

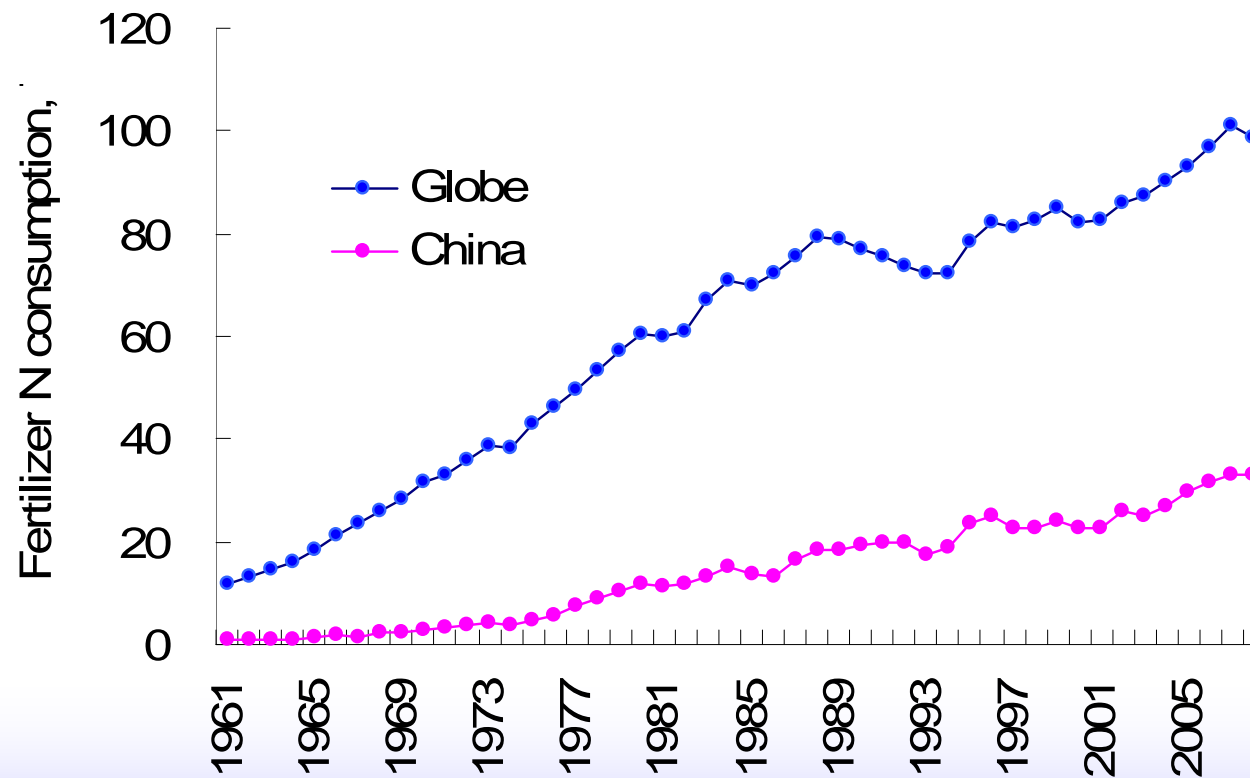
IPCC Expert Meeting on HWP, Wetlands and Soil N<sub>2</sub>O  
19-21 October 2010, WMO, Geneva

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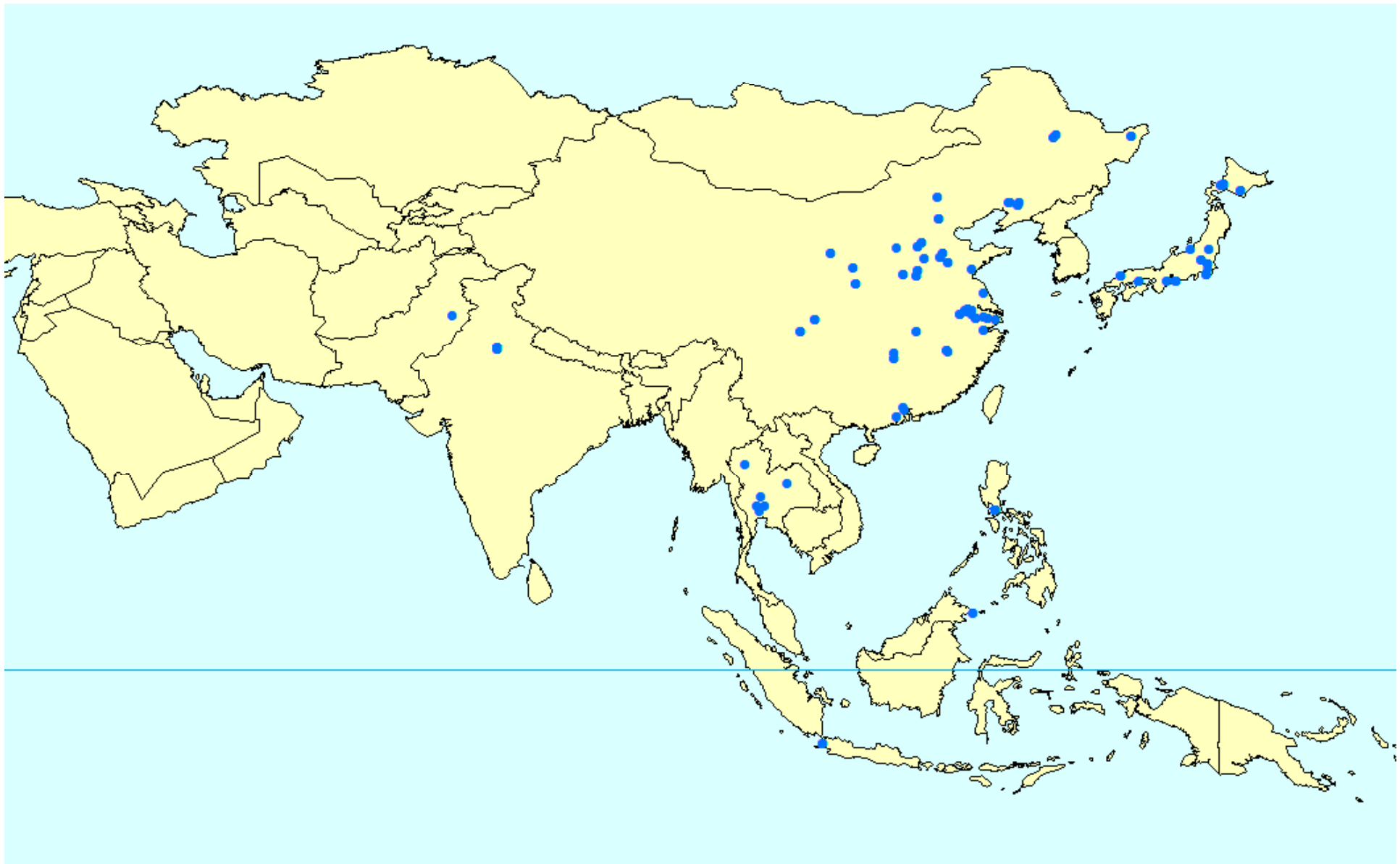
# Estimating N<sub>2</sub>O emission from Chinese croplands by statistical modeling

**Xiaoyuan Yan**  
**Institute of Soil Science**  
**Chinese Academy of Sciences**

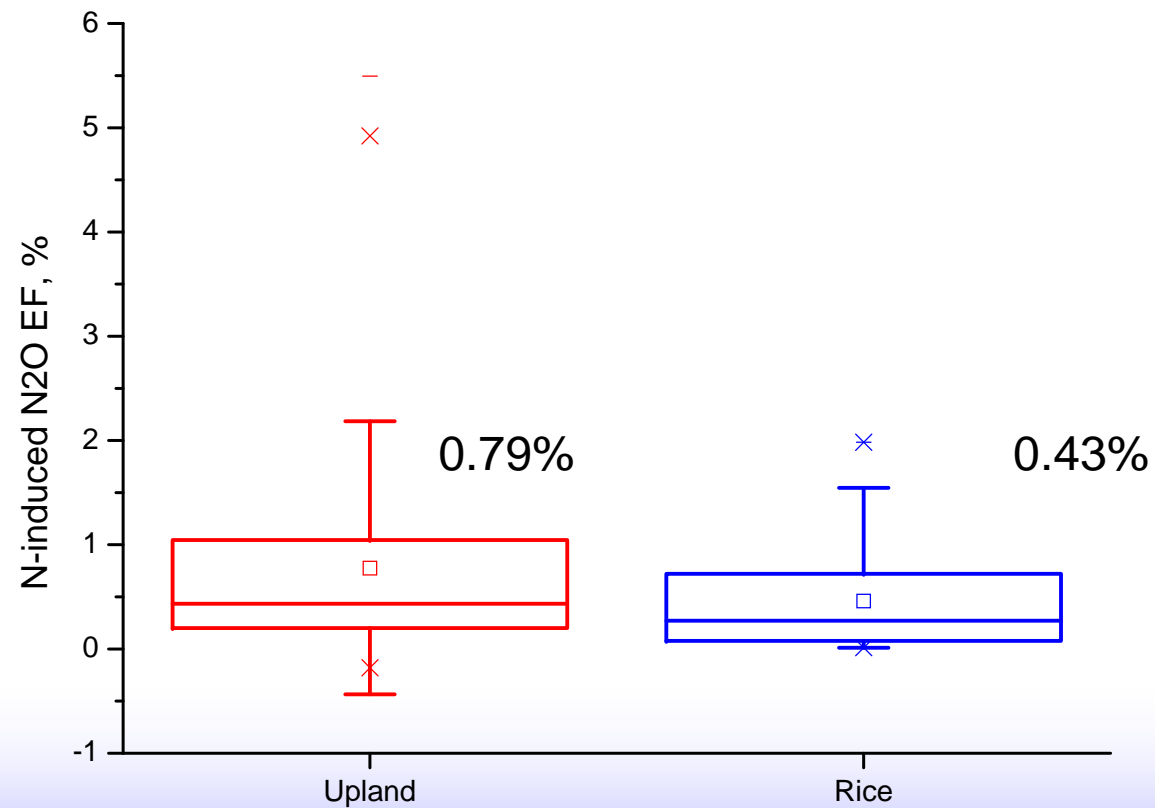
# Nitrogen consumption in China



# Data source

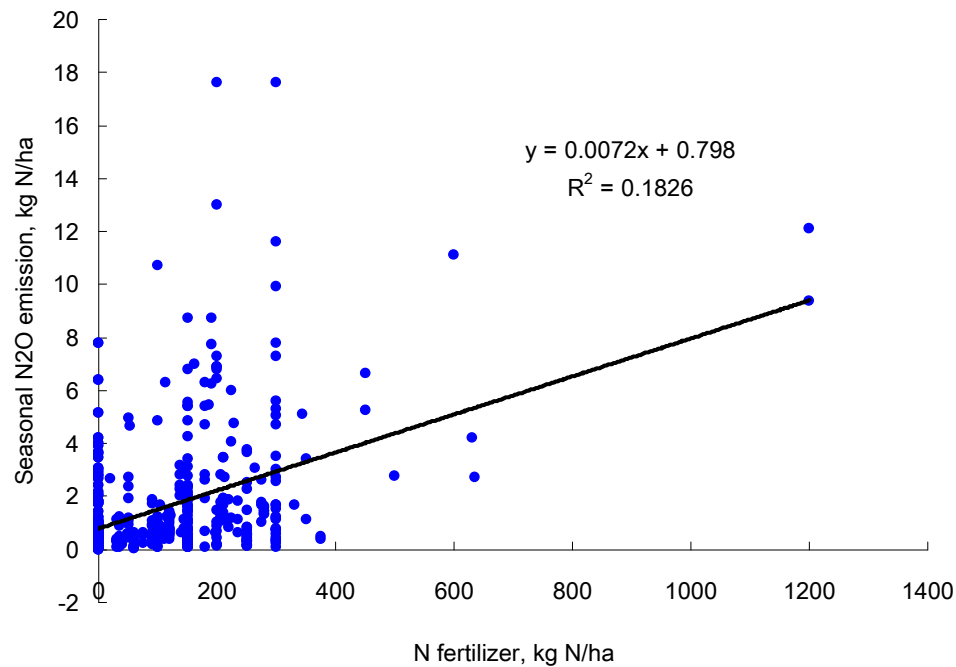


# N-fertilizer induced $\text{N}_2\text{O}$ EF

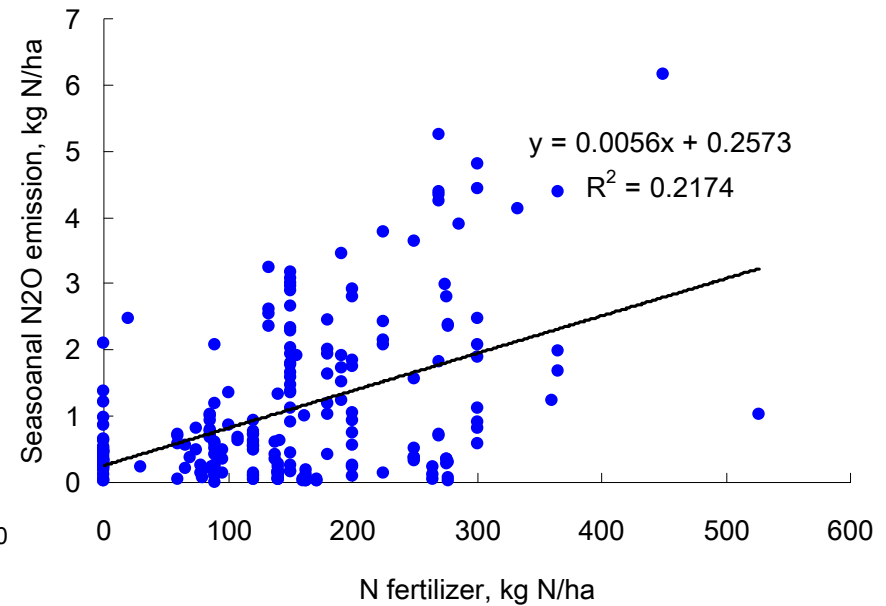


# Emission vs N fertilizer

Upland



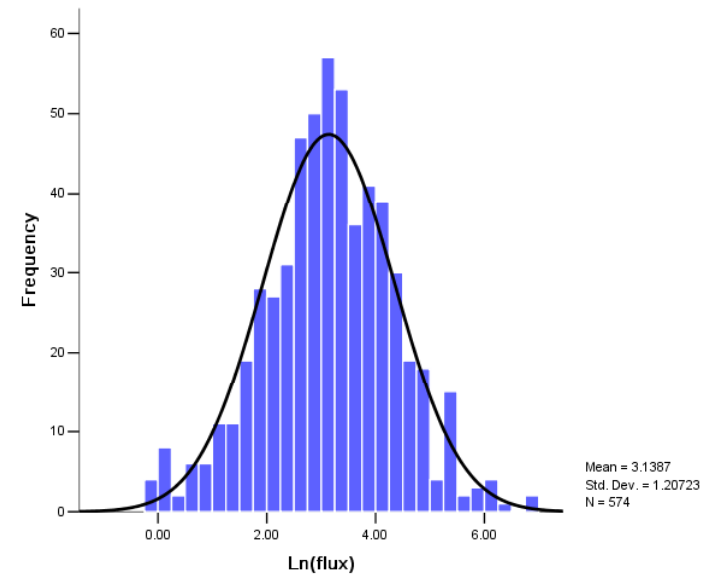
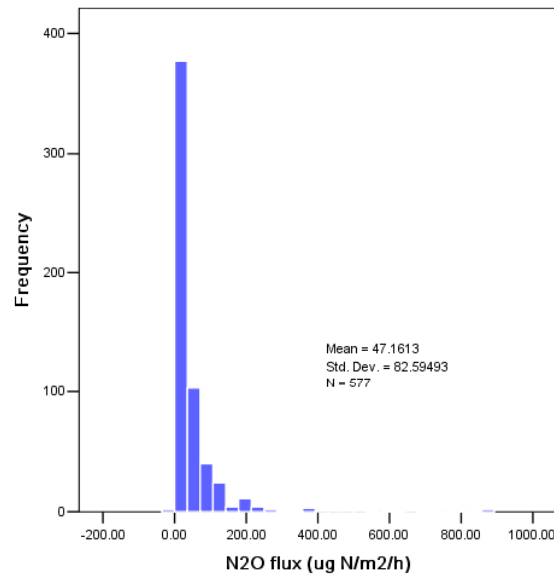
Rice



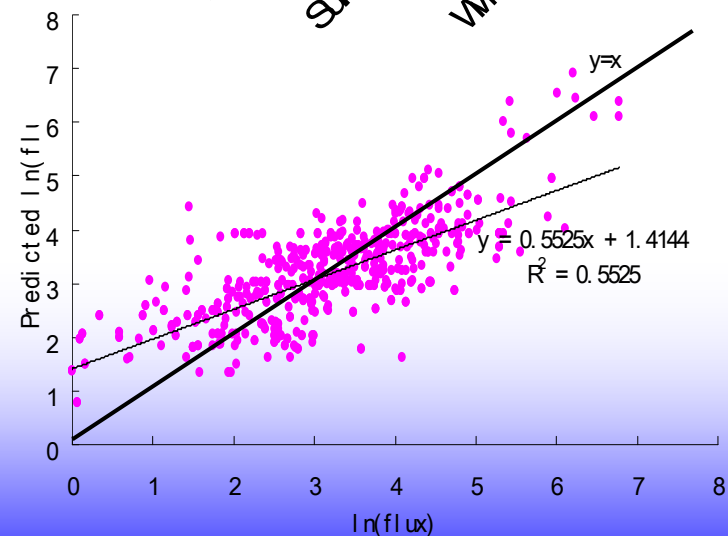
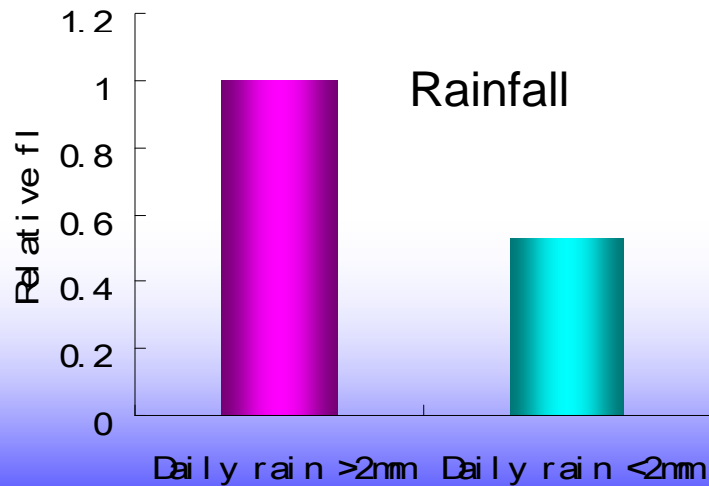
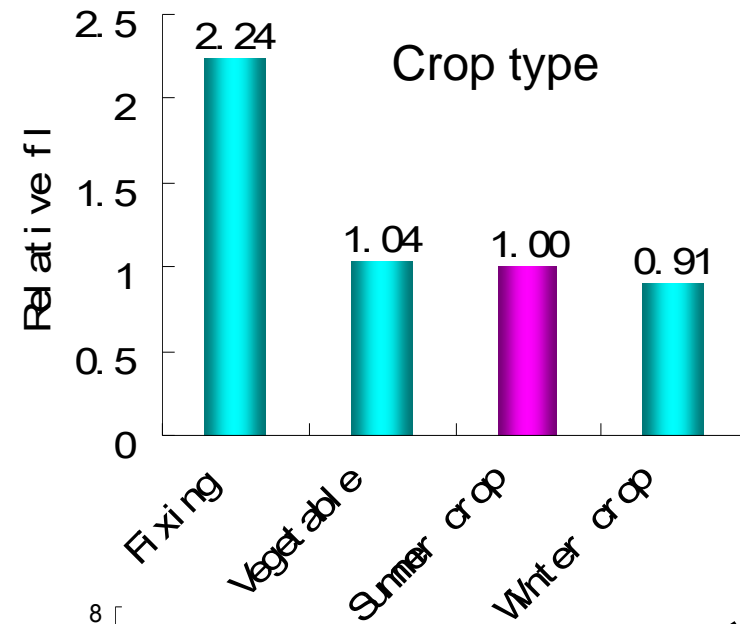
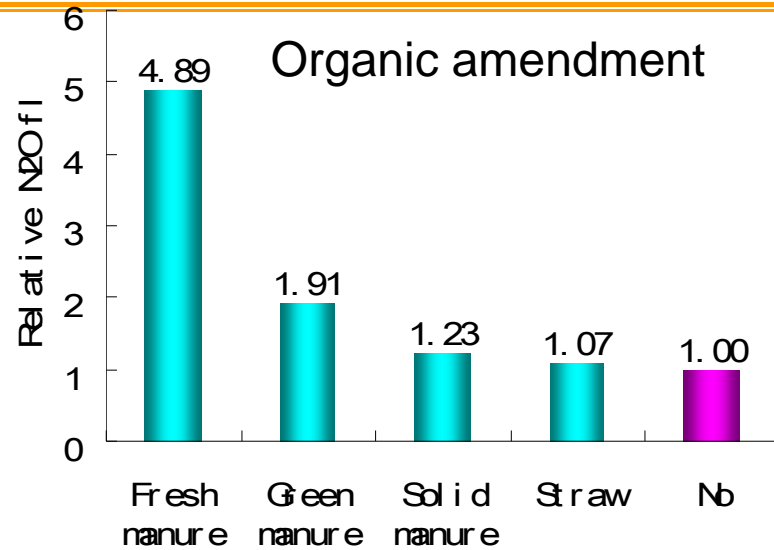
Seasonal emission, not yearly emission  
May include contribution of other N sources

# N<sub>2</sub>O emission from uplands

$$\ln(\text{flux}) = \text{Intercept} + a \cdot \ln(1 + N) + OM_i + Fert_j + Prec_k + Crop_n \\ + b \cdot AT + c \cdot \ln(\text{STN}) + pH_l + SOC_m$$



# Influencing factors

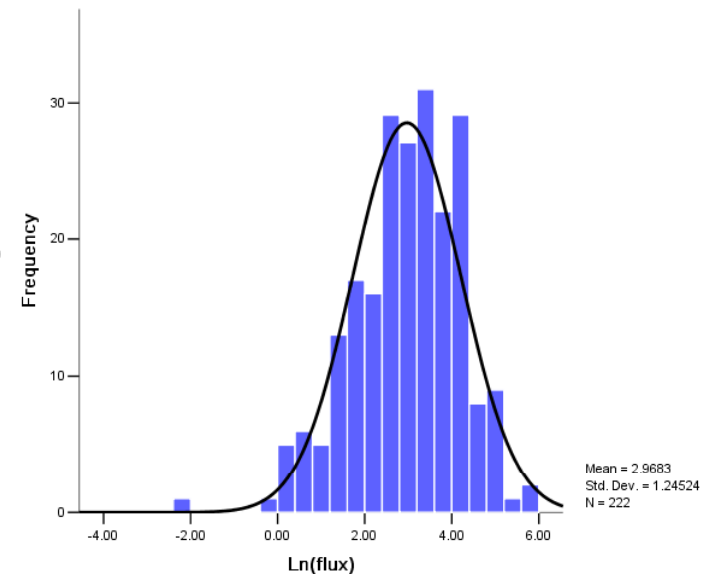
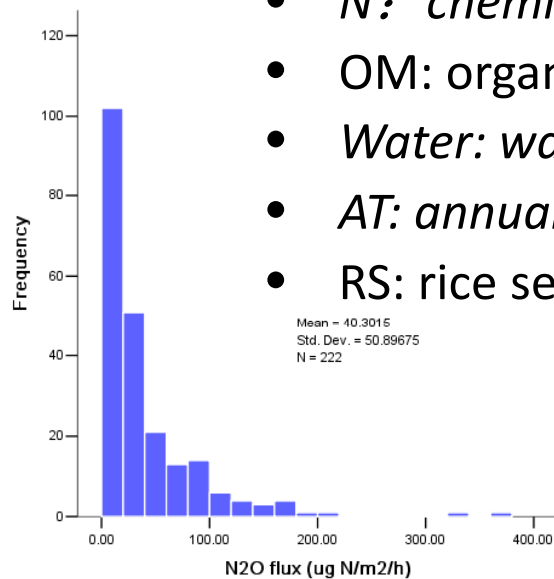


# N<sub>2</sub>O emission from rice paddy

$$\ln(\text{flux}) = \text{Intercept} + a \cdot \ln(1 + N) + OM_i + Water_j \\ + b_k \cdot (pH_k * \ln(STM)) + AT_l + RS_m$$

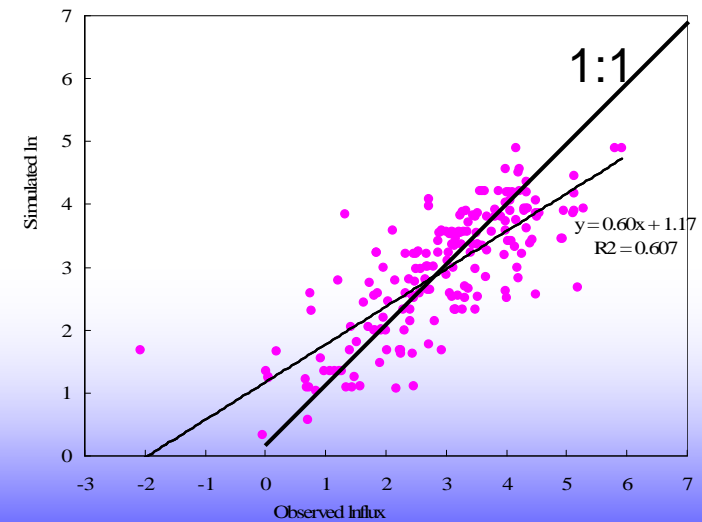
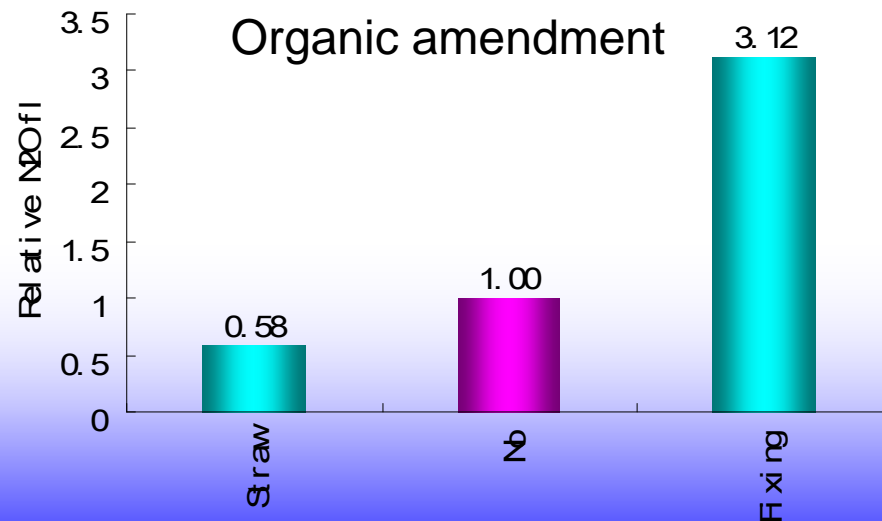
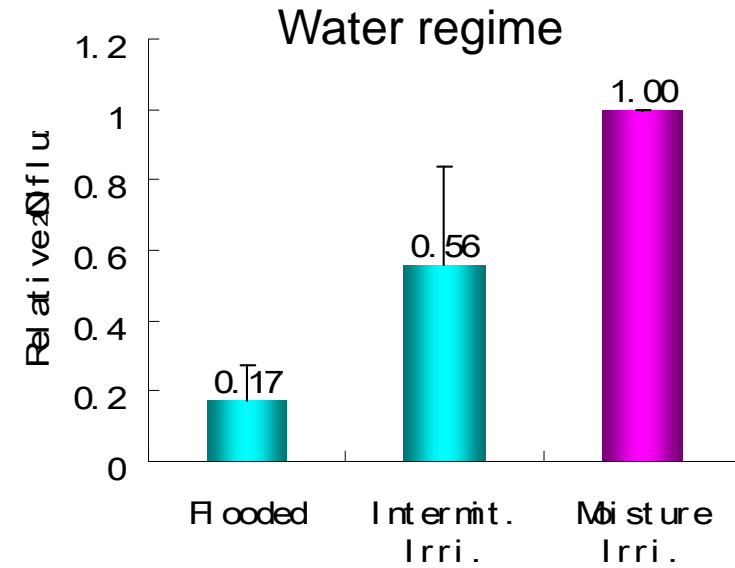
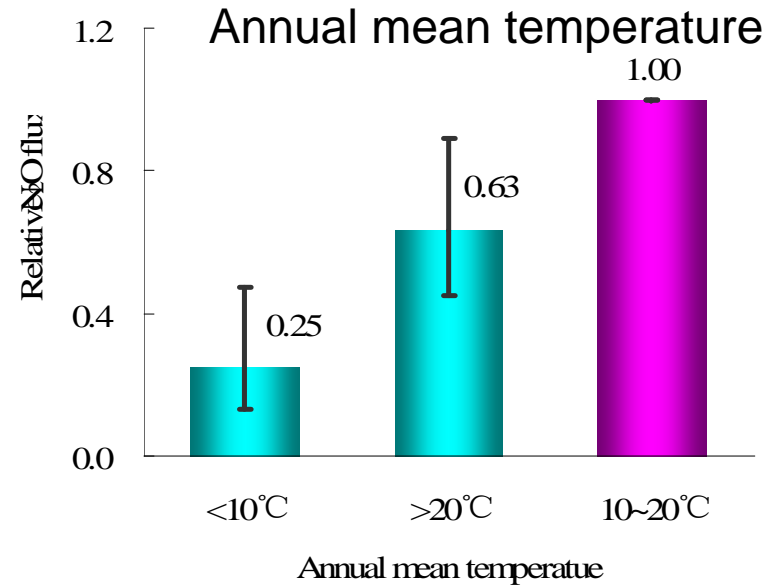
Where:

- *pH*: soil pH
- *STN*: soil total N
- *N*: chemical N;
- *OM*: organic amendment;
- *Water*: water regime
- *AT*: annual mean temperature
- *RS*: rice season (single, early, late)



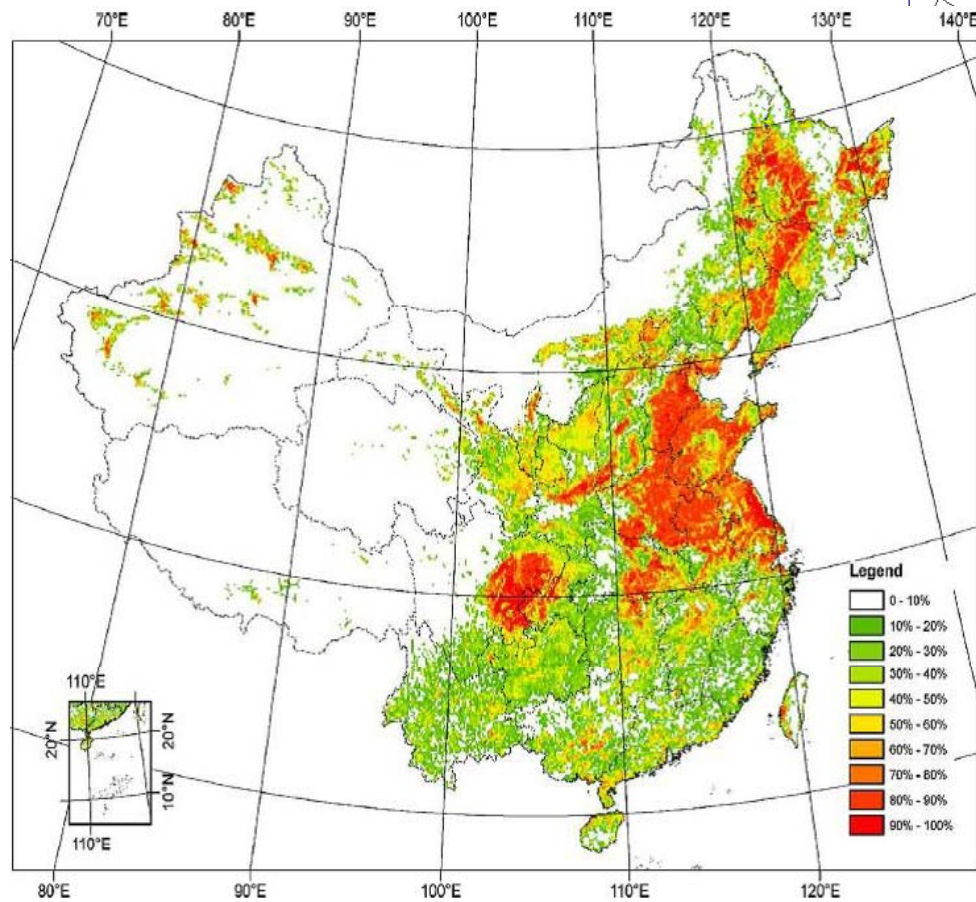


# Influencing factors

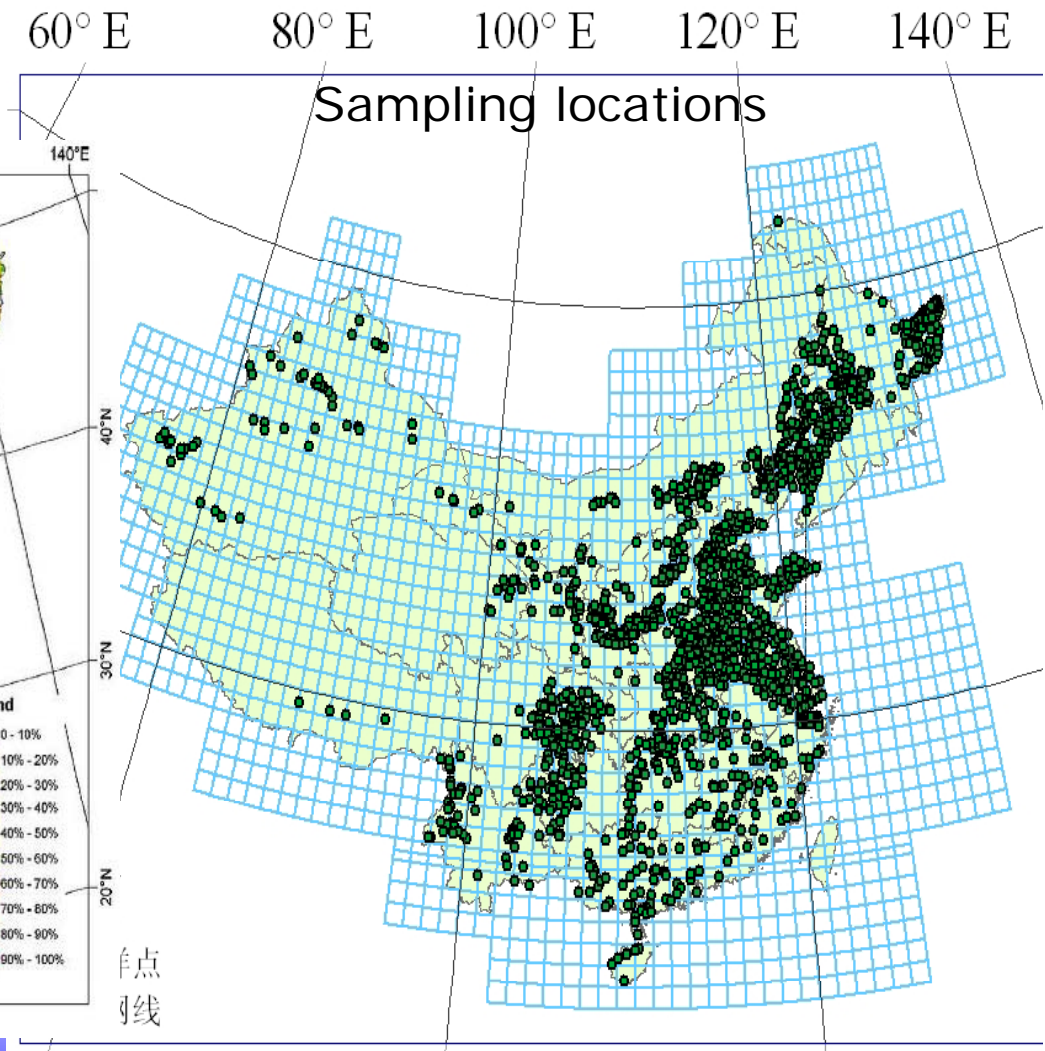


# A soil dataset

Distribution of croplands

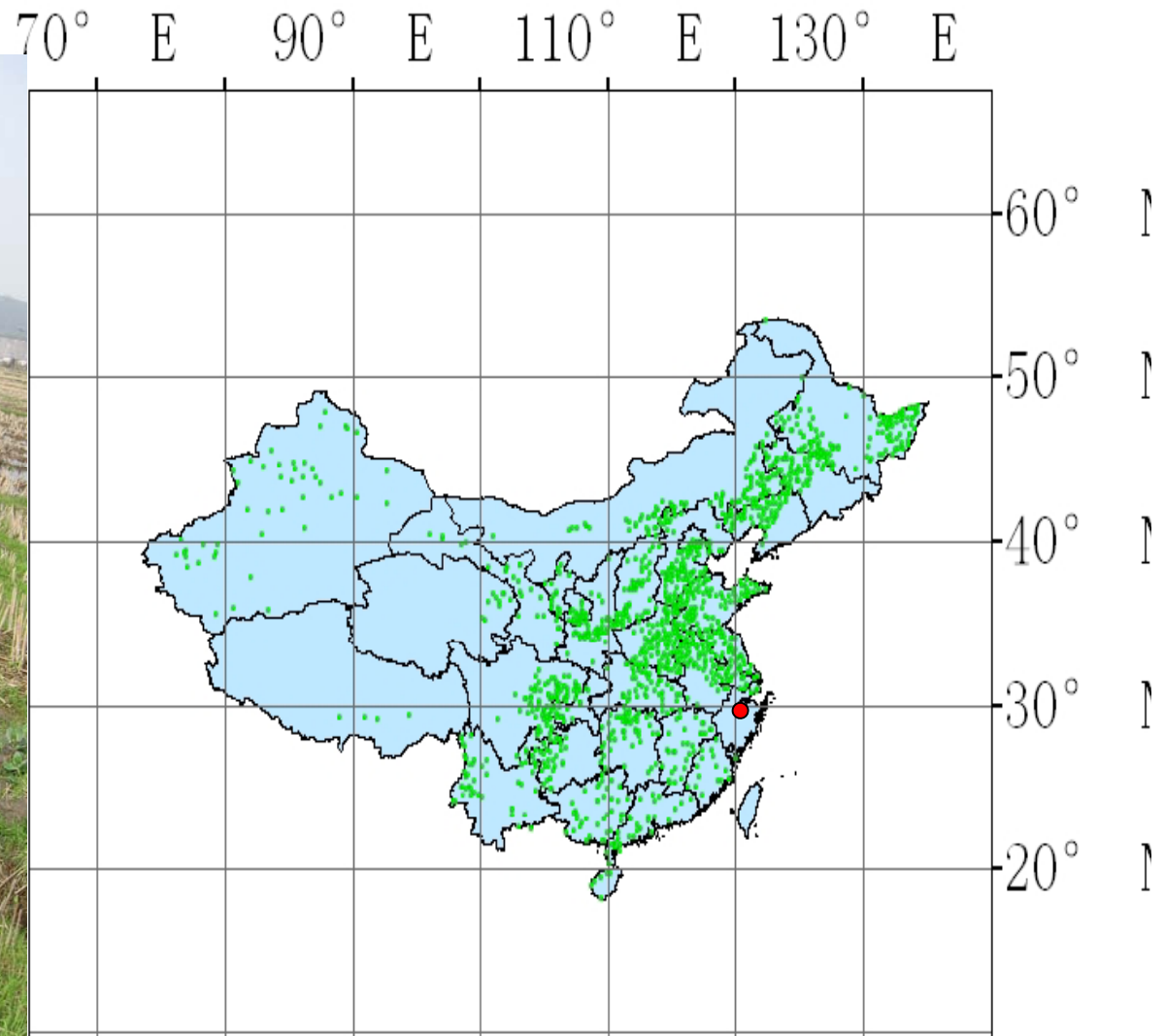
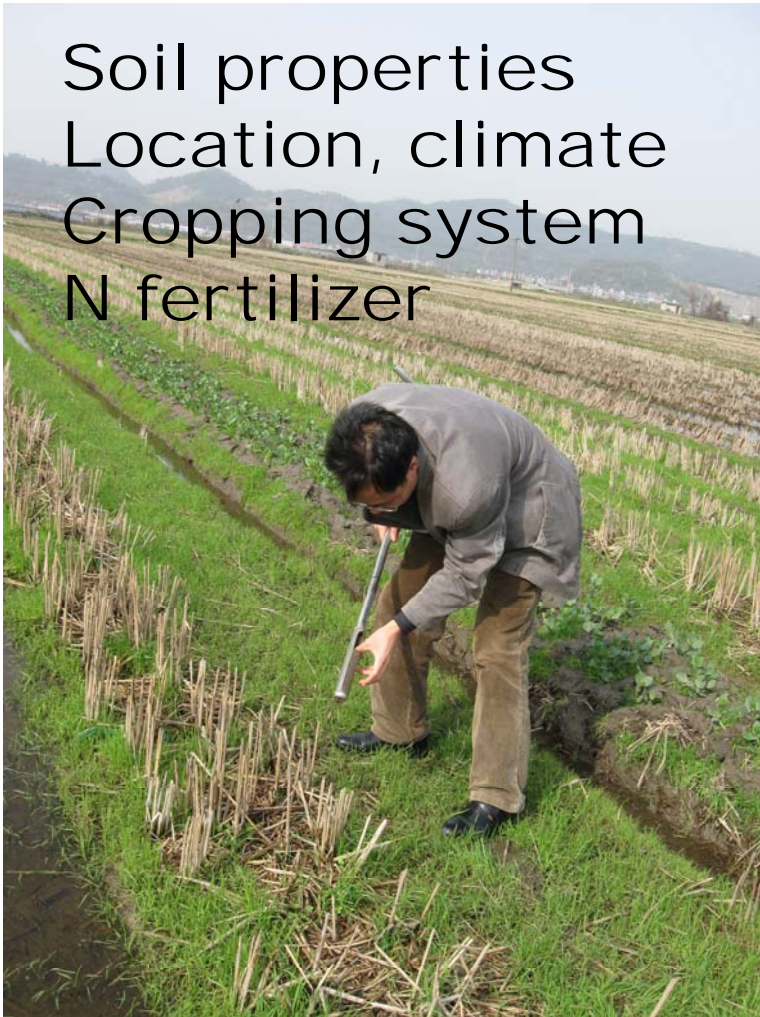


Sampling locations

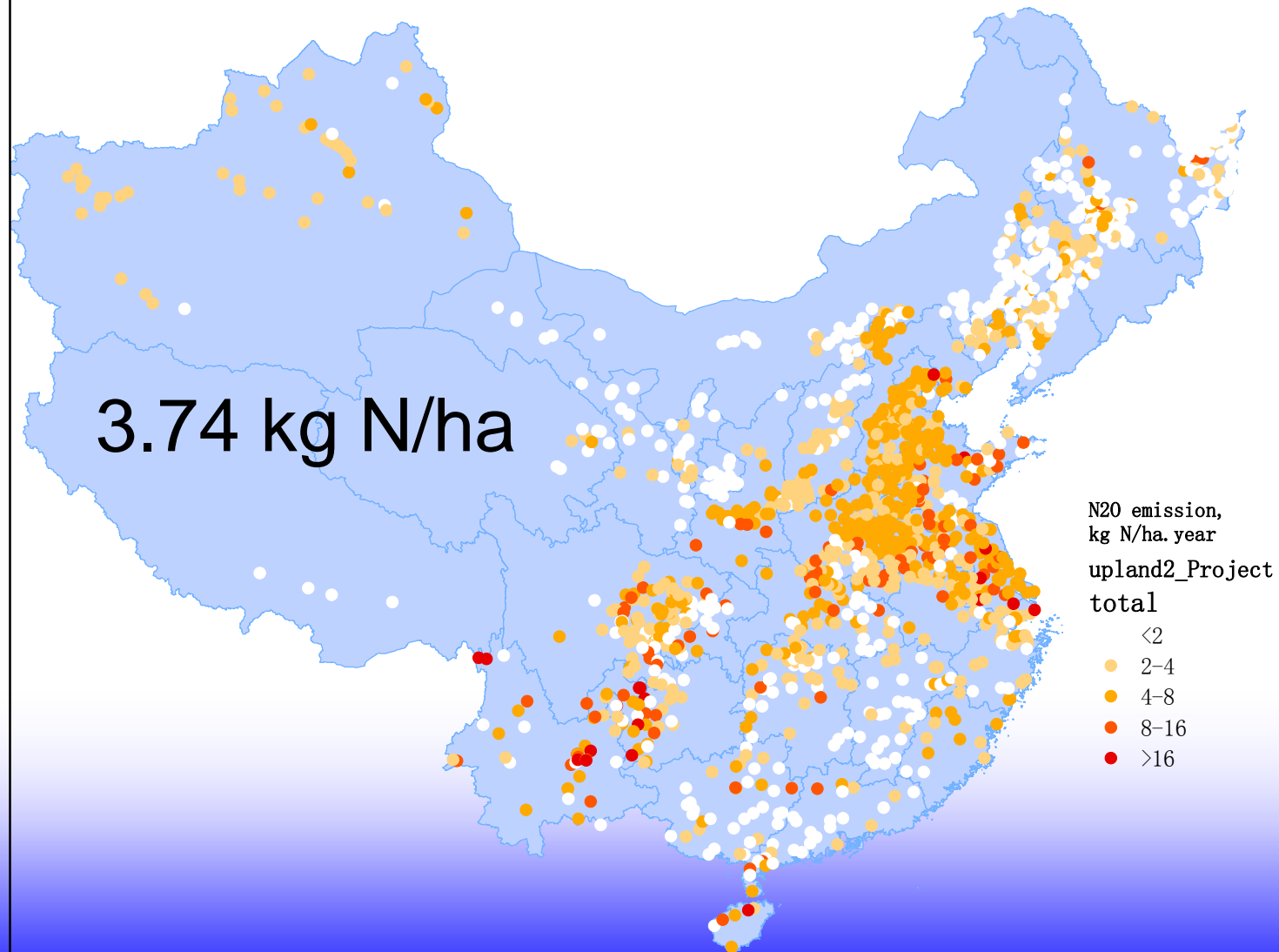


# A soil dataset

Soil properties  
Location, climate  
Cropping system  
N fertilizer



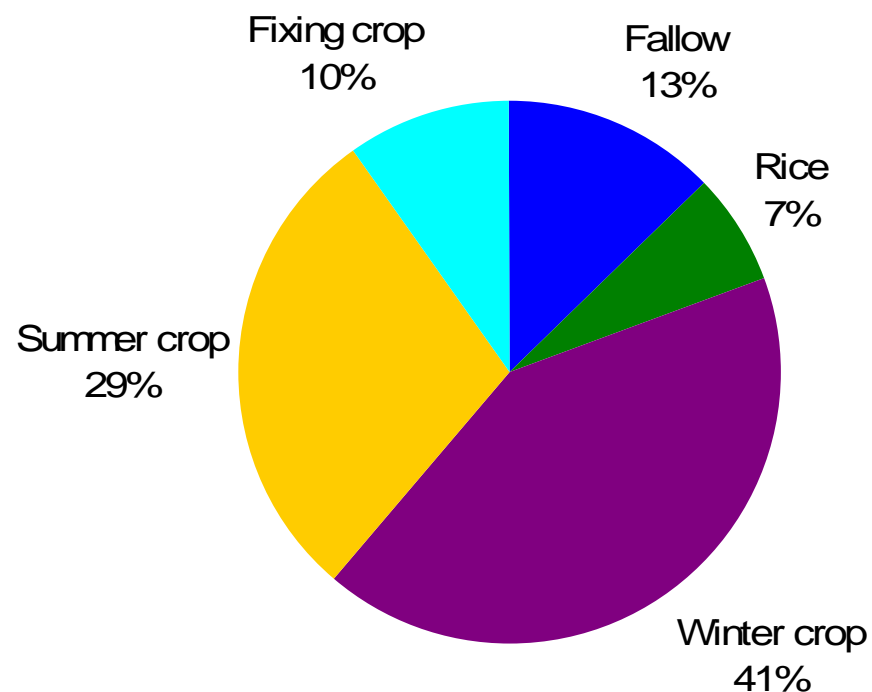
# Simulated N<sub>2</sub>O emission



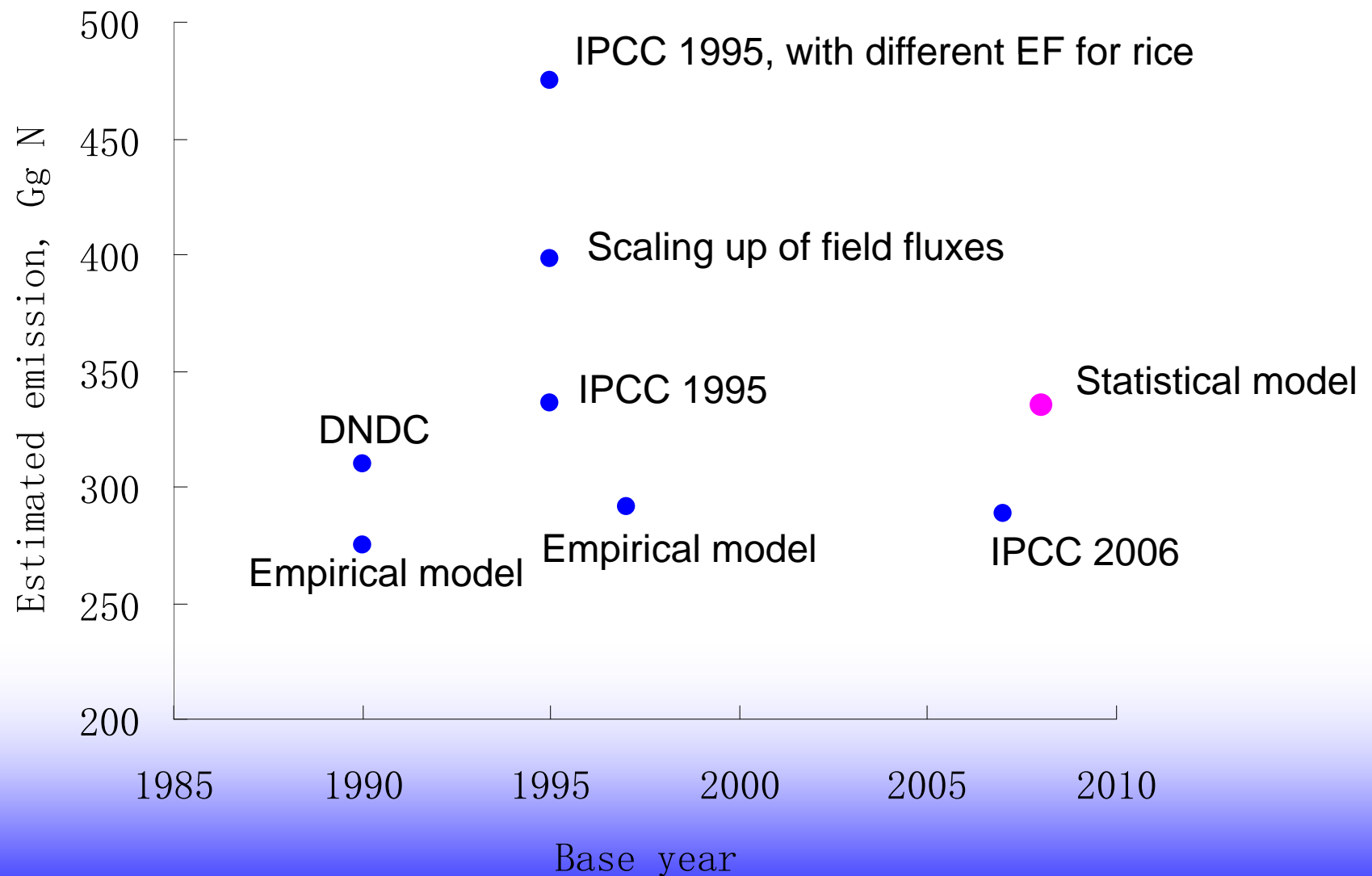
# Total emission from Chinese croplands

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- Total: 334.2 Gg  $\text{N}_2\text{O}$ -N
- Background emission: 153.4 Gg
- Fertilizer-induced  $\text{N}_2\text{O}$  emission factor:
  - 0.82% for upland
  - 0.26% for rice



# Various estimations of N<sub>2</sub>O emission





# CONCLUSIONS

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- Crop residue is not as effective as chemical N
- Fresh manure tends to emit more  $\text{N}_2\text{O}$
- Simulated emission factors for China are slightly lower than IPCC 2006 default ones
- Background emission constitute a significant proportion of the total emission.
- Uncertainties arise from method, emission factor and activity data

# Other issues to be discussed

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- Calculation of FCR too complicated
- $EF_5$  for leaching/runoff from soil: 0.0075
- $EF_{\text{EFFLUENT}}$  for N discharge to wastewater: 0.005
- $\text{Frac}_{\text{LEACH}}$  of 0.3 seems too high



# Histogram of simulated emission

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