Upscaling and Uncertainty Analysis of Greenhouse Gas Emission Inventories

Analysis for the Dutch fen meadow landscapes

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Personal details and framework

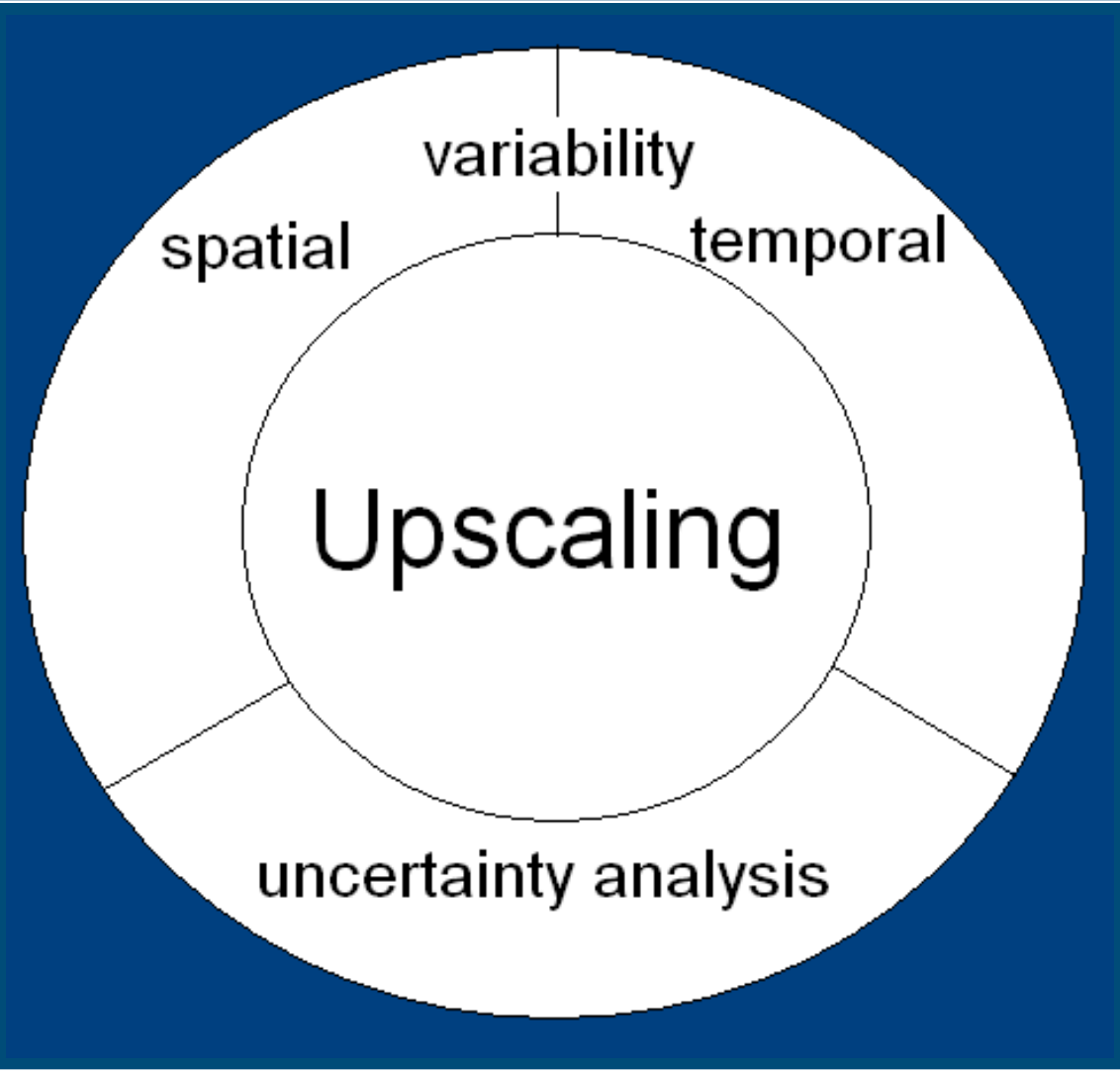
- Started at September 1 2005
- Wageningen University
  - Environmental Sciences Group
  - Chair Group: SIL (Soil Inventory and Land Evaluation)
- Supervision
  - Daily Supervisors: Peter Verburg & Gerard Heuvelink
  - Promoter: Tom Veldkamp
  - Project leader: Eddy Moors

Problem definition

- Much research is done on
  - Global / continental / national models
  - Processes influencing / controlling GHG emissions
- THERE IS A GAP – MISSING LINK:

  Integration → upscaling from plot/fieldscale to landscape scale

Focus


variability
spatial
temporal
Upscaling
uncertainty analysis

Topics

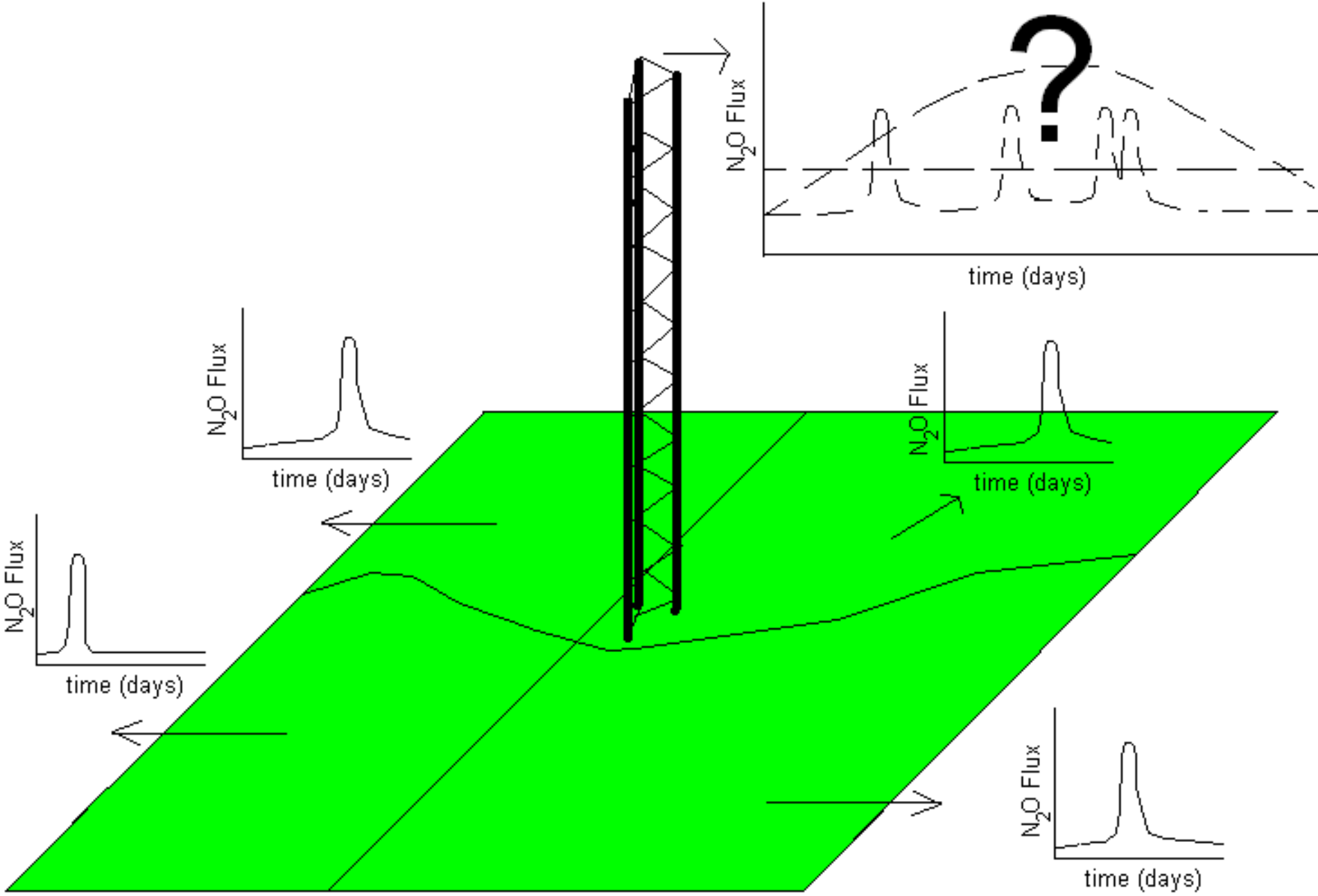
1. Spatial variability
2. Temporal variability
3. Comparison of different upscaling methods and validation
4. Uncertainty analysis

1. Spatial variability

- The effect of landscape scale variability of N_2O driving factors on the N_2O emission estimates for the Dutch fen meadow systems.
- Determining the effect of ditches, ditch sites and grassland on the emission.
- Determining the distibution of ditches and ditch sites in a fen meadow system
- Correct the upscaling procedure(s) for ditches and ditch sites

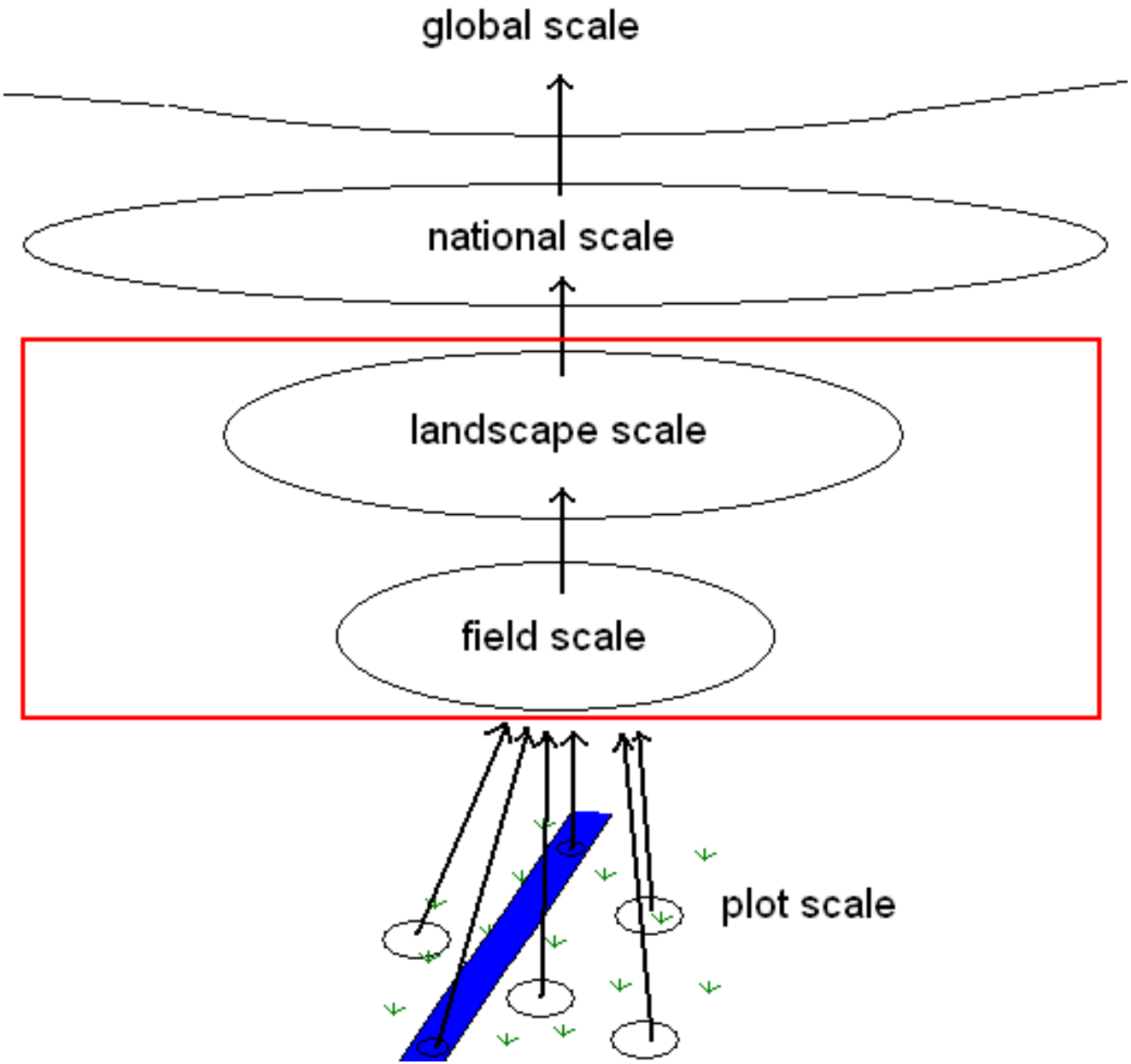
2. Temporal Variability

- The effect of temporal variability of N_2O driving factors on the N_2O emission estimates at landscape scale.
- Can uncertainty in measurements at the landscape scale (partly) be explained by temporal variability
- Modify estimation procedures to take temporal variability into account.


N2O Flux
?
time (days)
N2O Flux
time (days)
N2O Flux
time (days)
N2O Flux
time (days)
N2O Flux
time (days)

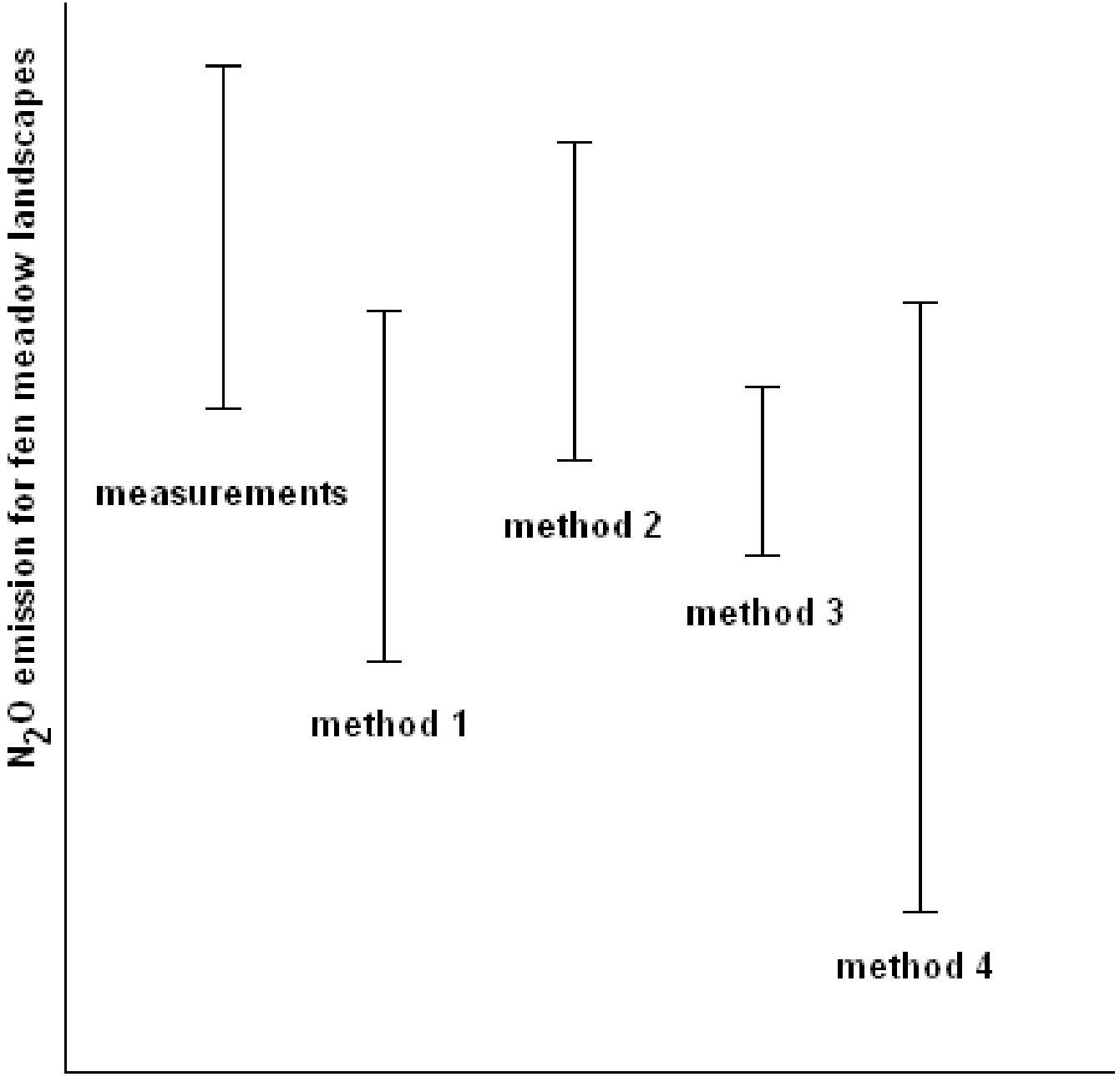
3. Upscaling

- Different upscaling methods (IPCC Tier 1, 2, 3, multiple regression, DNDC, etc.)
  - Input data, uncertainty of input data
  - Indication if temporal and spatial variability can be included in the methods
  - Validation: compare outcomes of the different methods with real emission measurements (flux data)

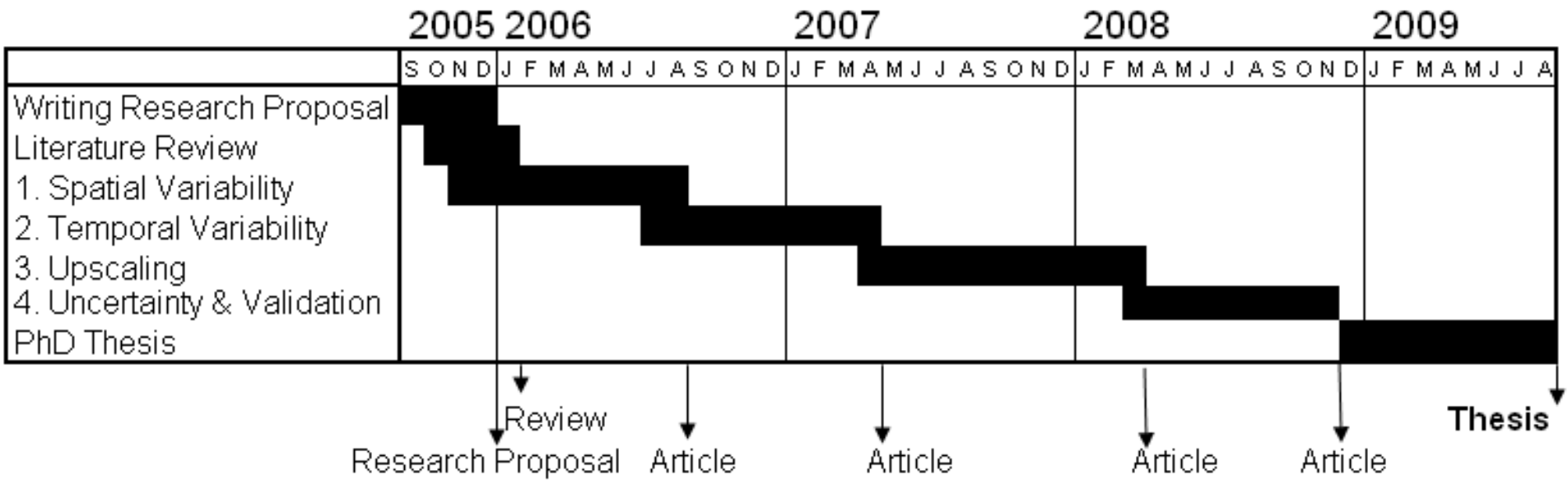

global scale
national scale
landscape scale
field scale
plot scale

4. Uncertainty Analysis

- Input data, uncertainty of input data
- Model uncertainty
- Using Monte Carlo sampling to determine the effect of input uncertainty on the output.
- Identification of the ‘most uncertain’ aspects of the different upscaling procedures → Recommendations for future research


N_2O emission for fen meadow landscapes
measurements
method 1
method 2
method 3
method 4

Time Schedule



Collaboration within ME1

- Work packages: WP2, WP5 (WP6)
- PhD Discussion group
- Exchange
  - Useful data
  - Useful literature
  - Useful upscaling methods
- Collaborative papers