Modelling of subsidence, nutrient releases and emission of greenhouse gasses in peatlands in the Europeat project

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Content:

- Europeat project
- Models
- First results of the modelling

Europeat project:

- Objective: Tools and scenarios for sustainable management of European peat soils to protect associated landscapes and natural areas in relation to agricultural production

- Participants:
  - Netherlands
  - Germany
  - Poland
  - England
  - Sweden
  - Norway

EUROPEAT Sites

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Objective modelling:

- to develop a dynamic process oriented model for predicting for peatlands, in relation to drainage conditions and climatic conditions :
  - subsidence,
  - nutrient releases
  - emission of greenhouse gasses

  (by improving, extending and combining two existing models)

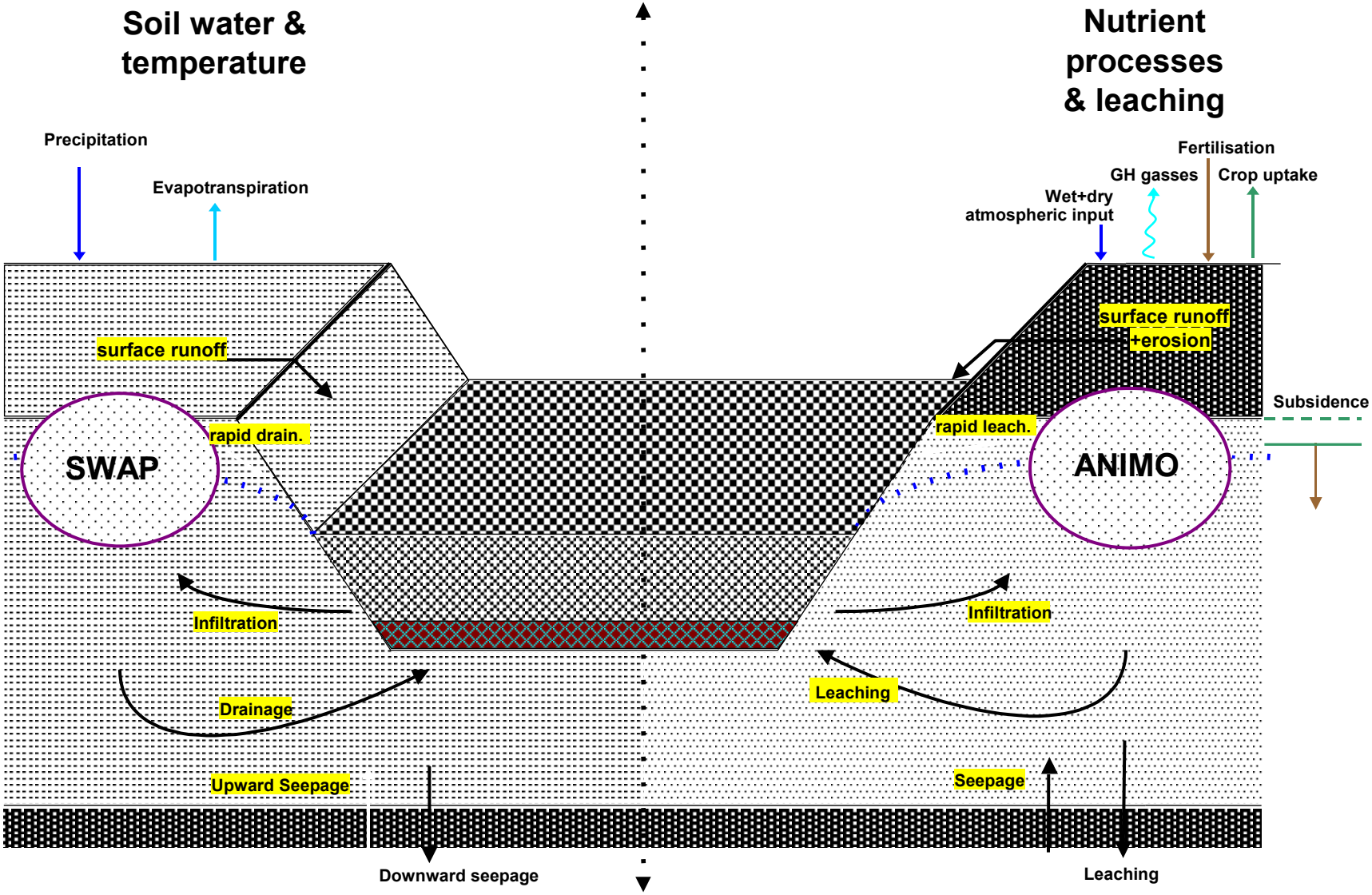
- to calibrate and validate the improved model combination against data collected in the project:

  all 6 participants model their own fields

Objective modelling:

- The calibrated and validated moddel will be used to run scenario's on:
  - landuse
  - water management
  - global climat change

Schematic representation of the system to describe



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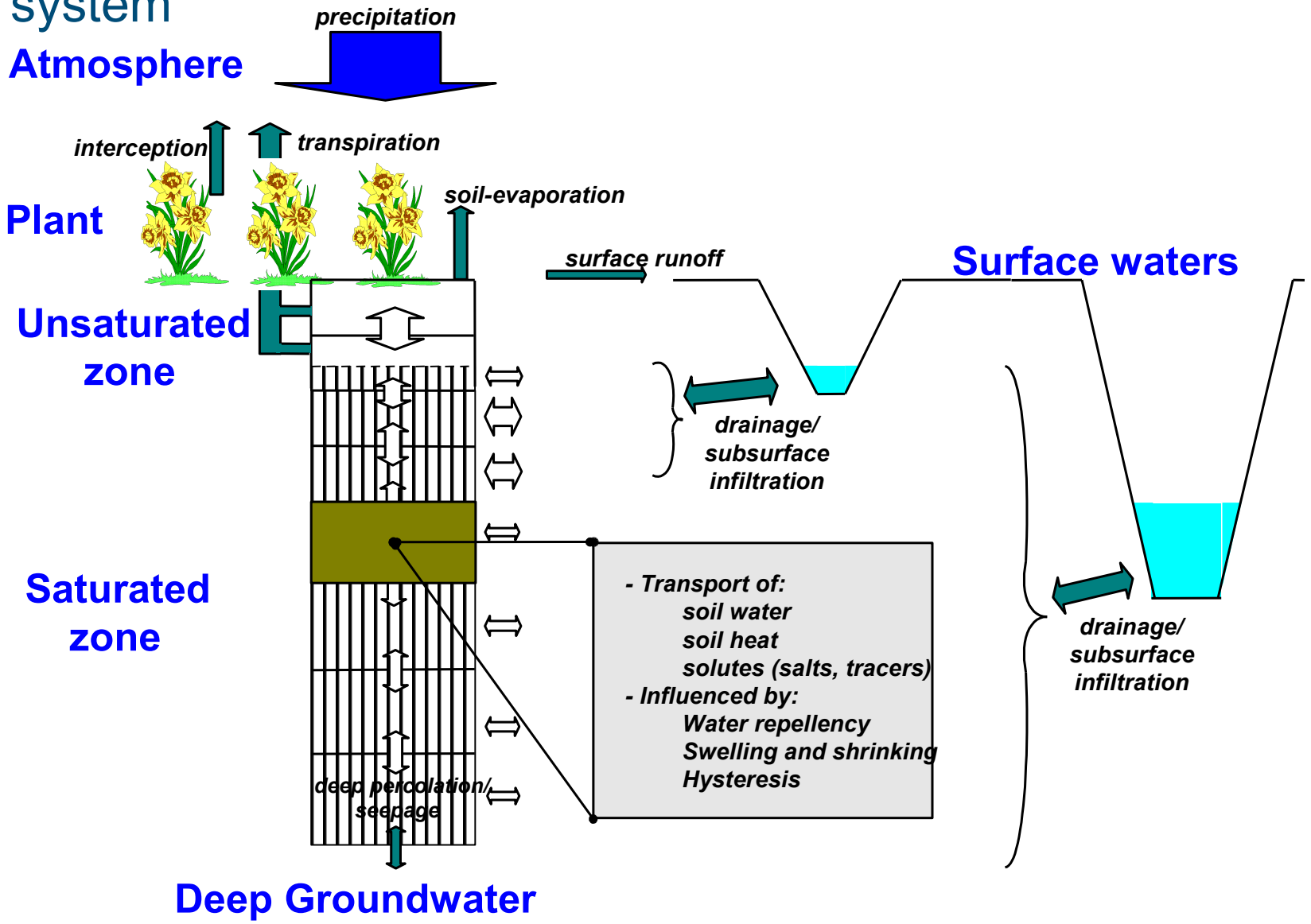
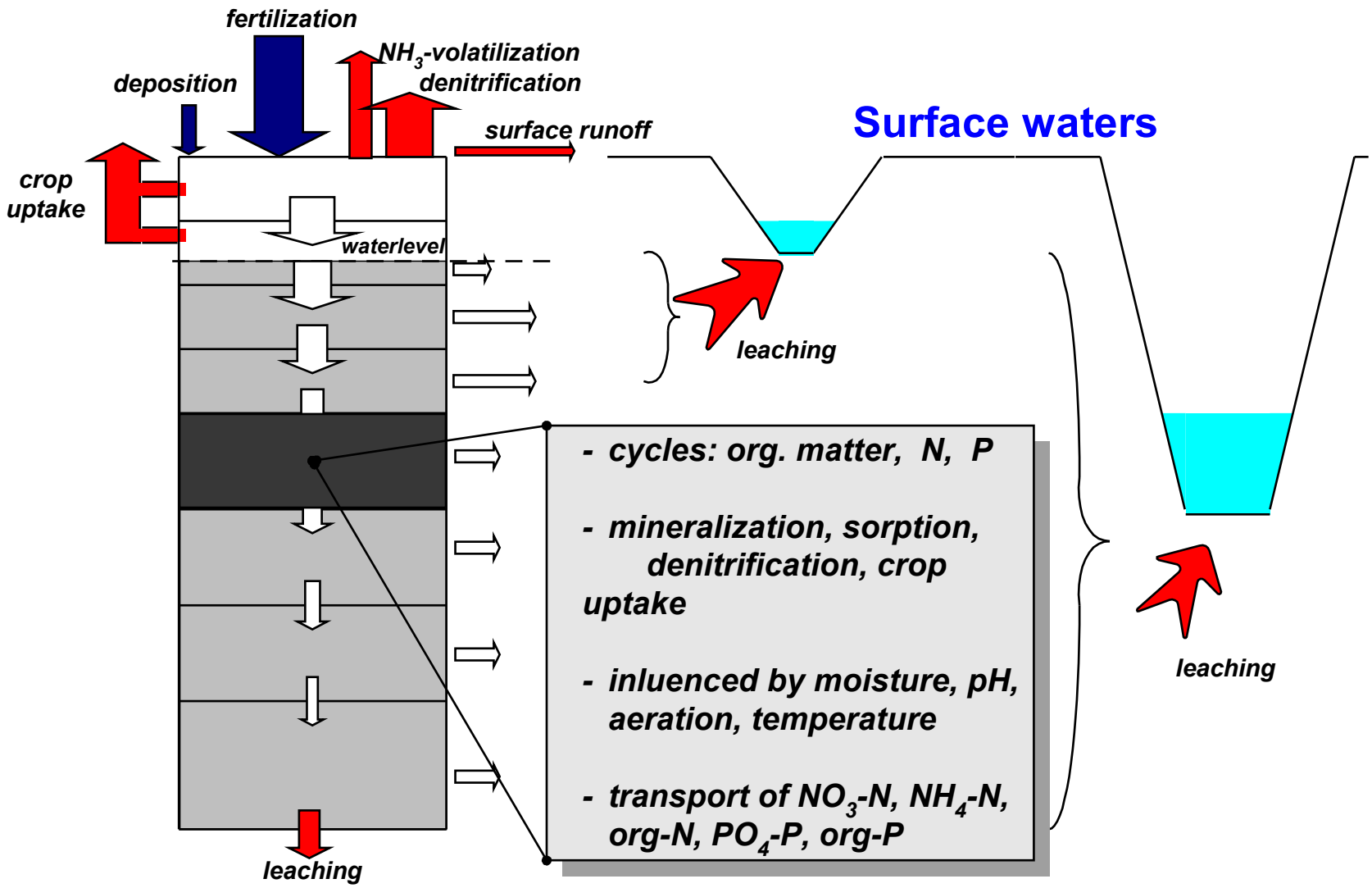
SWAP model: Integrated modeling of the Soil-Water-Atmosphere-Plant system



Nutrient model: ANIMO



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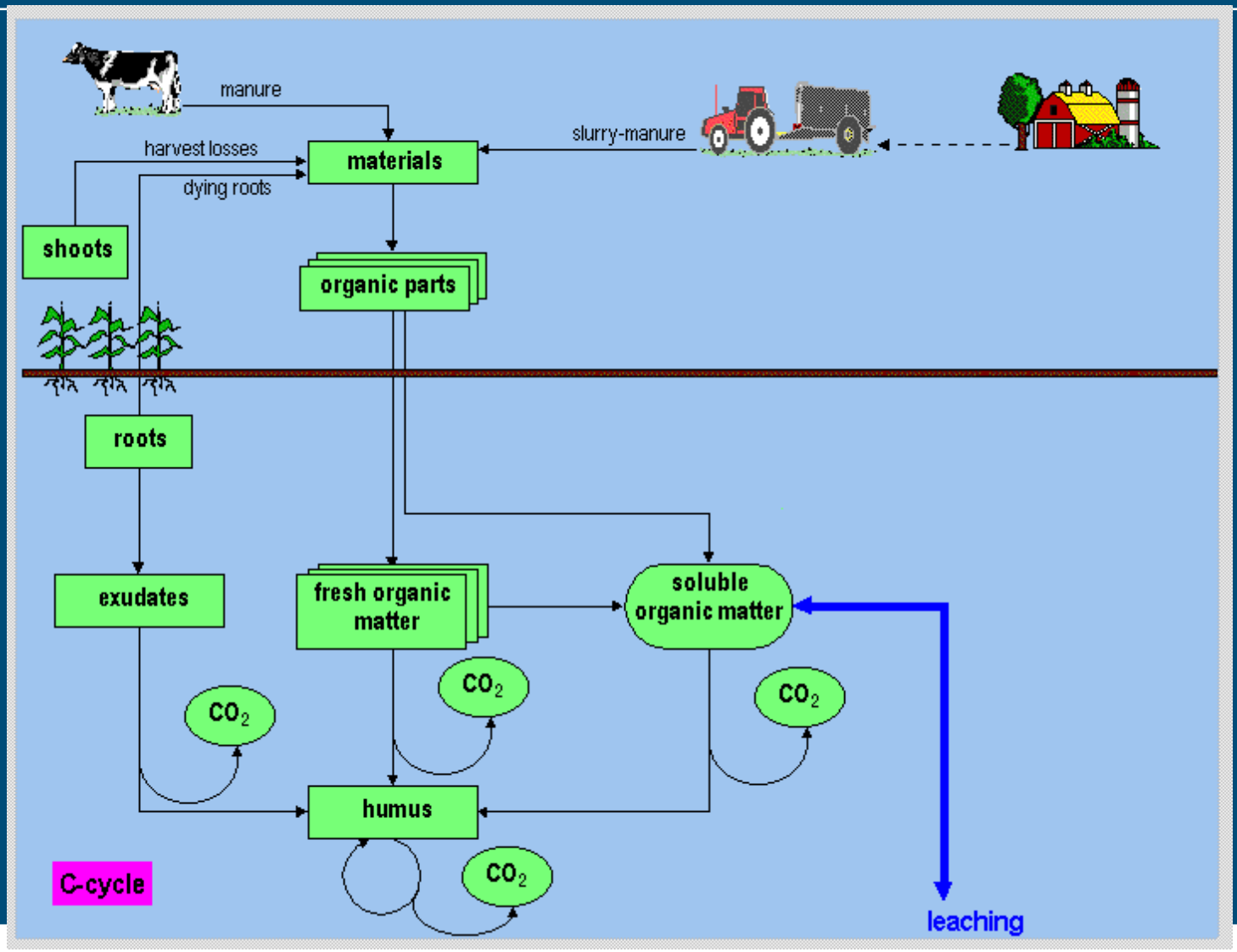
ANIMO in this project:

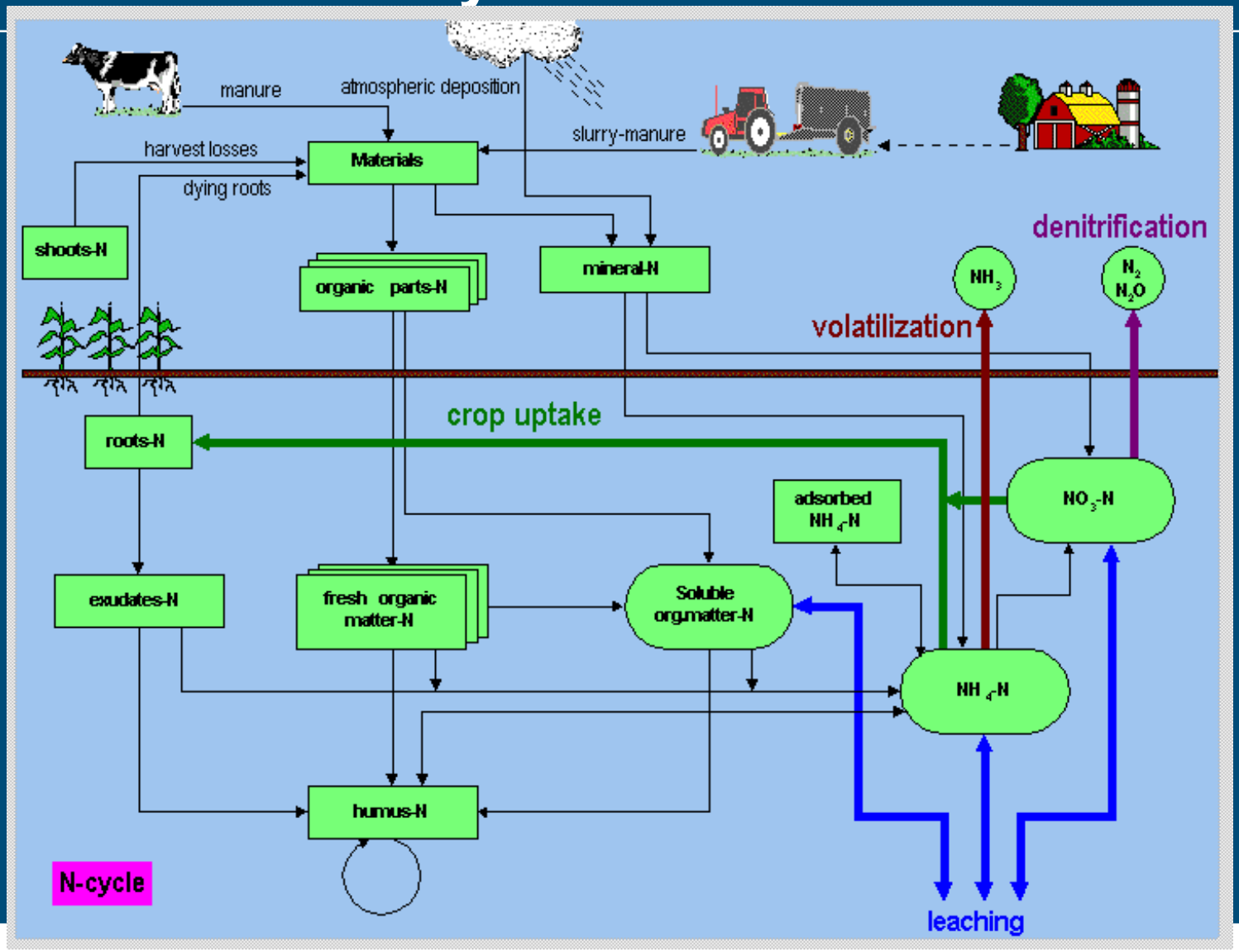
- crucial feature of ANIMO for simulations of processes in peat soils:

- nutrient cycles are based on the carbon cycle

ANIMO model: C-cycle



ANIMO model: N-cycle



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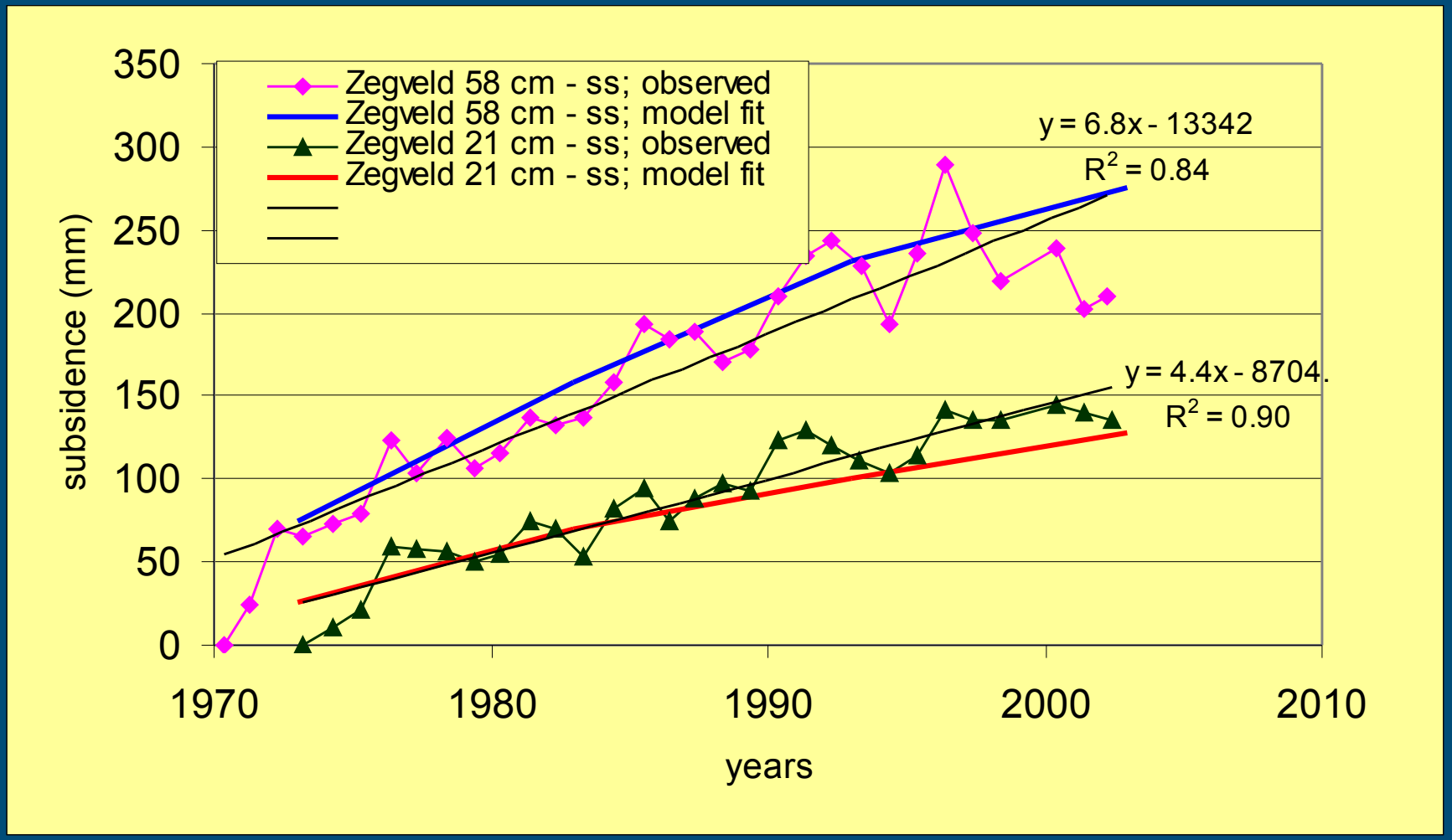
New processes:

- macropore transport
- changing of soil profile due to disappearance of peat
- effects of hysteresis in alternating swelling and shrinking of peat
- evolution and emission of CO_2, N_2O and CH_4

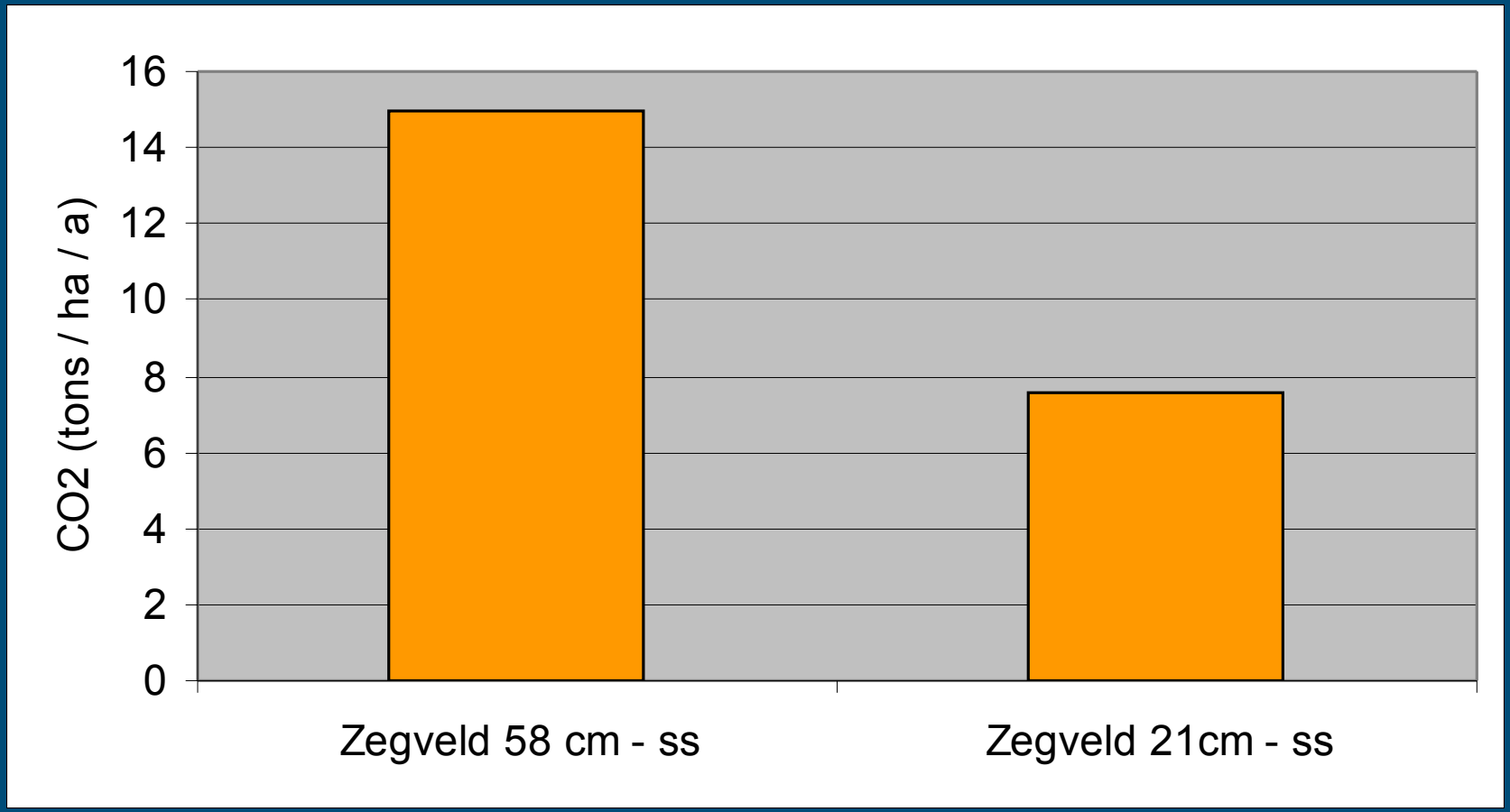
Model results:

- Preliminary: no real calibration and validation; only rough tuning
- Zegveld, experimental site in The Netherlands:
  - Shallow drainage: 21 cm below ss
  - Deeper drainage: 58 cm below soil surface
- Compared with 30 years measurement of subsidence

Subidence modelled

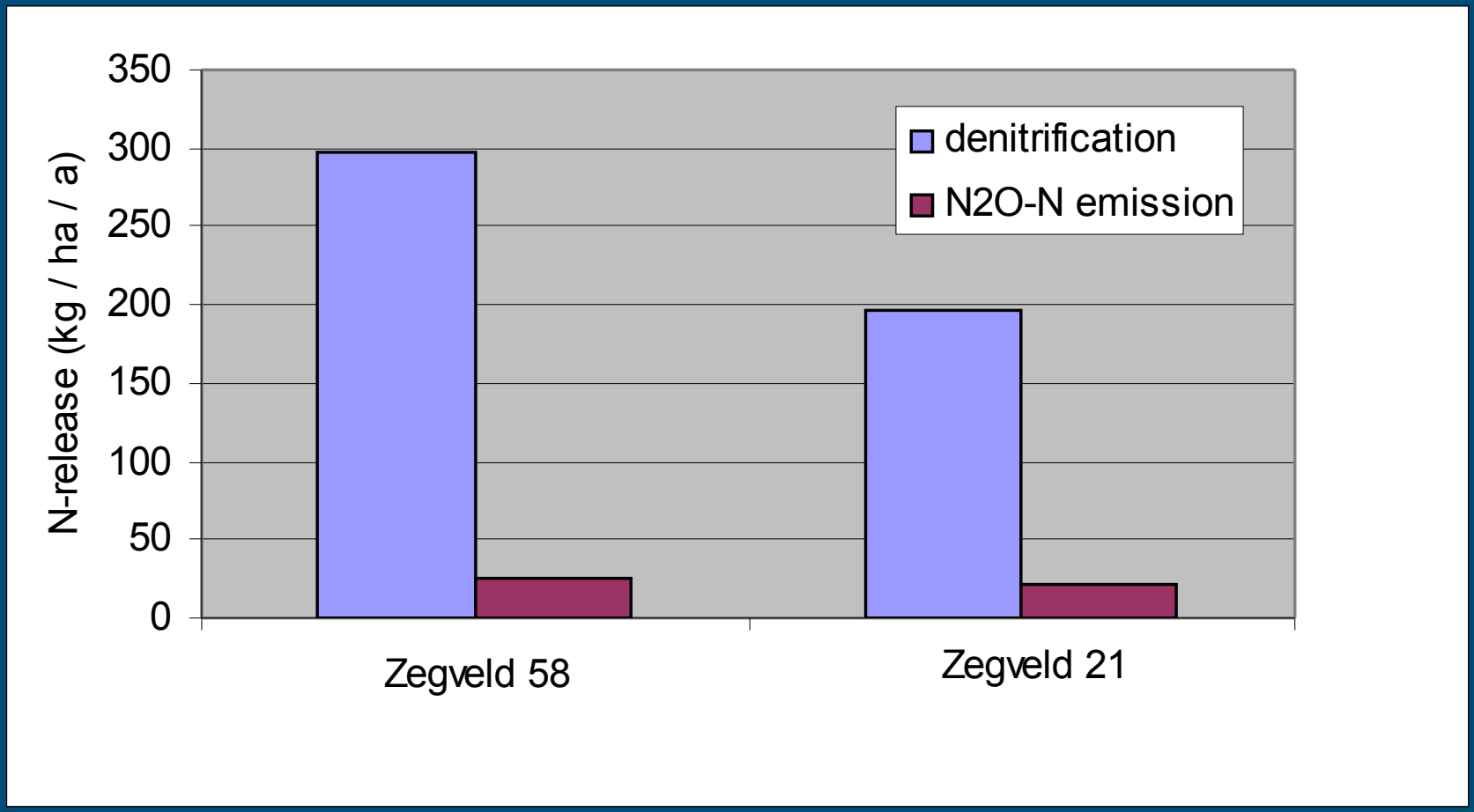


30-yearly average CO_2-emission; model result

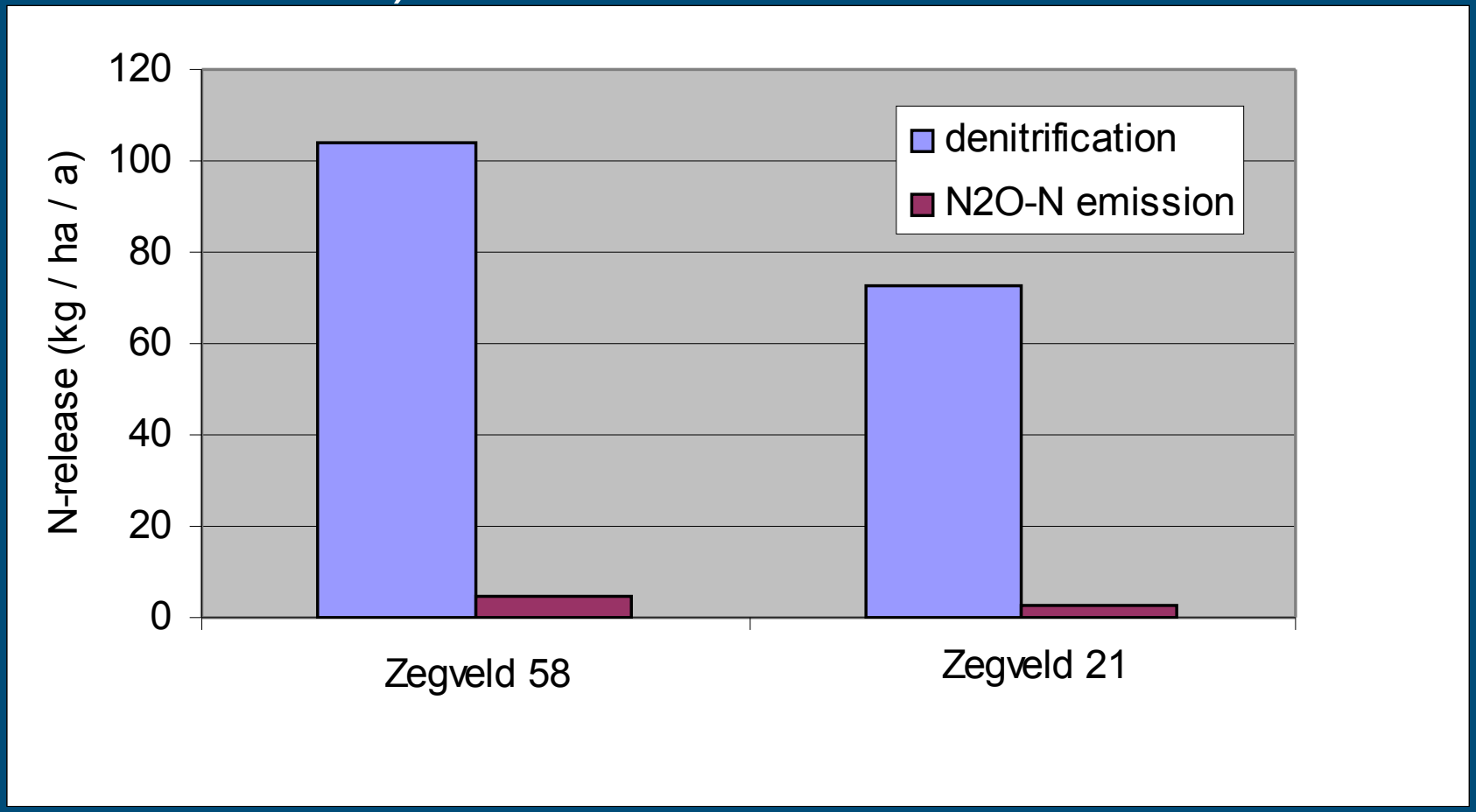


Denitrification and N_2O-emission: fertilized

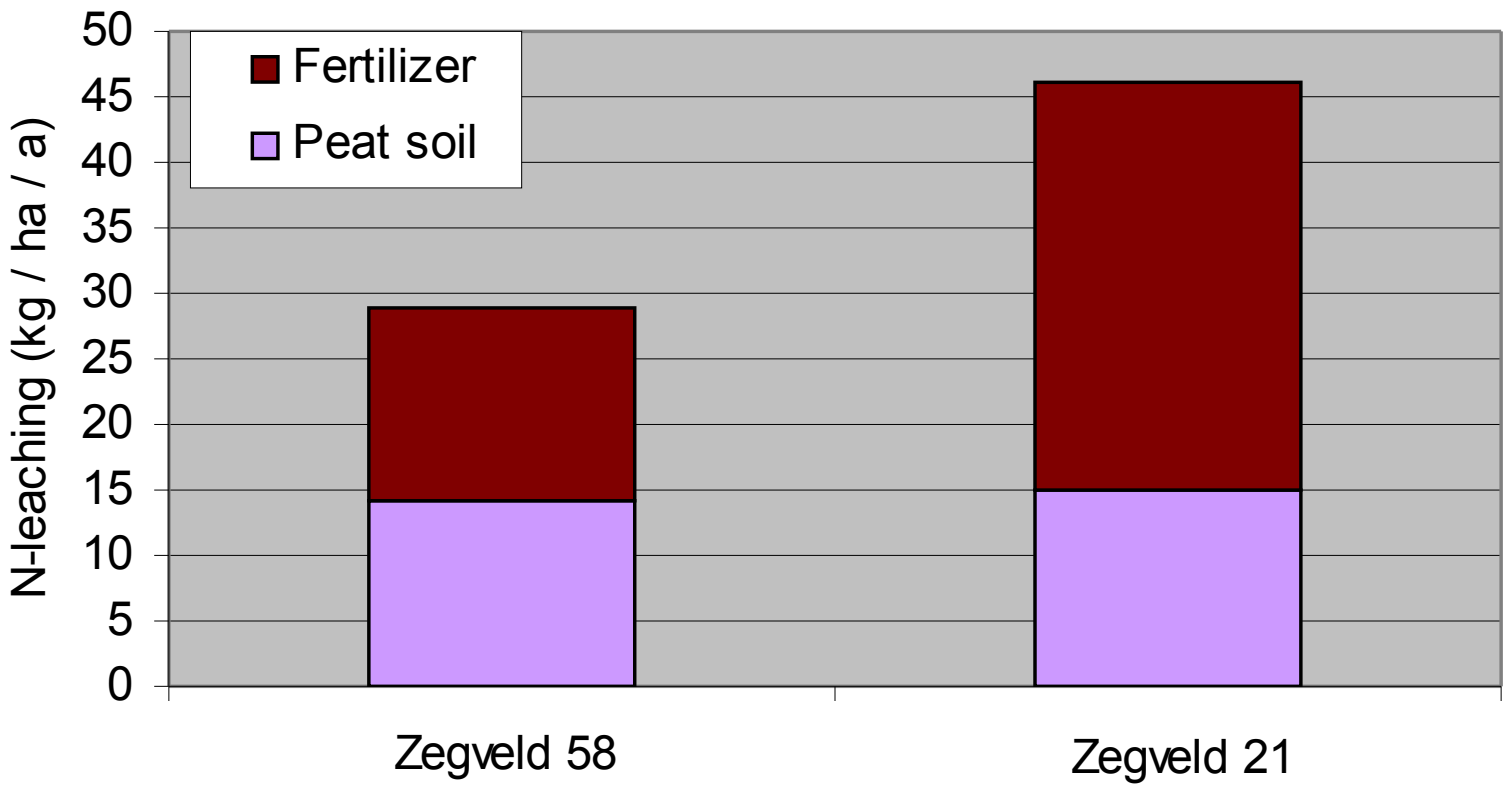
(emperical relation)



Denitrification and N_2O-emission: not fertilized (emission factor)

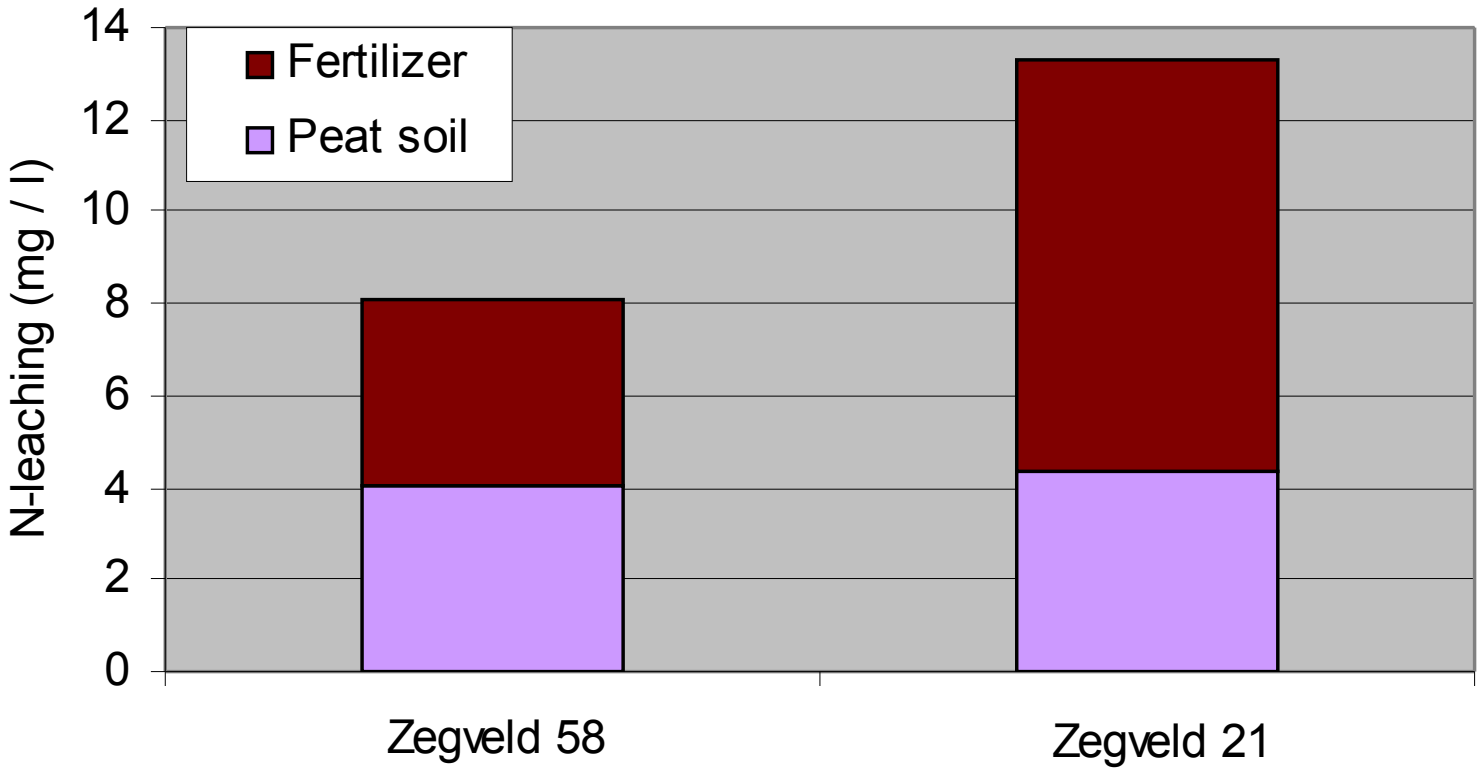


N-leaching to surface water: sources



N-leaching to surface water:

yearly average leaching concentration



Conclusions

- Model is promissing
- Nitrous oxide and methane evolution are lacking
- Calibration and validation against measurements from field experiments of the 6 countries have to proof its value
- Highest value is in comparisment between scenario results

Thank you for your attention

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