N_2O emission from fertilized grassland and arable land in sandy soils

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  - Greenhouse gases
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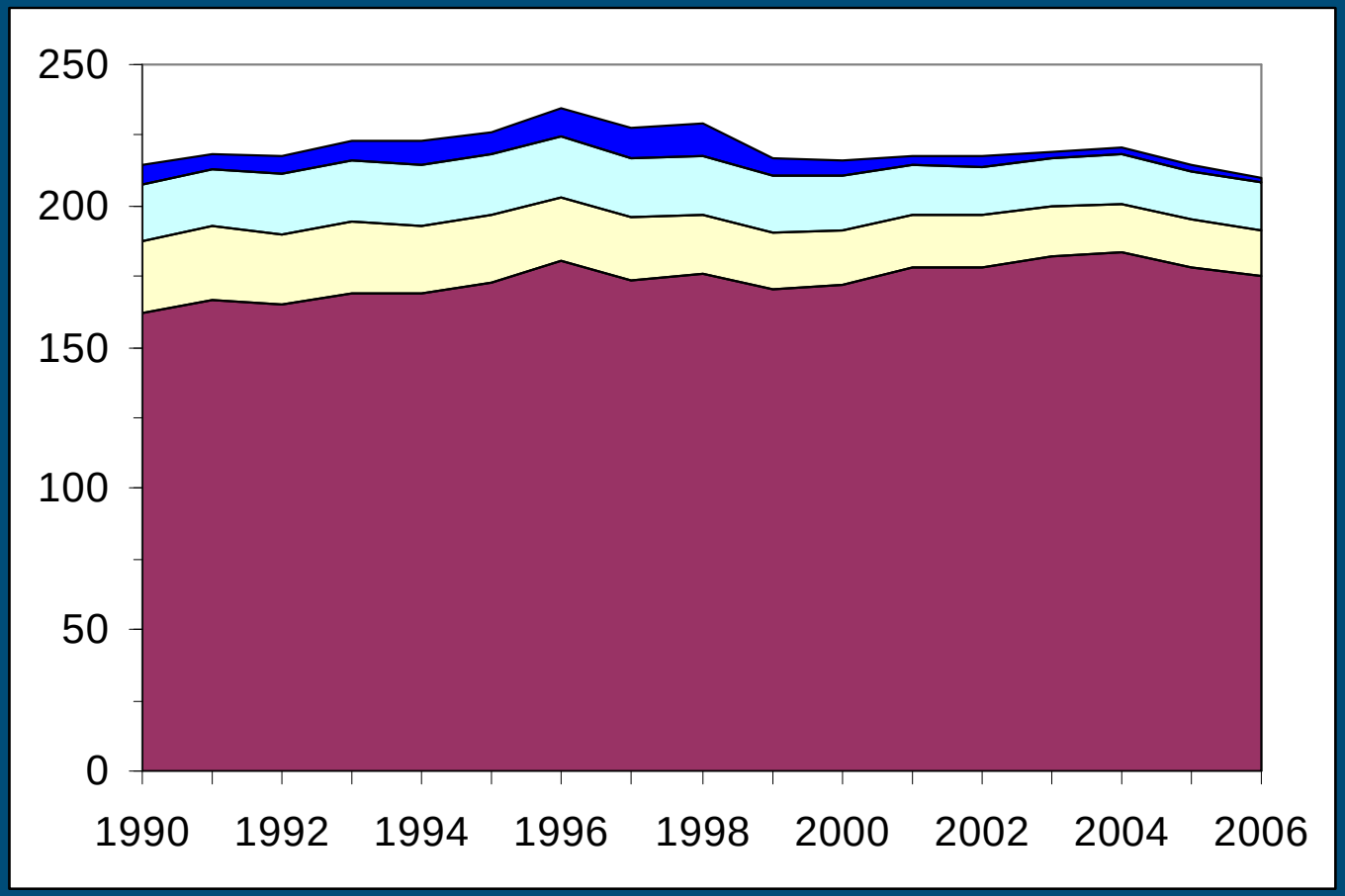
Global GHG emissions

- Global emissions: 33.3 x 10^9 ton CO_2 eq. (FAO, 2006)
  - 72% CO_2 , 18% N_2O , 10% CH_4
- Emissions from agriculture: 18% from total
- Contribution agriculture to global emissions:
  - CO_2: 9 % (deforestation)
  - CH_4: 37 % (enteric fermentation, manure)
  - N_2O: 65 % (manure)

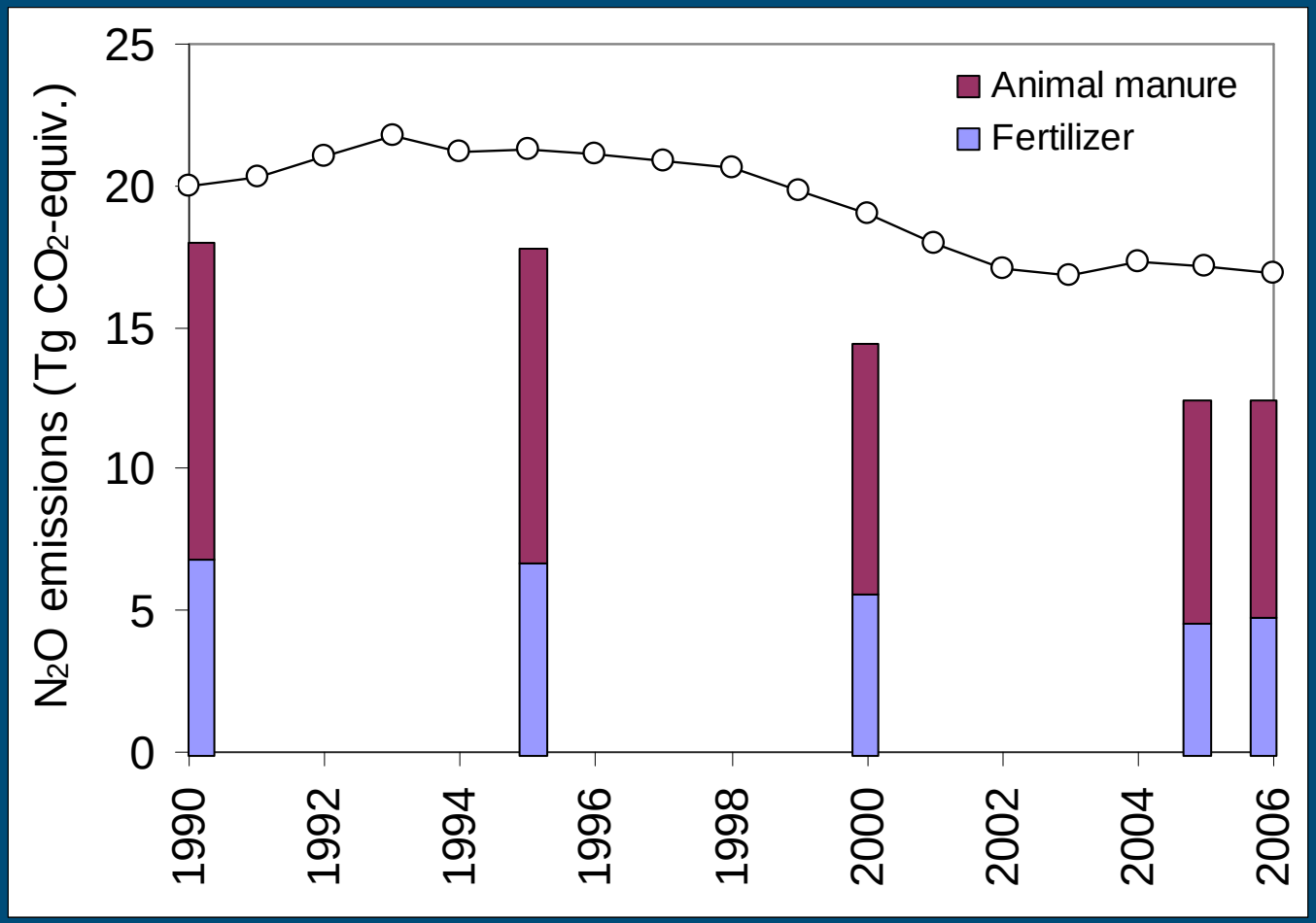
Greenhouse gas emission trends (The Netherlands)

Mton CO_2-equiv.



Maas *et al.* (2008)

Fertilizer use + animal manure production



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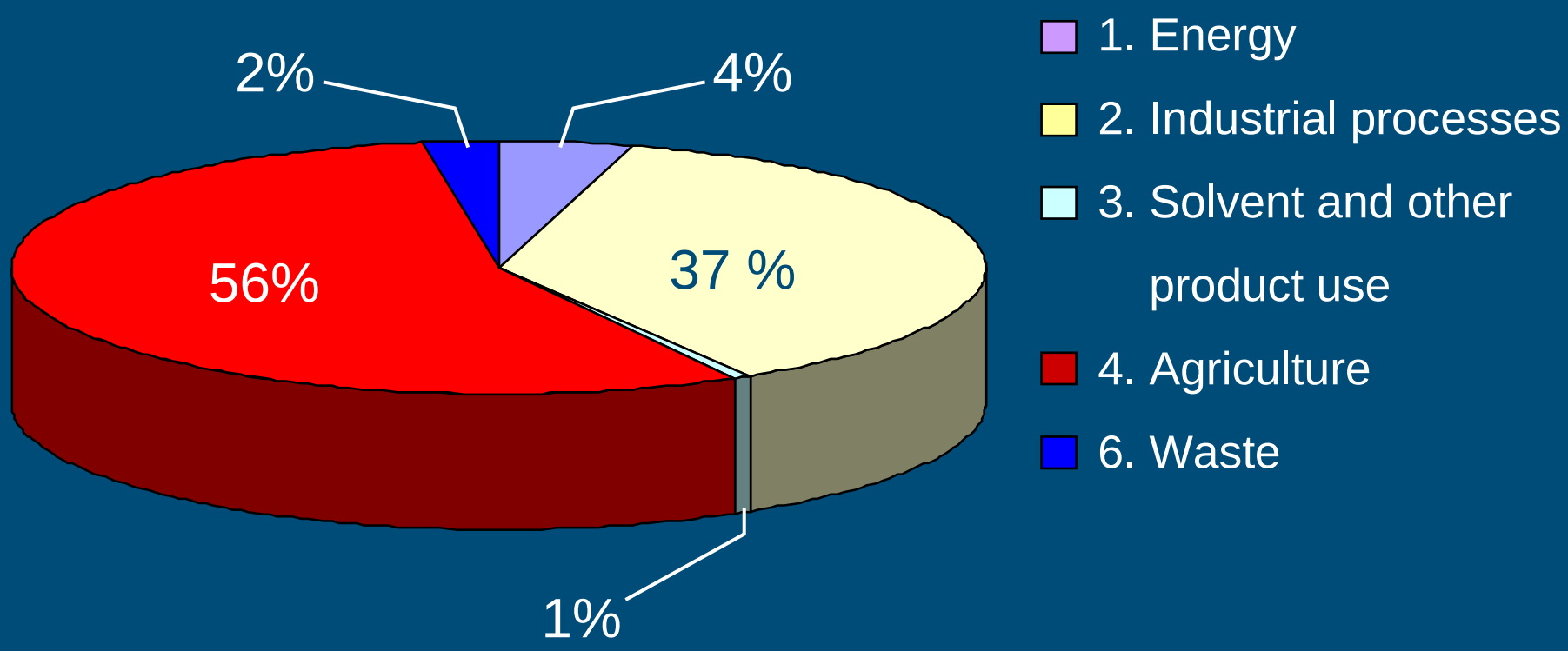
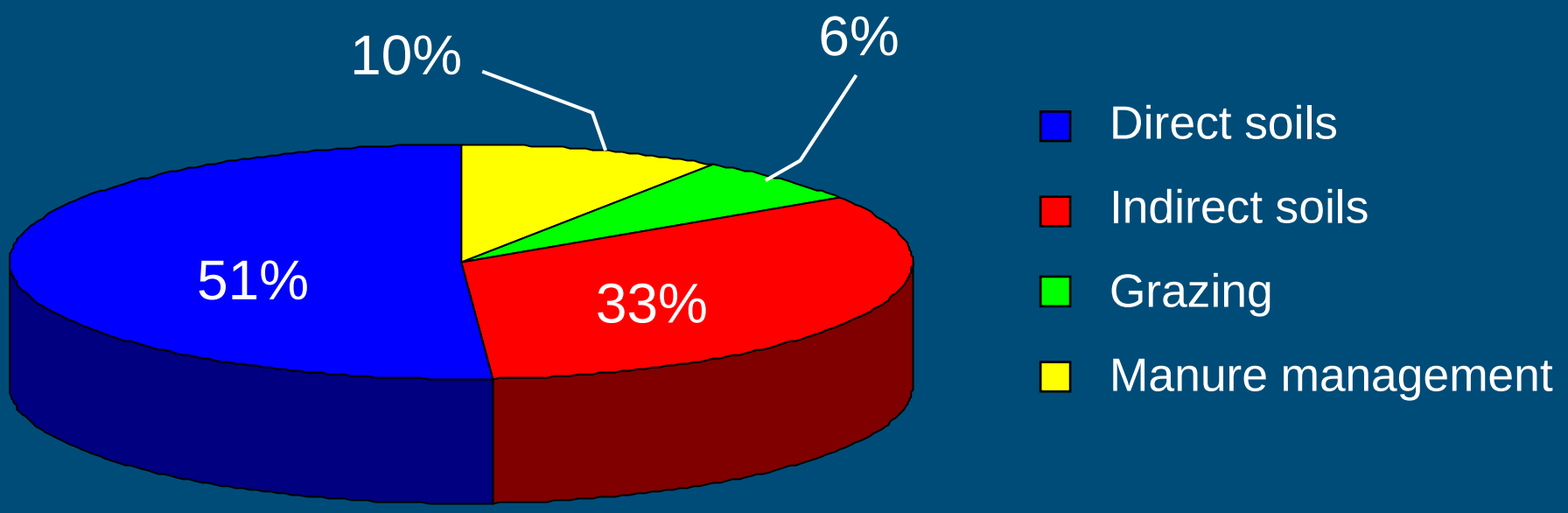
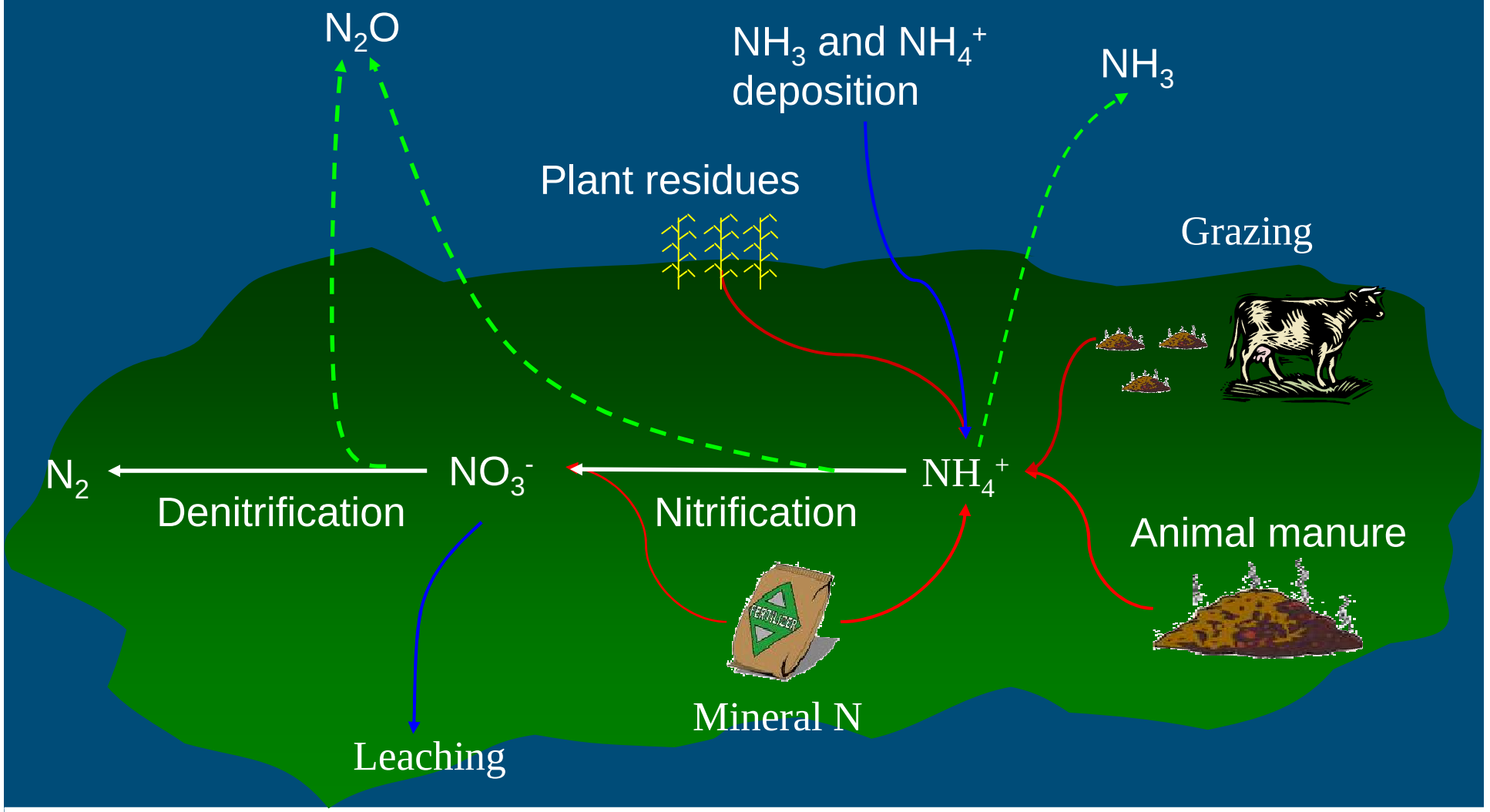
Sources of N_2O in the Netherlands



N_2O emissions from agriculture in the Netherlands



N_2O production in soils



Monitoring protocols

$$N_2O \text{ emission [kg } N_2O] = \Sigma E_{ij} * EF_{ij} * 44/28$$

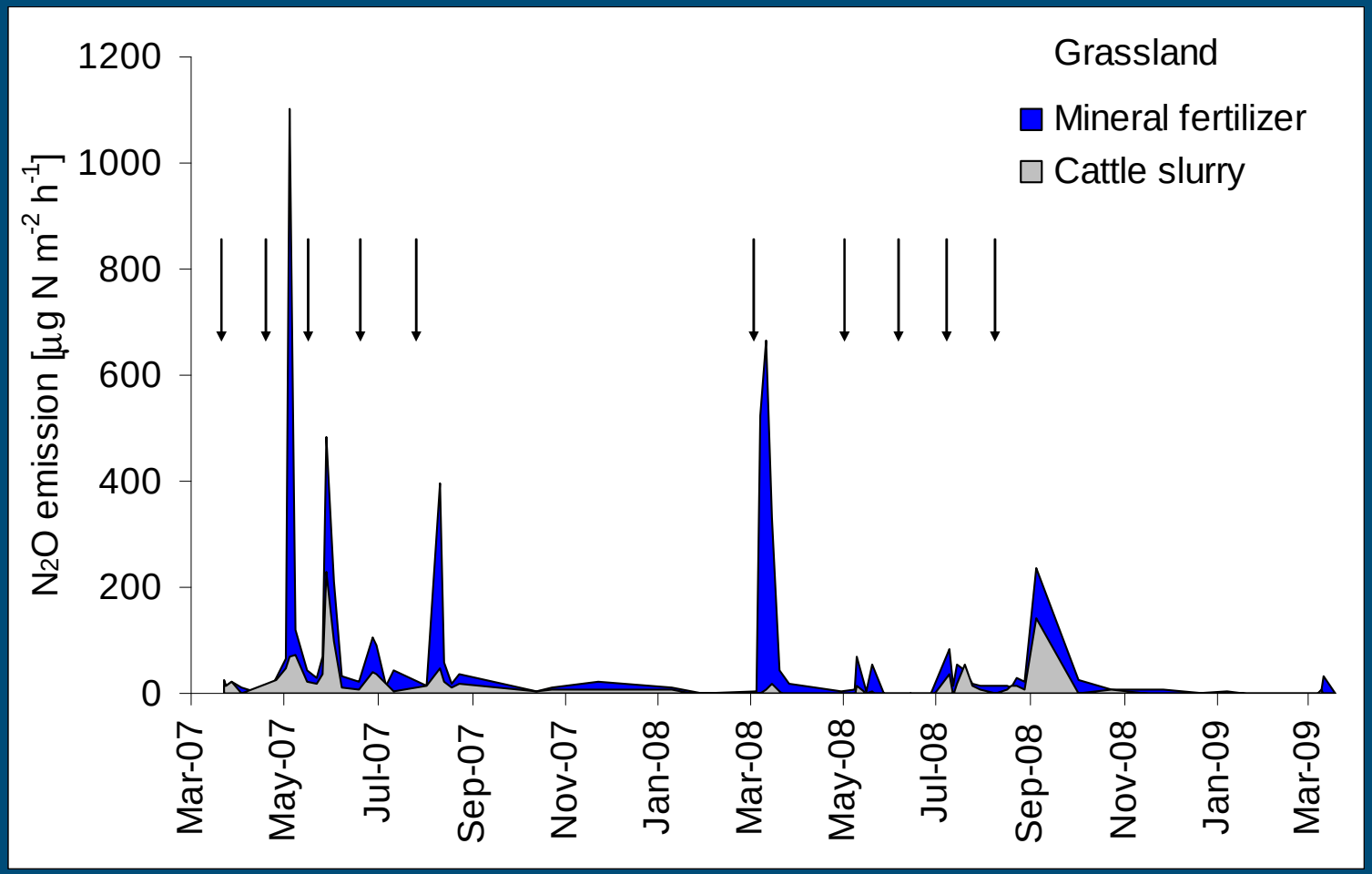
- Manure application technique
  - Surface spreading
  - Low ammonia emission application techniques
- Fertilizer type
  - Ammonium based
  - Other
- Soil type
  - Mineral soils
  - Organic soils

Field measurements

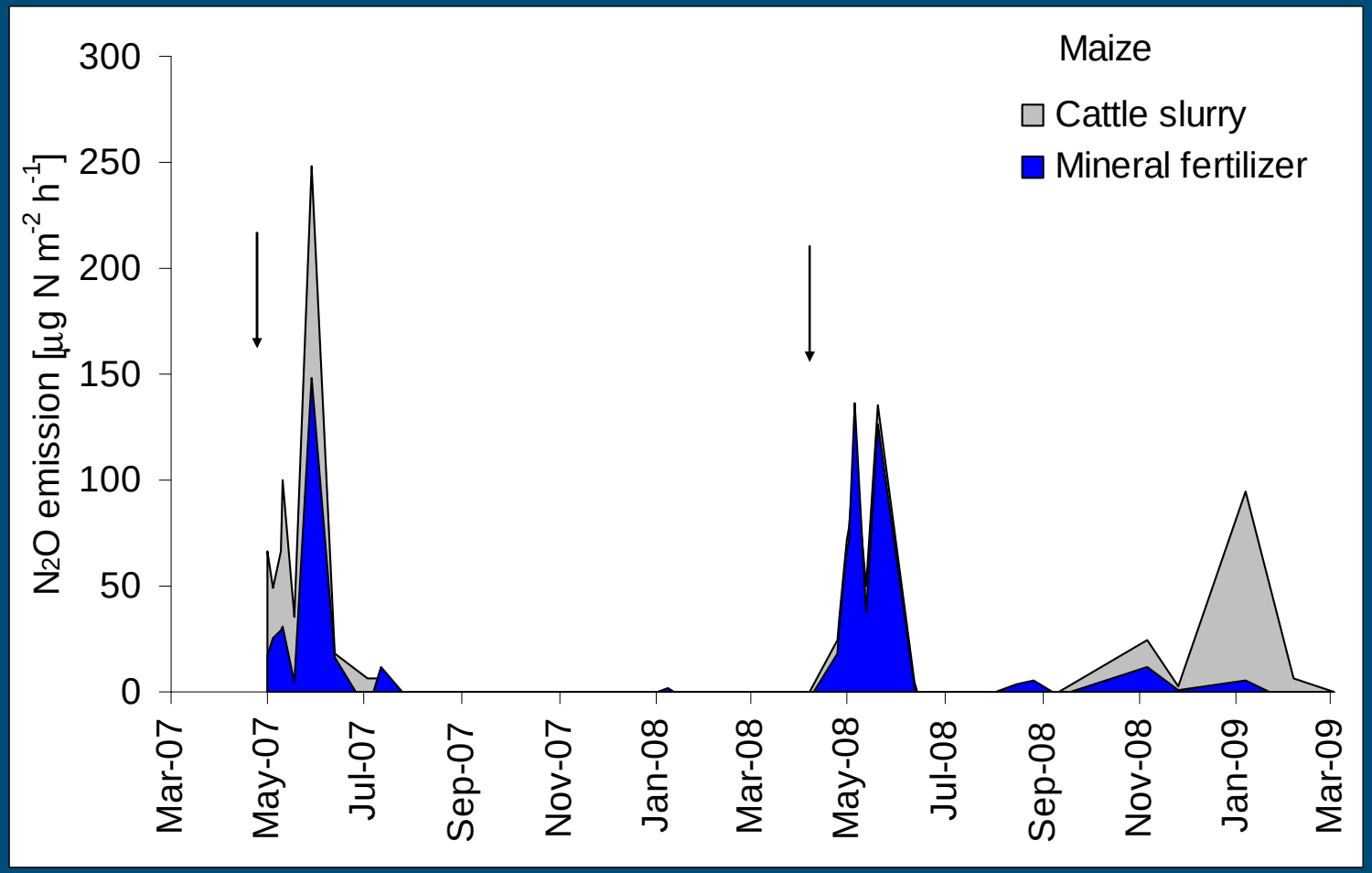
- Crop and soil type
  - Sand
  - Grassland
  - Maize
- Application technique
  - Surface spreading
  - Narrow-band (grassland)
  - Injection (maize)
- Type of fertilizer
  - Cattle slurry
  - CAN
- Measurements in triplicate

Measurement set-up

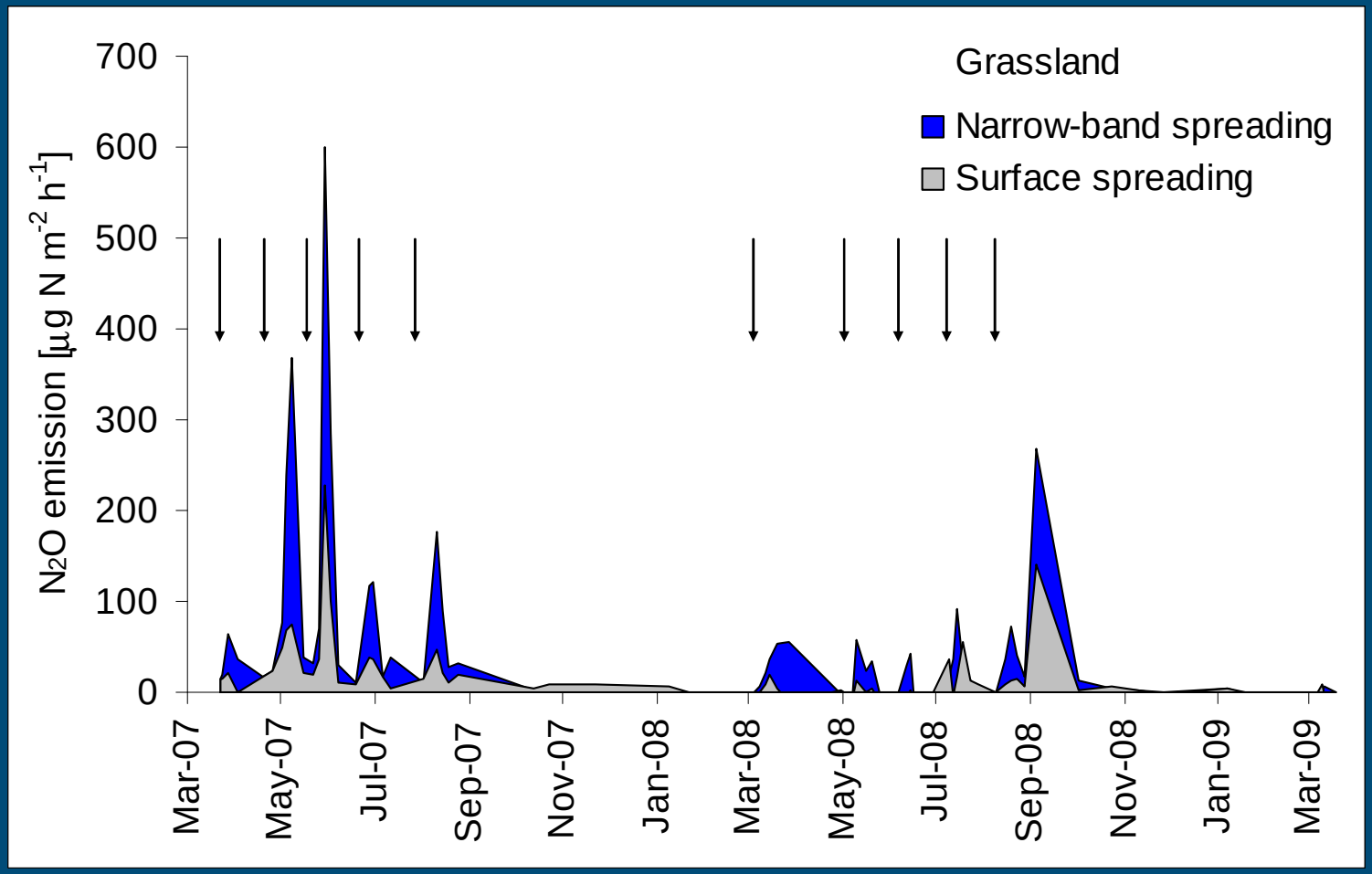
Type of Fertilizer (I)



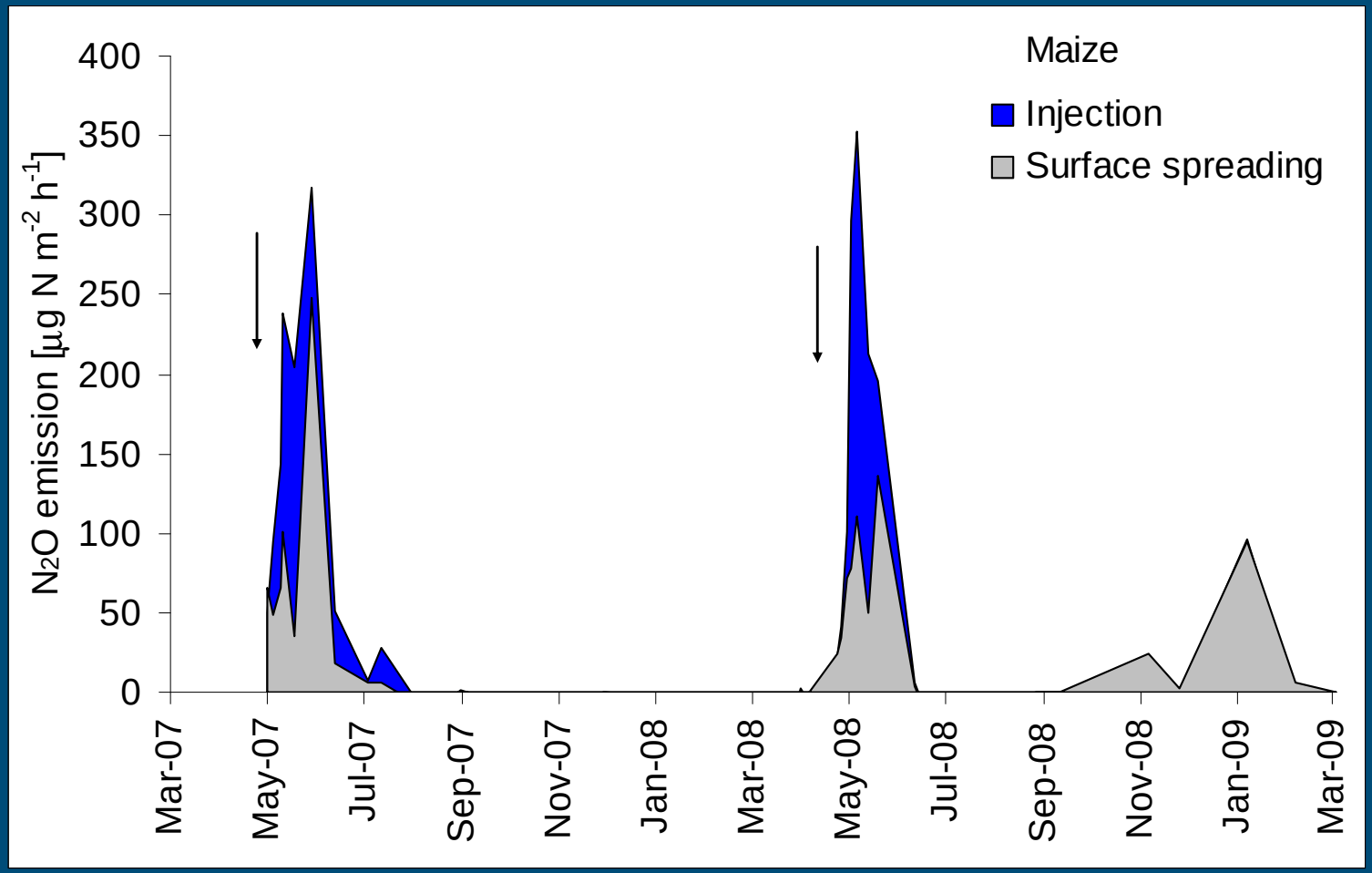
Type of Fertilizer (II)



Application Technique (I)



Application Technique (II)



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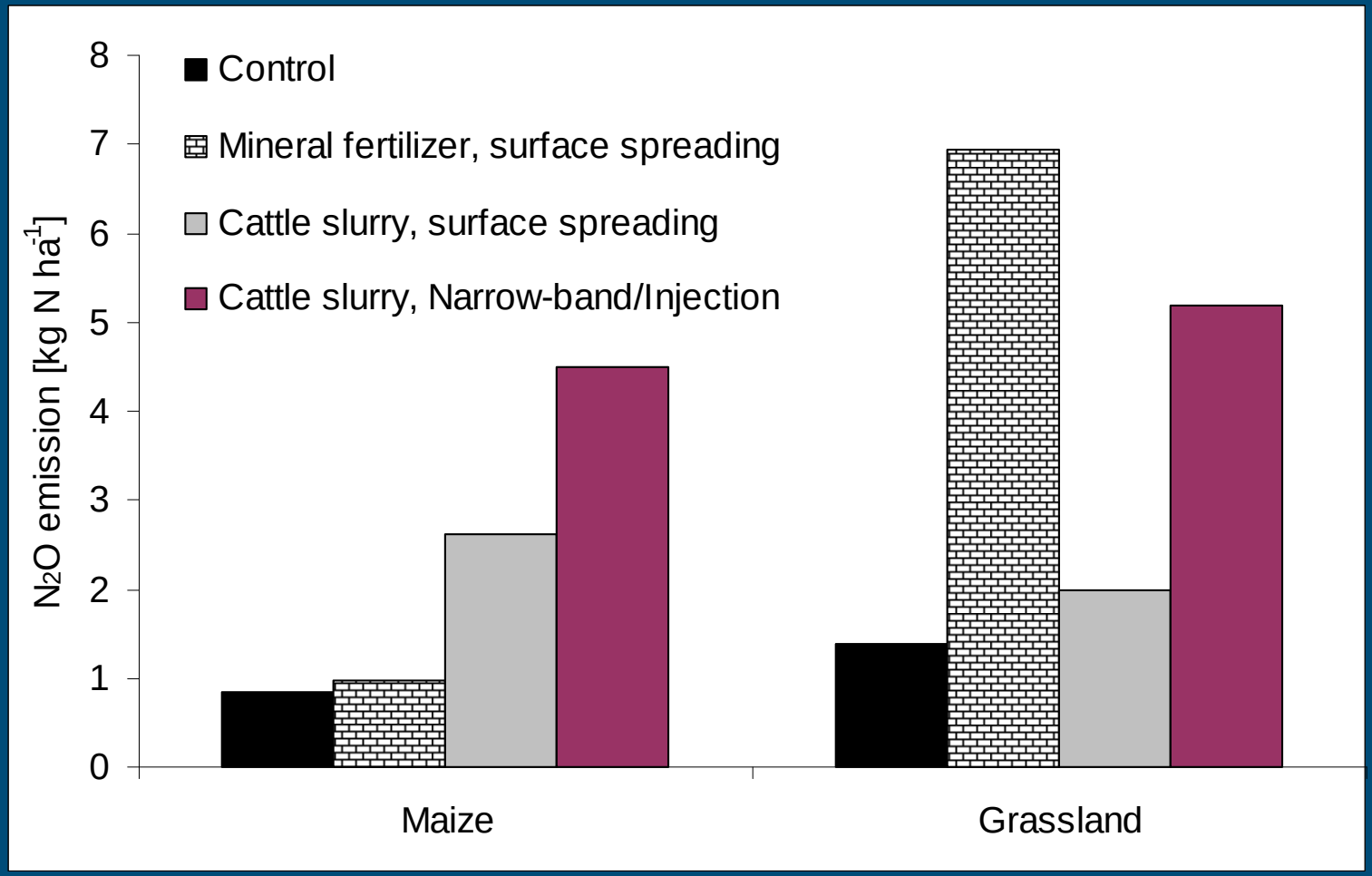
Direct N_2O emissions



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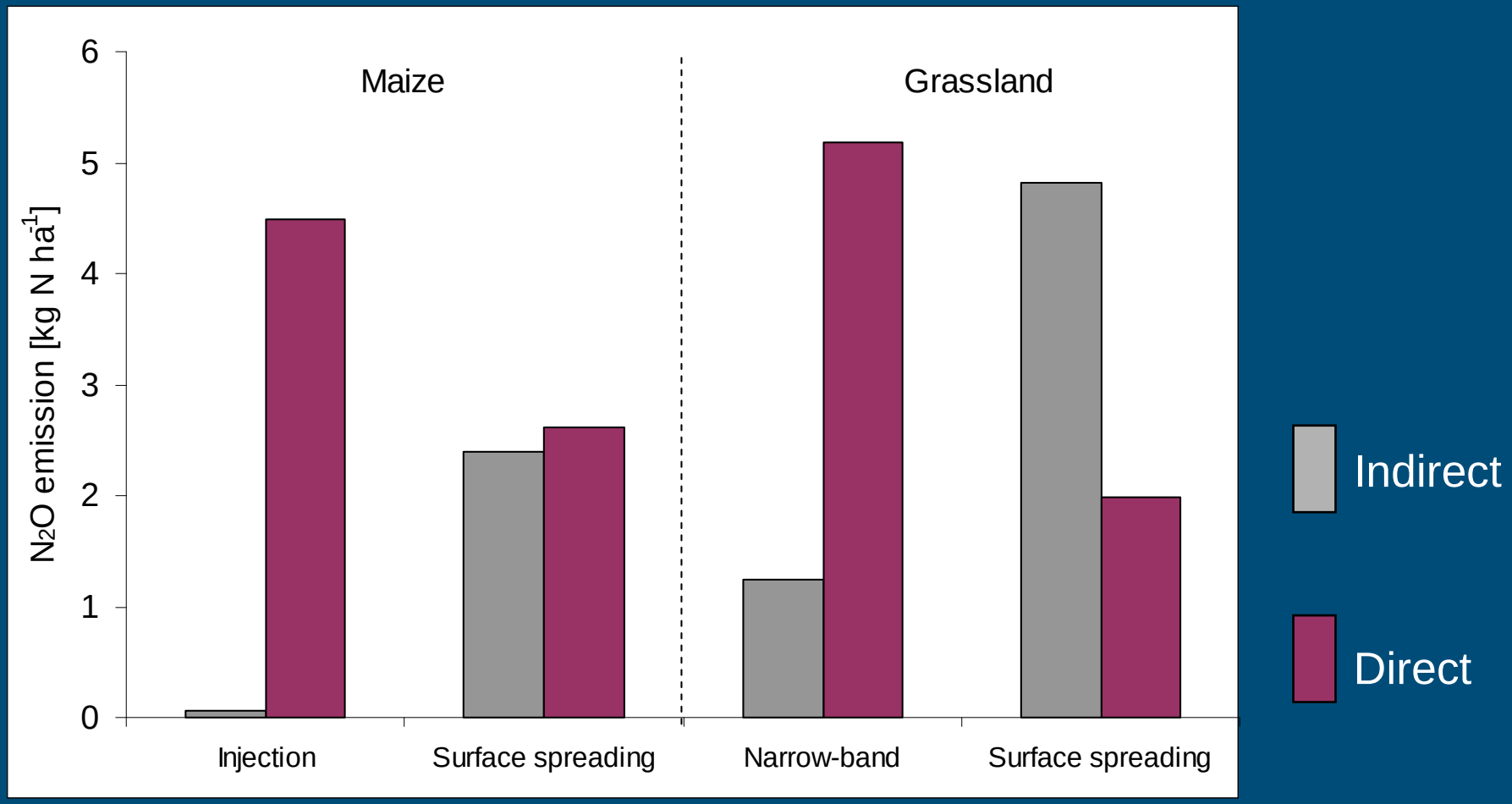
Indirect vs. Direct N_2O emissions



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Preliminary conclusions

- Application technique
  - Low (ammonia) emission manure application techniques > surface spreading
- Type of fertilizer
  - Grassland: CAN > cattle slurry
  - Maize: CAN < cattle slurry
- Indirect vs. direct emissions
  - Low ammonia emission application: indirect N_2O < direct N_2O
  - Surface spreading: indirect N_2O >= direct N_2O

Thank you for your attention

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