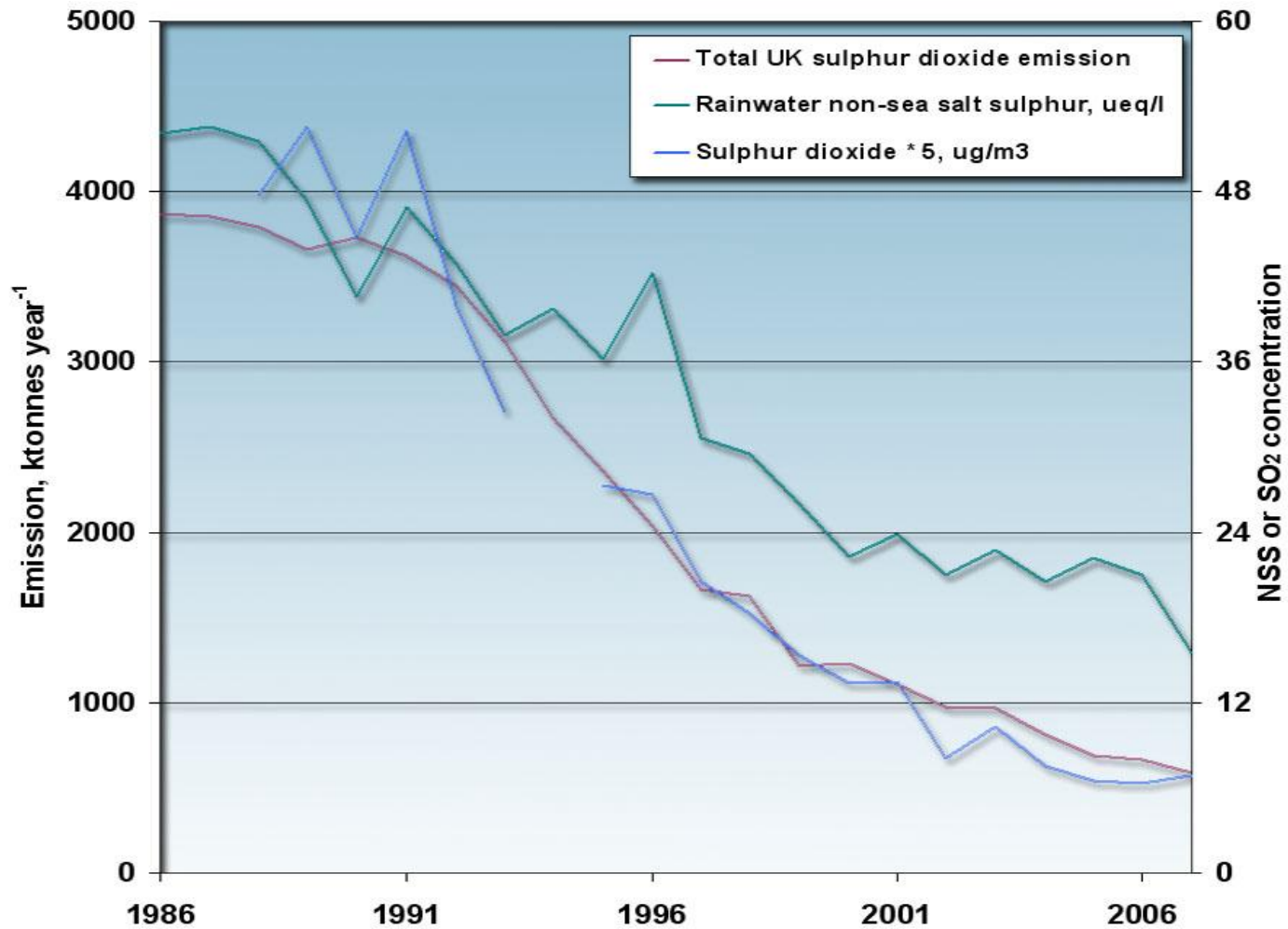
Temporal trend – Strathvaich Dam



Emissions summary



Relationship with emissions (1)



Diffusion tube network (1)



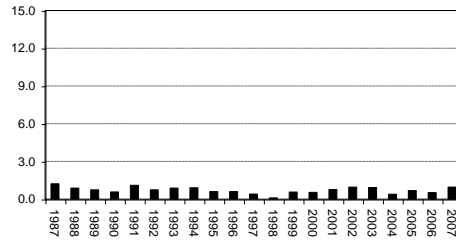
Purpose:

To provide measured UK NO₂ fields in conjunction with the AURN measurements

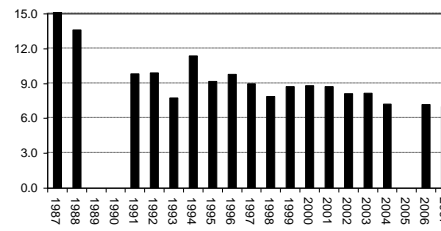


Diffusion tube network (2)

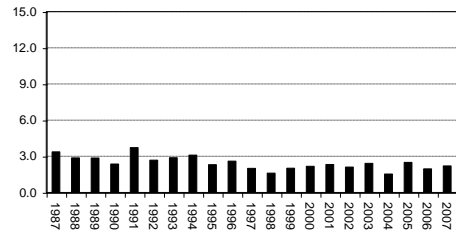
Strathvaich Dam



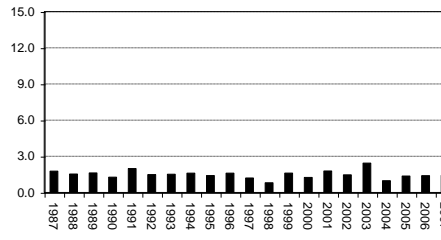
Flatford Mill



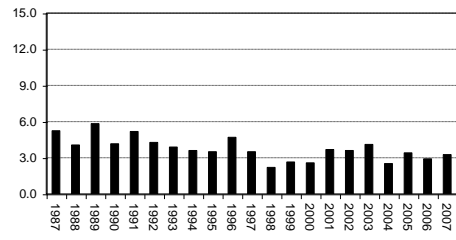
Eskdalemuir



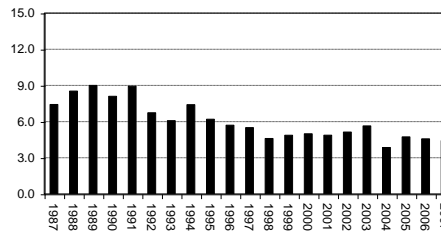
Lough Navar



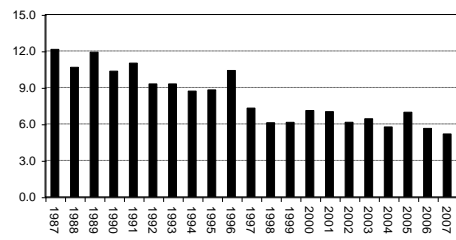
Yarner Wood



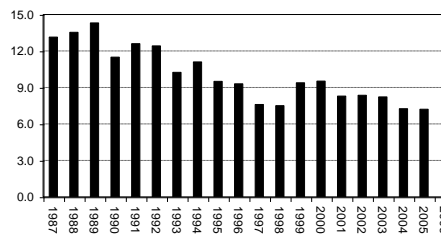
High Muffles



Barcombe Mills



Stoke Ferry



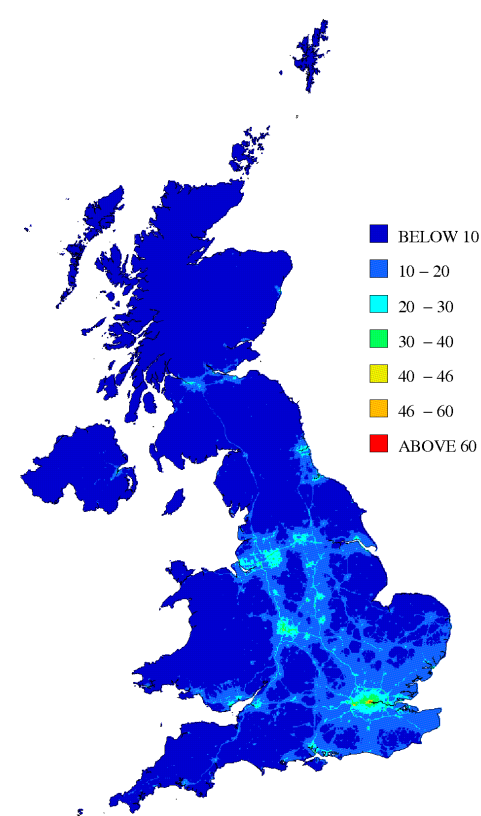
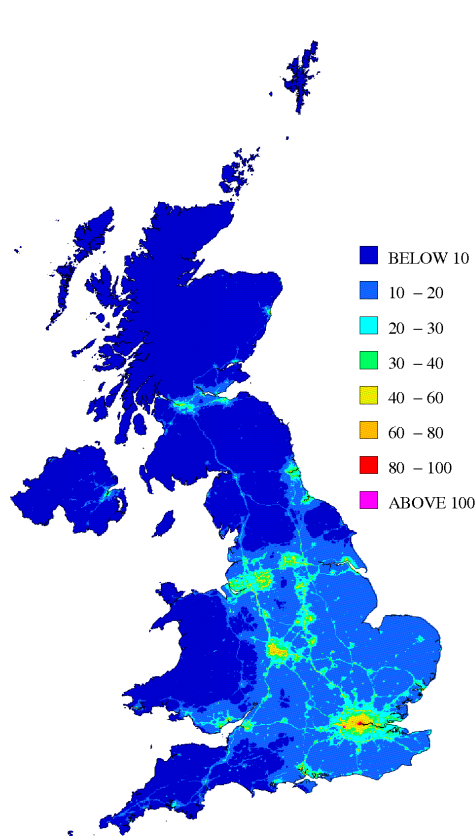
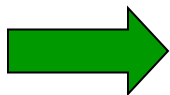
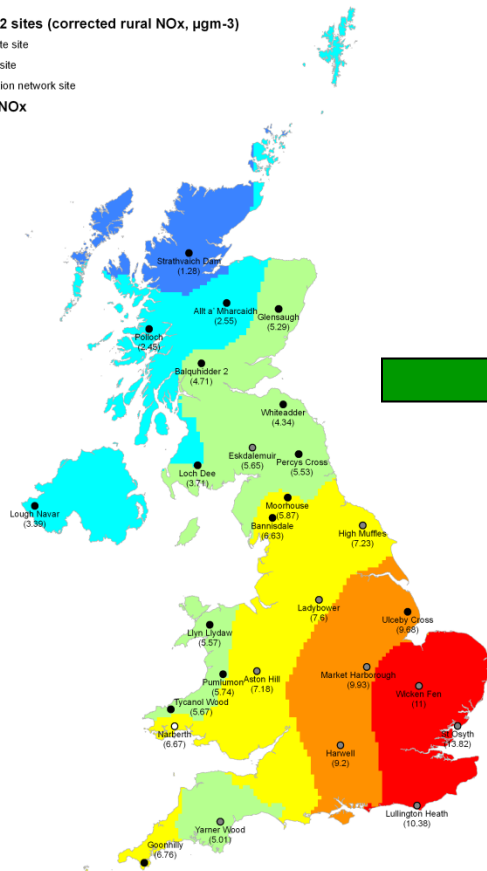
Used to produce the rural background concentration field

Rural NOx/NO2 sites (corrected rural NOx, $\mu\text{g}\text{m}^{-3}$)

- AURN remote site
- AURN rural site
- Acid deposition network site

Mapped rural NOx

- 0 $\mu\text{g}\text{m}^{-3}$
- 0-2 $\mu\text{g}\text{m}^{-3}$
- 2-4 $\mu\text{g}\text{m}^{-3}$
- 4-6 $\mu\text{g}\text{m}^{-3}$
- 6-8 $\mu\text{g}\text{m}^{-3}$
- 8-10 $\mu\text{g}\text{m}^{-3}$
- >10 $\mu\text{g}\text{m}^{-3}$



NO_x rural concentration field

NO_x 1 km x 1km map All sources

NO₂ 1 km x 1km map All sources

With regards to trends

- Monitoring data provides fundamental inputs to atmospheric models and critical load models
- Rate of decrease for nitrate concentrations is lower than sulphate
- SO₂ concentrations have decreased in line with emissions

With regards to current work

- Continue to collect samples, analysis and interpret data
- Site visits and meter calibration
- Take part in EMEP analytical intercomparisons



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