



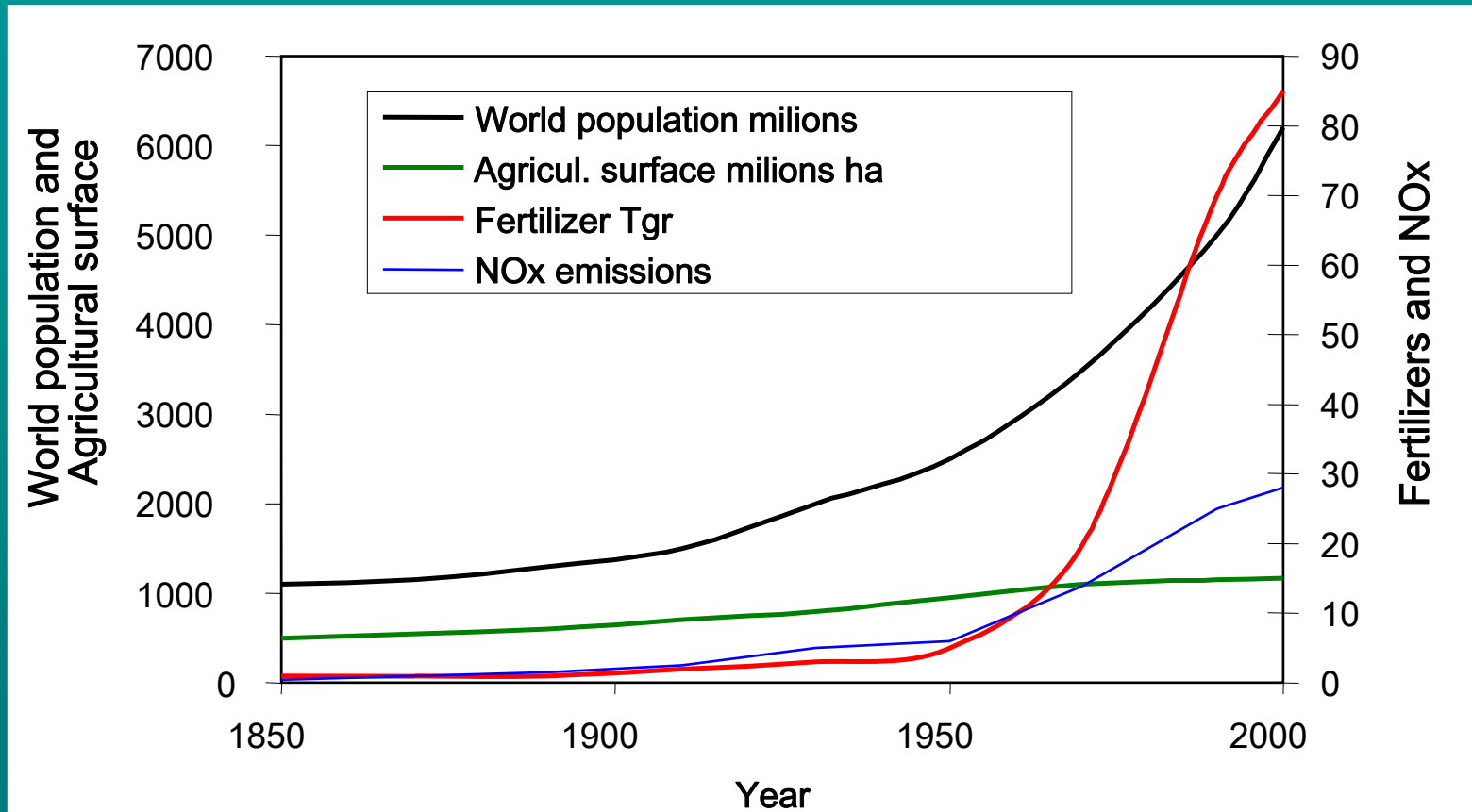
NitroEurope IP

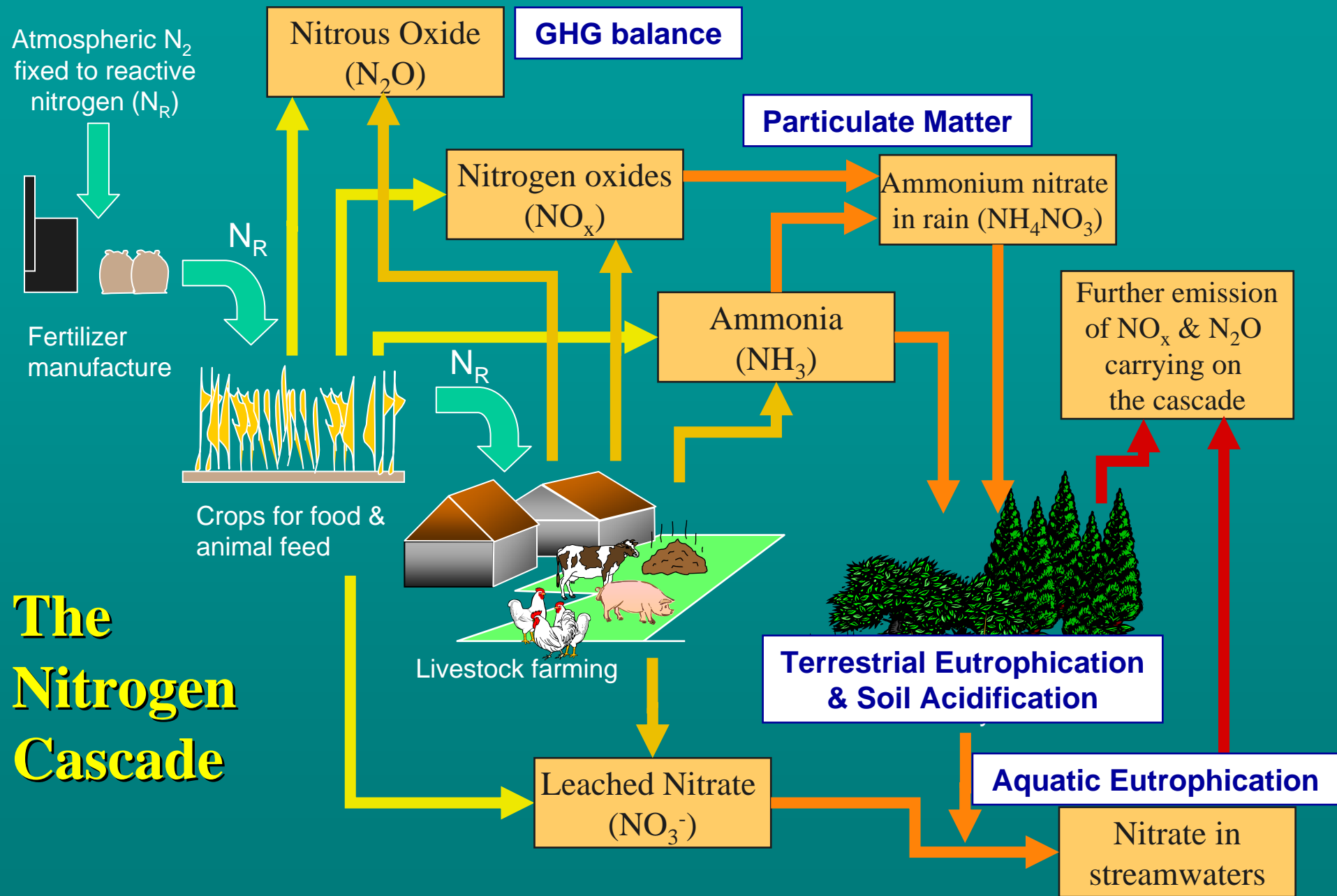
Nitrogen and the European GHG balance

Mark Sutton

Wim de Vries, Jan Willem Erisman, Klaus Butterbach-Bahl, Claus Beier, Pierre Cellier, Francesca Cotrufo.

Why care about nitrogen?





The Nitrogen Challenge

- **Multi-source**
agriculture, fossil fuel, natural
- **Multi-pollutant**
 N_2O , NO_x , NH_3 , aquatic NO_3^- , aerosol etc
- **Multi-problem**
GHG balance, biodiversity, water quality, human health
- **Multi-receptor**
Forests & other terrest. ecosystems, agriculture, rivers, stratosphere, urban, coastal & marine, humans

NitroEurope IP



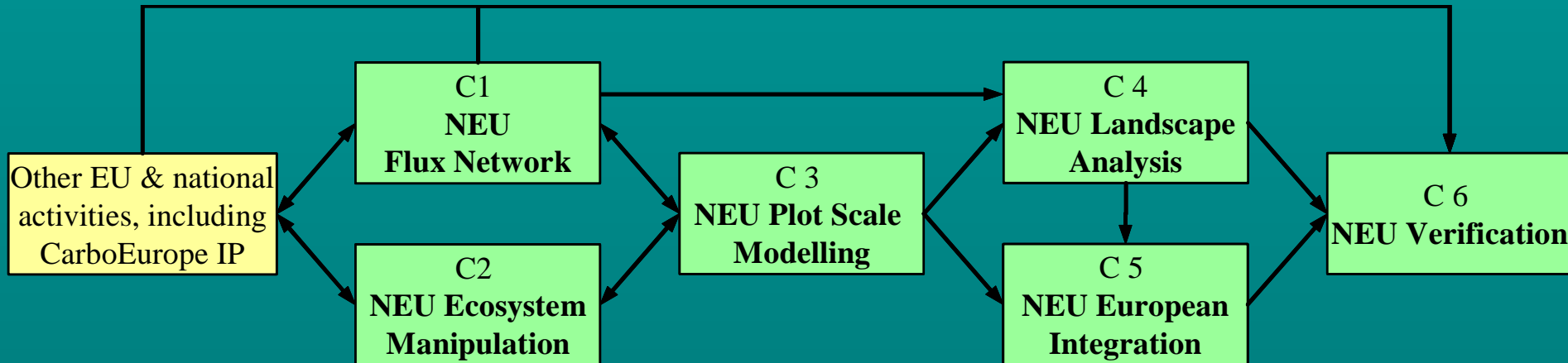
What is the effect of reactive nitrogen supply on the direction and magnitude of net greenhouse gas budgets for Europe?

Effect of N on the GHG balance:

↑ GHG	?	↓ GHG
N₂O (+2' from NH ₃ , NO ₃ ⁻)	Cattle CH₄	C uptake by plants
CH₄ from wetlands	SOM decomposition	Nitrogen aerosol
NO_x → O₃ → less primary production		

NitroEurope

Overall Science Structure



Plus four supporting components:

C7. Standards and Data Management

C8. NEU Management

C9: NEU Training

C10: NEU Dissemination

Linking Tasks and Delivery in NEU



C1 Flux Networks

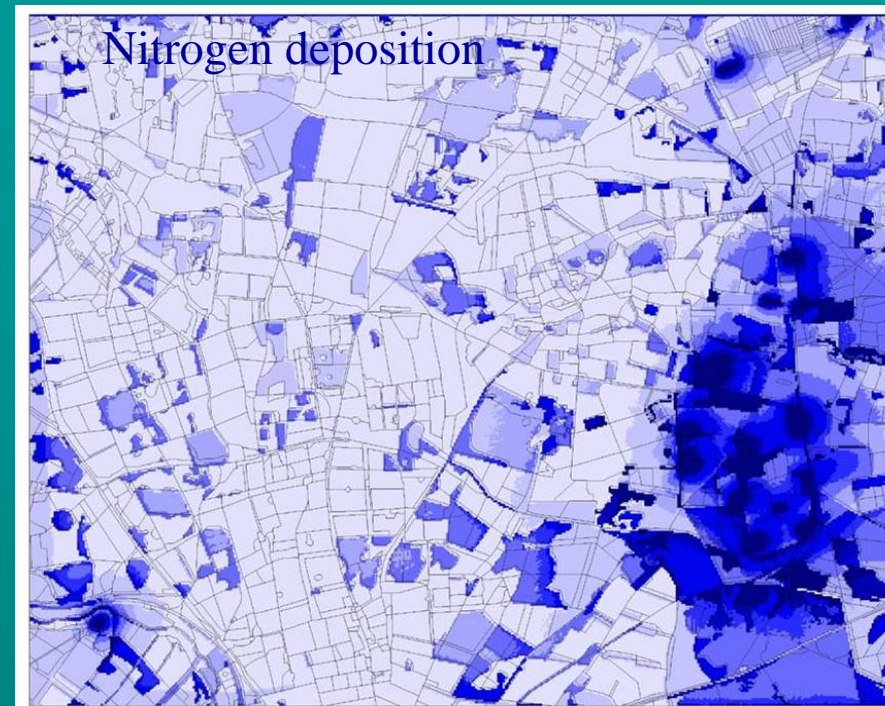
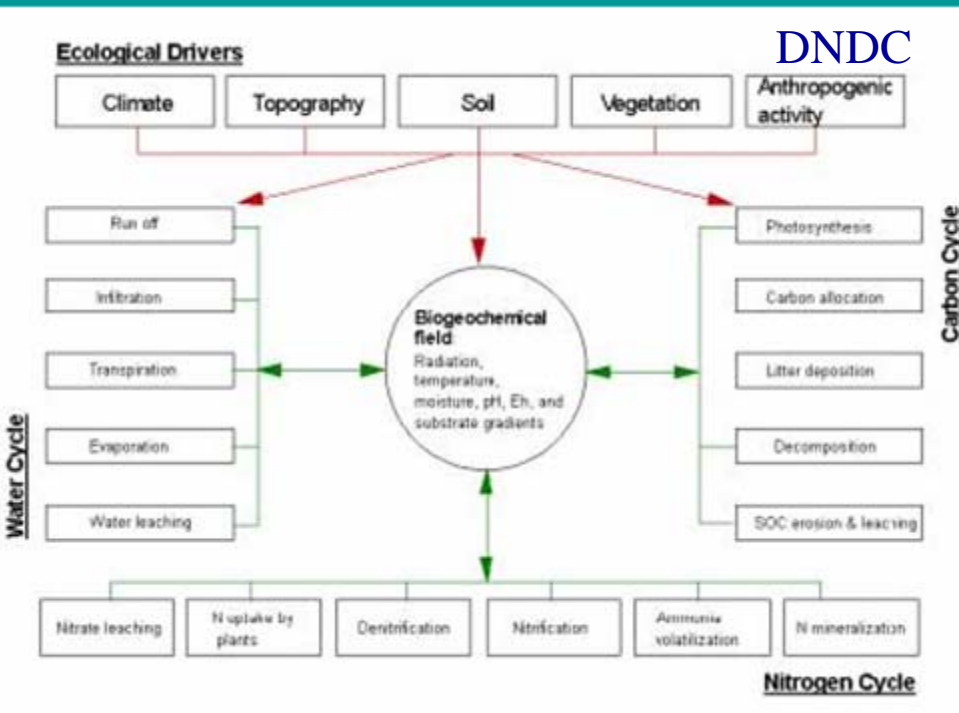
- Methods development
- Integrated air, plant and soil data
- Process understanding



C2 Manipulation

- Process testing
- System responses to perturbation
- Interactions between drivers

Linking Tasks and Delivery in NEU



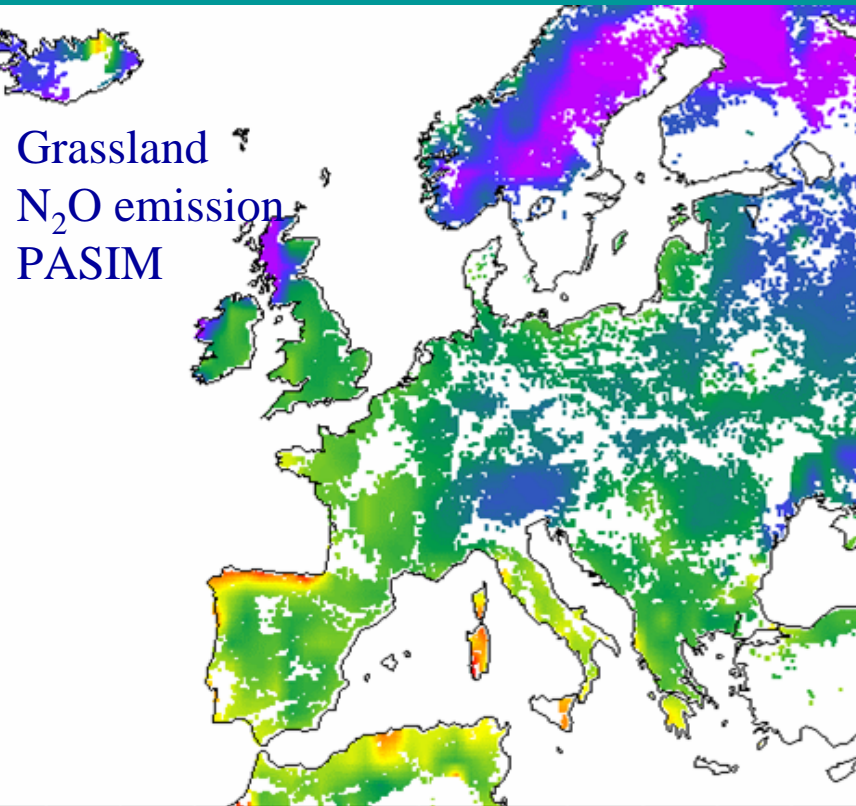
C3 Plot-scale modelling

- Reconstruction of observations
- Explanation of interactions
- Prediction of future responses

C4 Landscape analysis

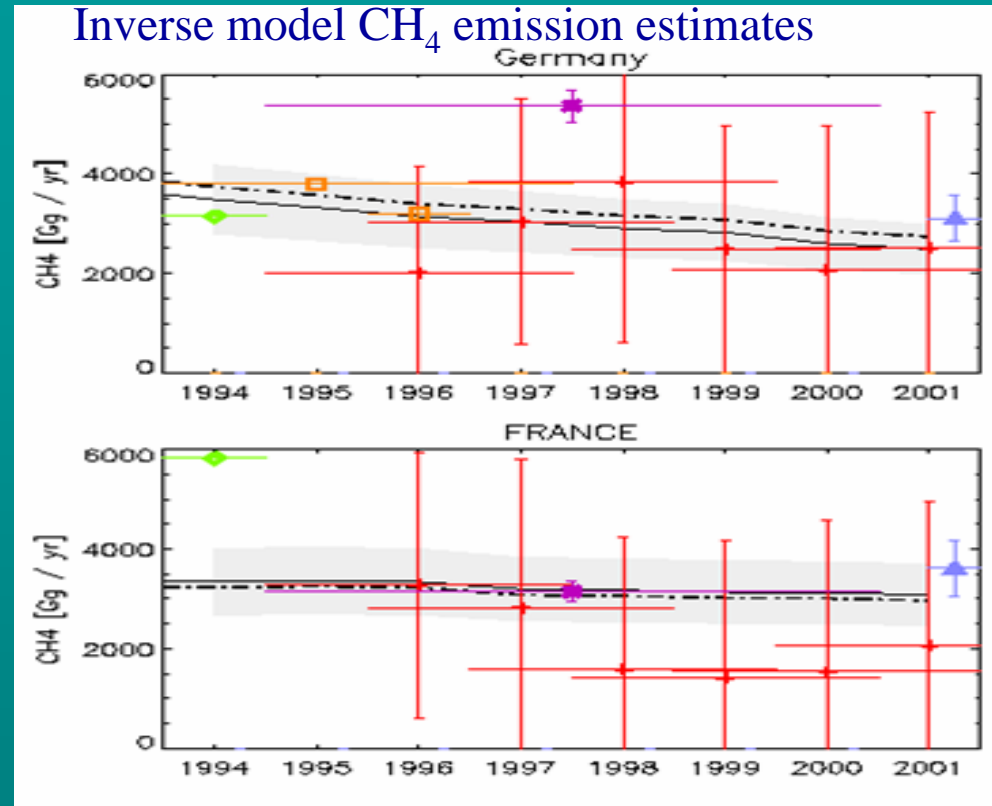
- Spatial interactions
- Complexity
- Management interactions
- Abatement strategies

Linking Tasks and Delivery in NEU



C5 European Integration

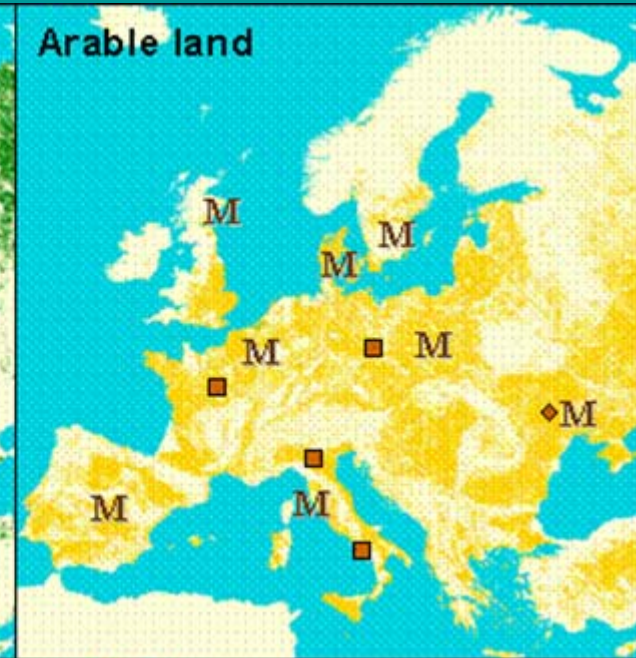
- Upscaling
- Improving input datasets
- Ecosystem vs multi-sector models
- Past changes and future scenarios



C6: Verification

- Independent data check
- Uncertainty assessment
- Protocol compliance
- Revision of IPPC/UNECE values

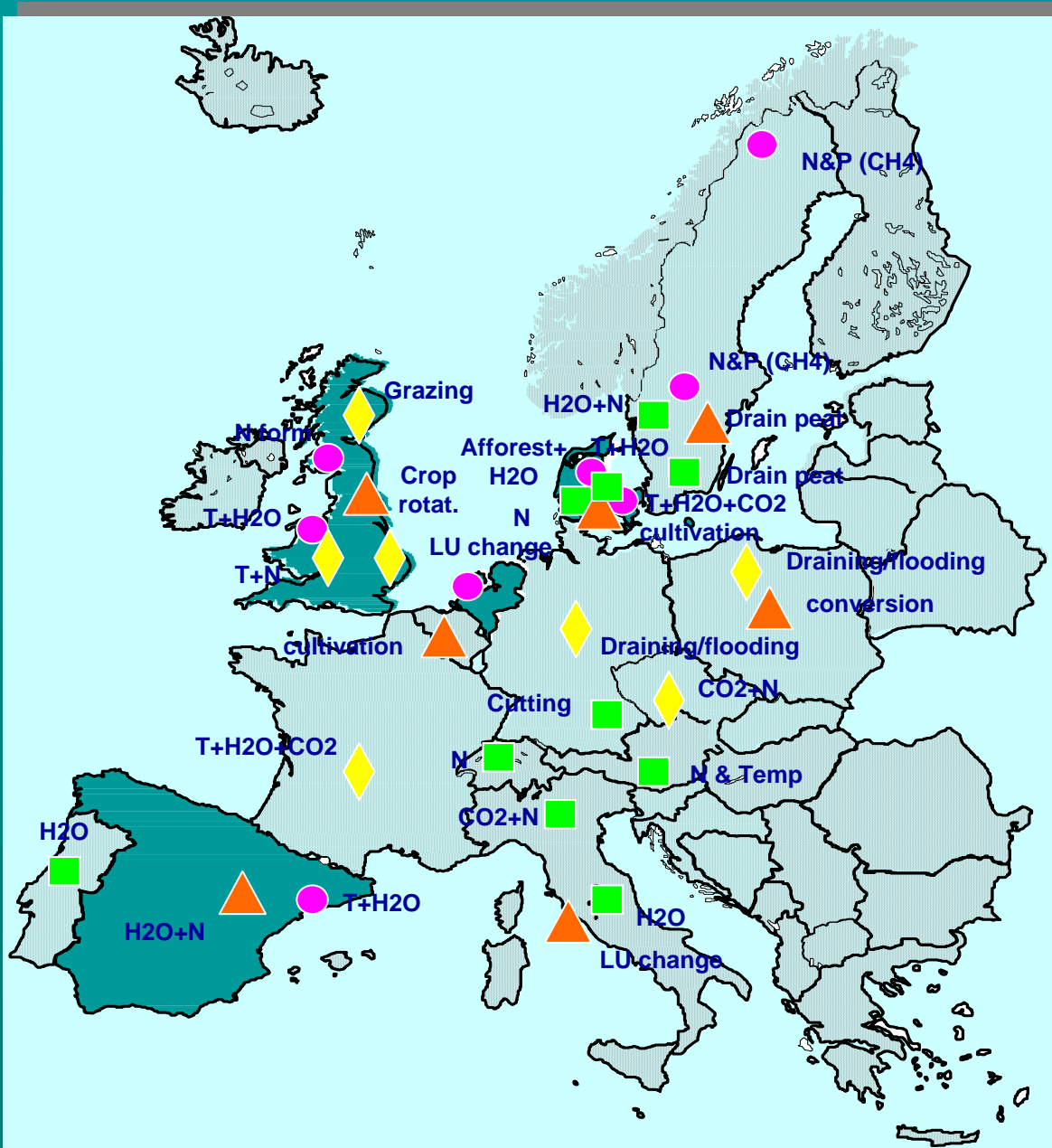
NitroEurope: Flux network (C1) & Manipulation network (C2)



13 Super Sites
9 Regional Sites
50 Inferential Sites

22 Core Manipulation Sites
14 Assoc. Manipulation Sites

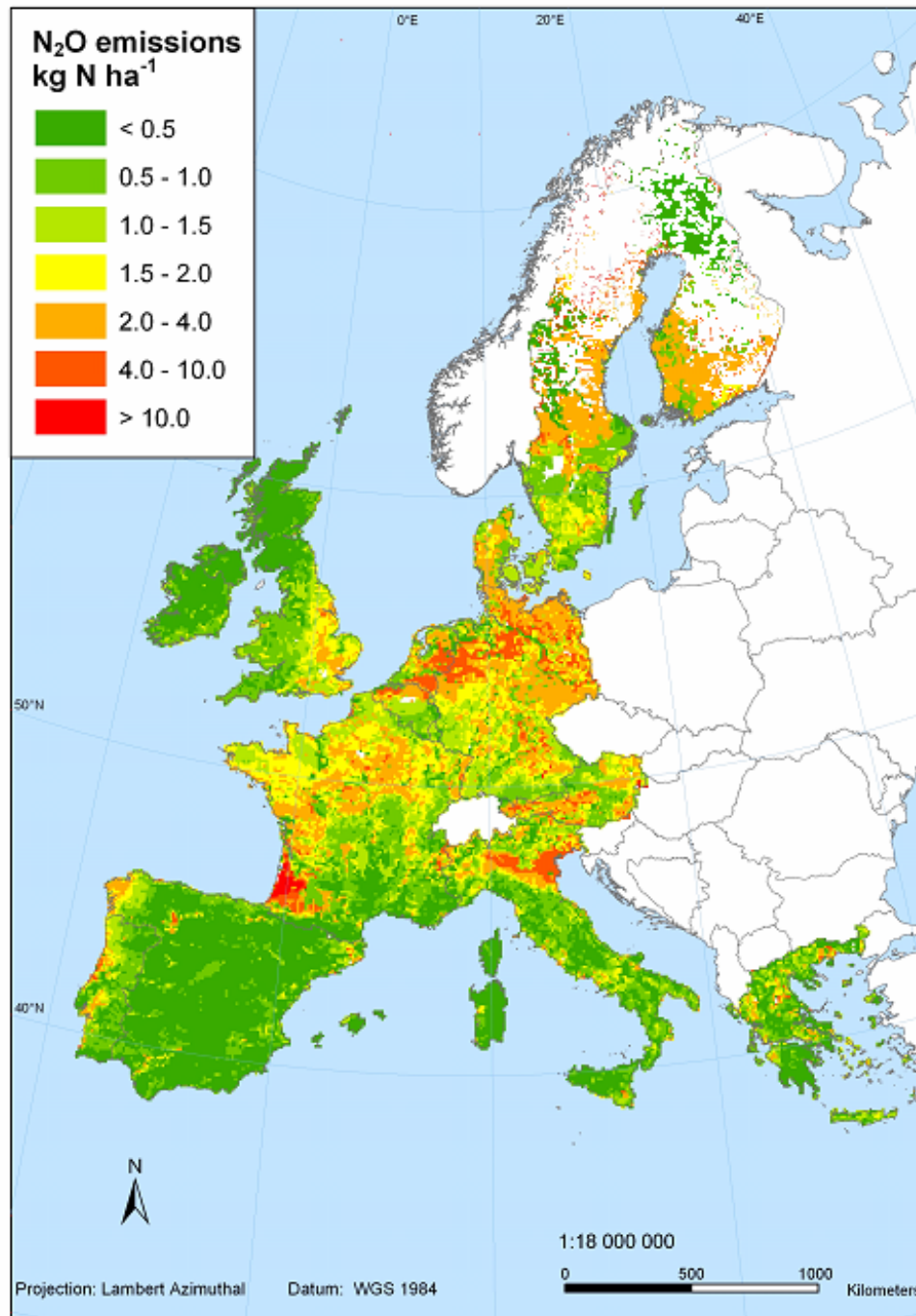
NitroEurope Manipulation Network (NEU C2)



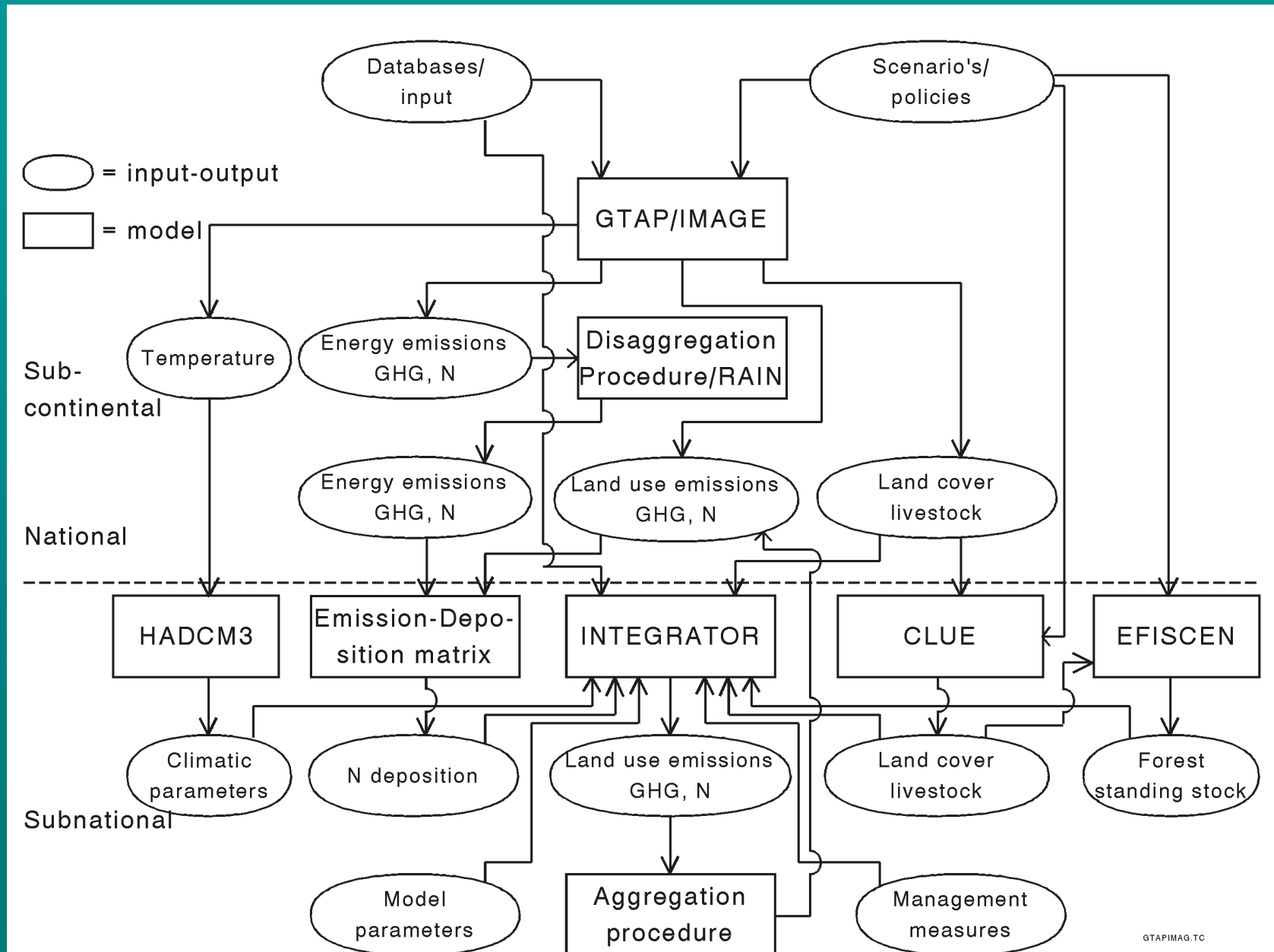
Sites and experiments

- ▲ Arable
- Forest
- Shrub/wet
- ◆ Grass

**N₂O emissions
kg N ha⁻¹**

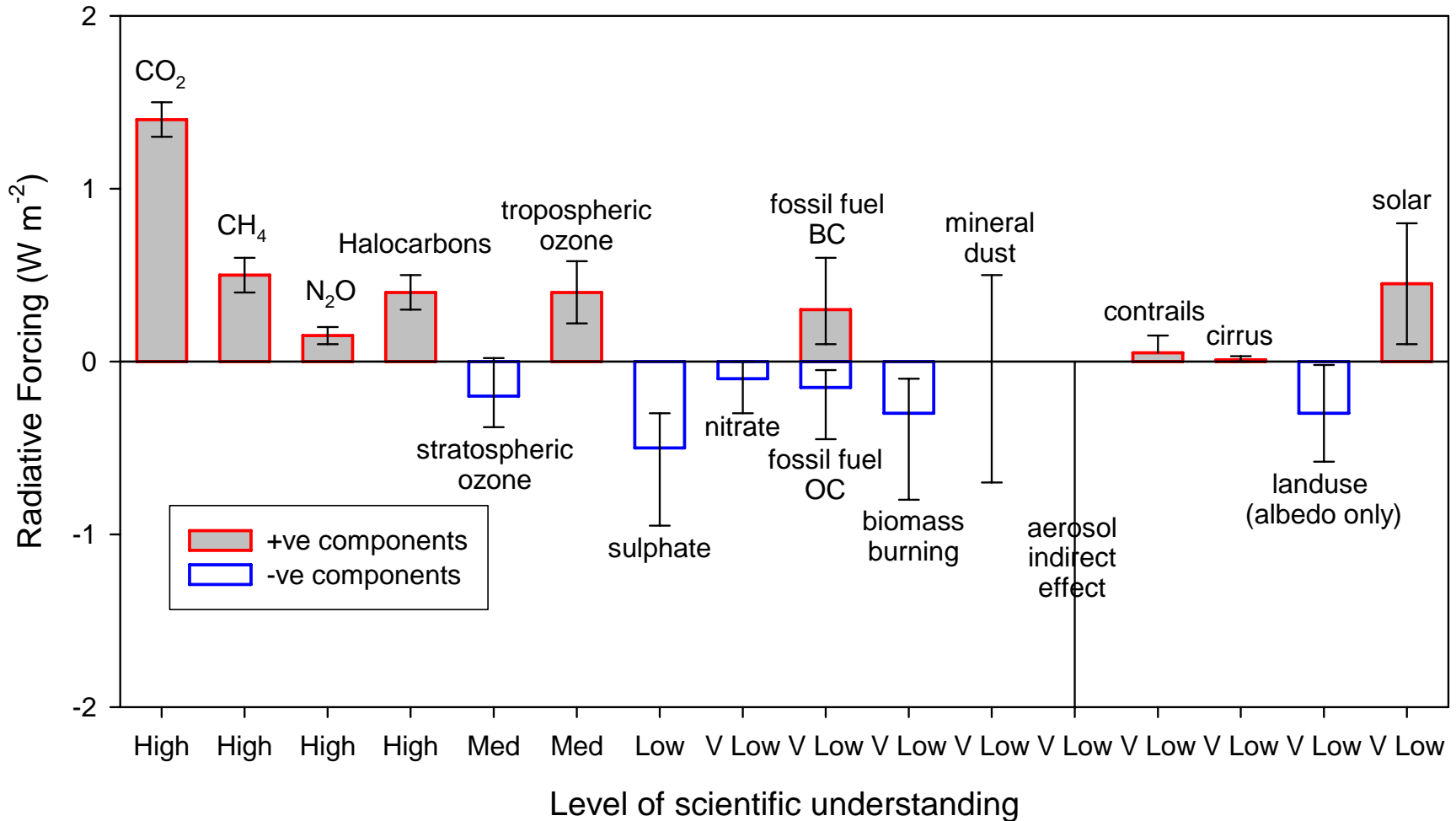


Application multi sector model



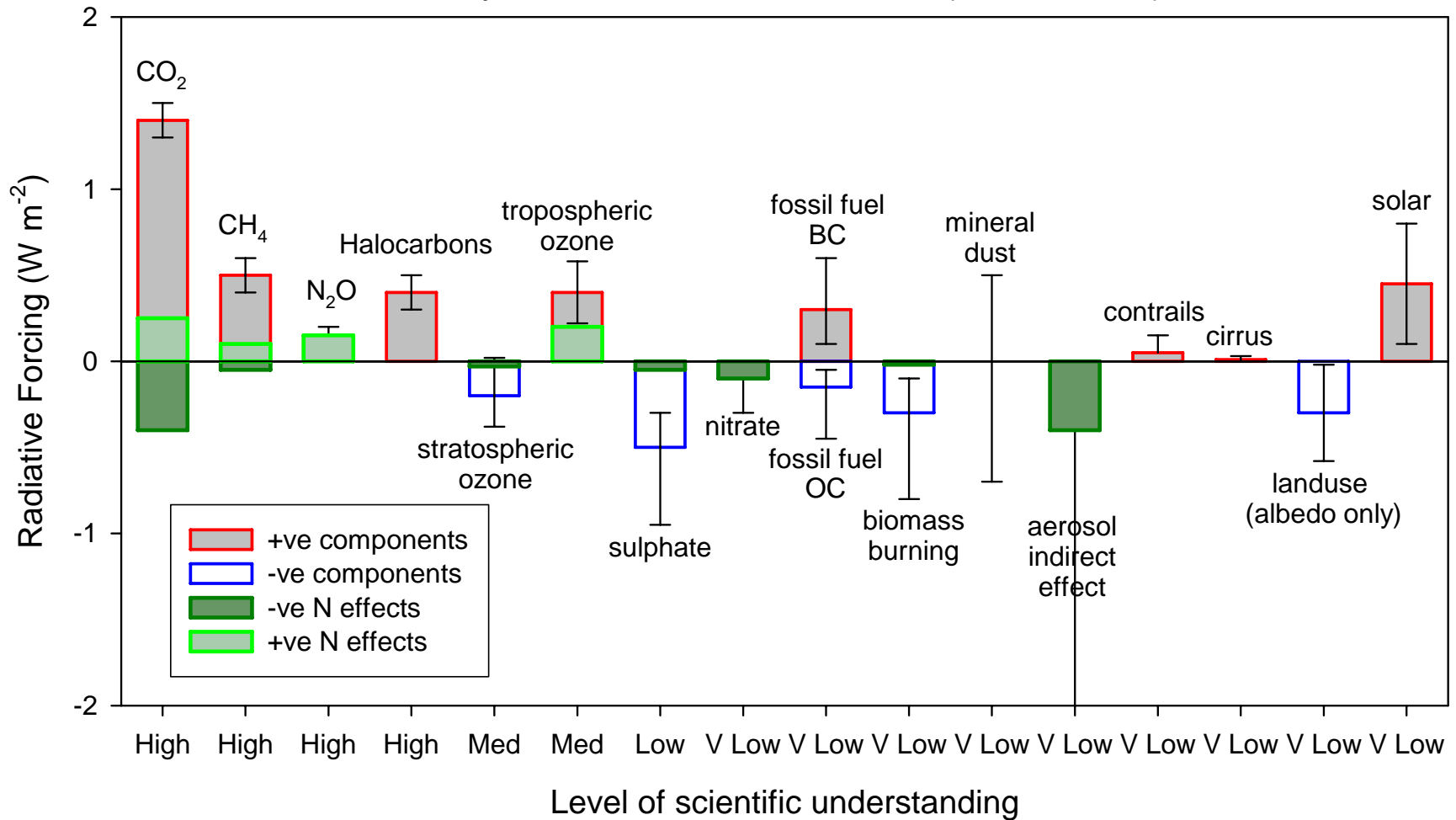
The effect of N on the GHG balance ...

The mean global radiative forcing of the climate system for the year 2000, relative to 1750 (IPCC, 2001)



The effect of N on the GHG balance ...

The mean global radiative forcing of the climate system for the year 2000, relative to 1750 (IPCC, 2001)



Further information

- See www.nitroeuropa.eu
- 2nd General Assembly Paestum, Italy (5-9 Feb 2006)
- Project Office
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