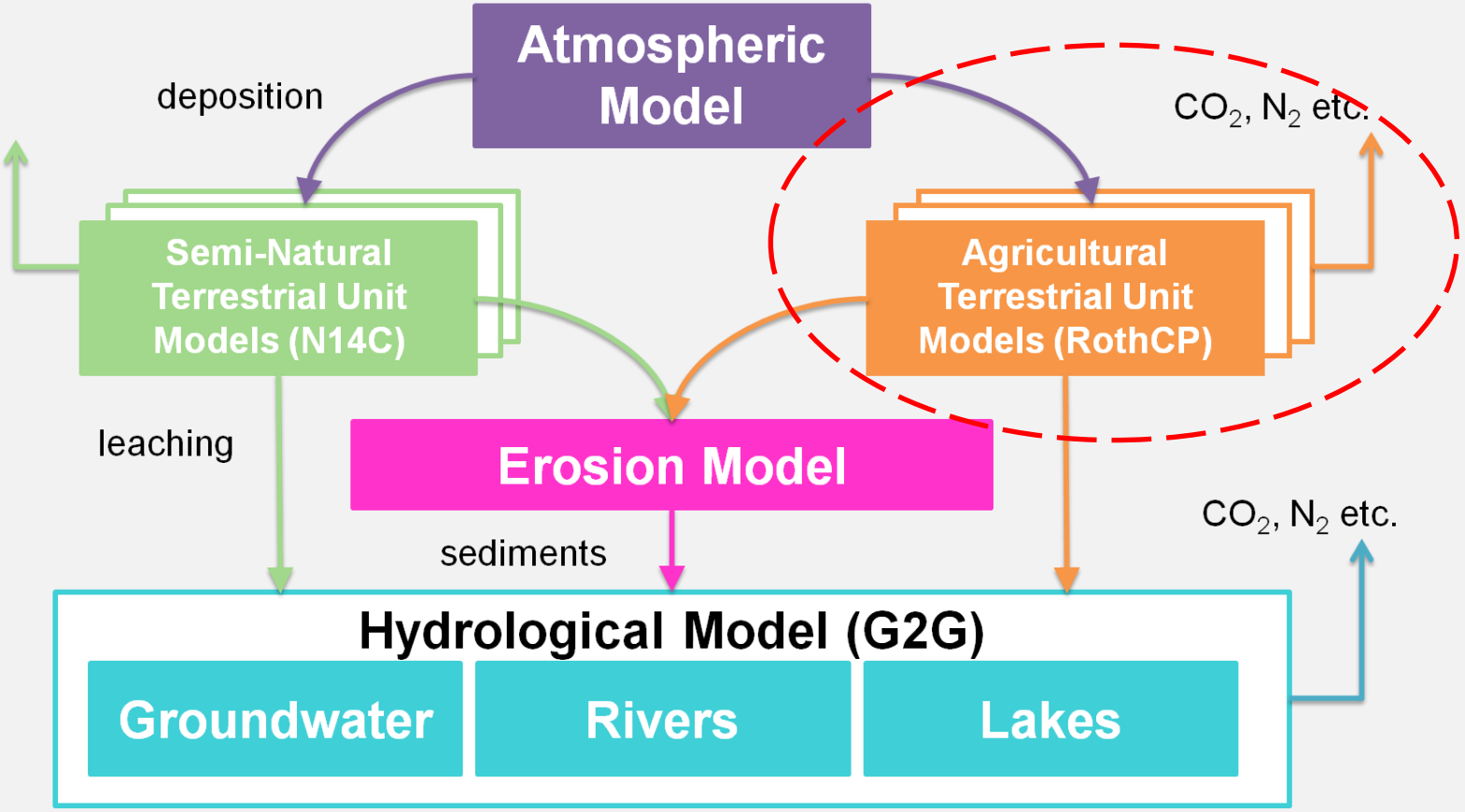
LTLS-Macronutrient cycling-Agriculture

Shibu Muhammed

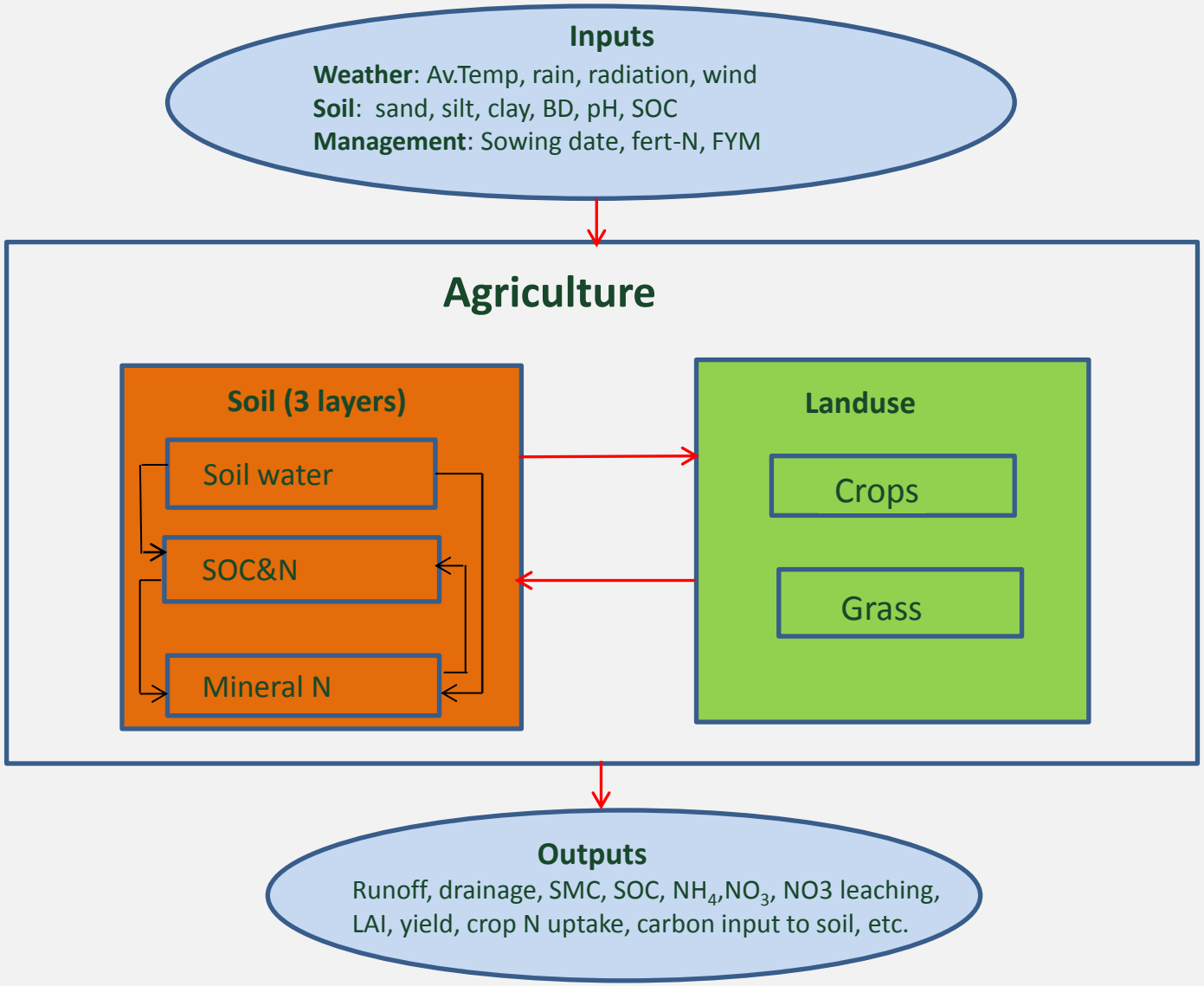
Andy Whitmore

Lianhai Wu

Integrated Modelling-Agriculture



Agricultural Model (monthly time step)



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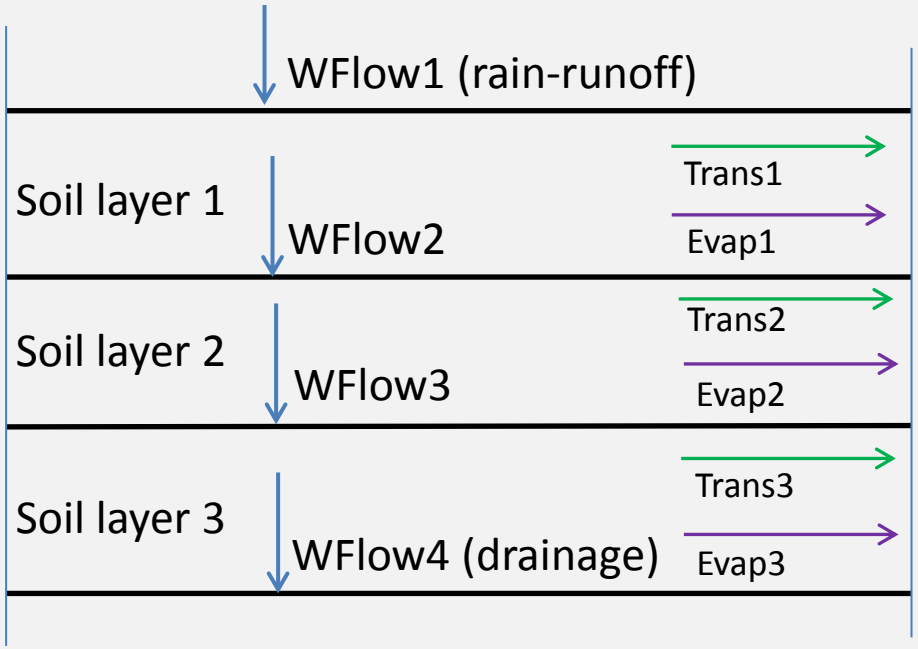
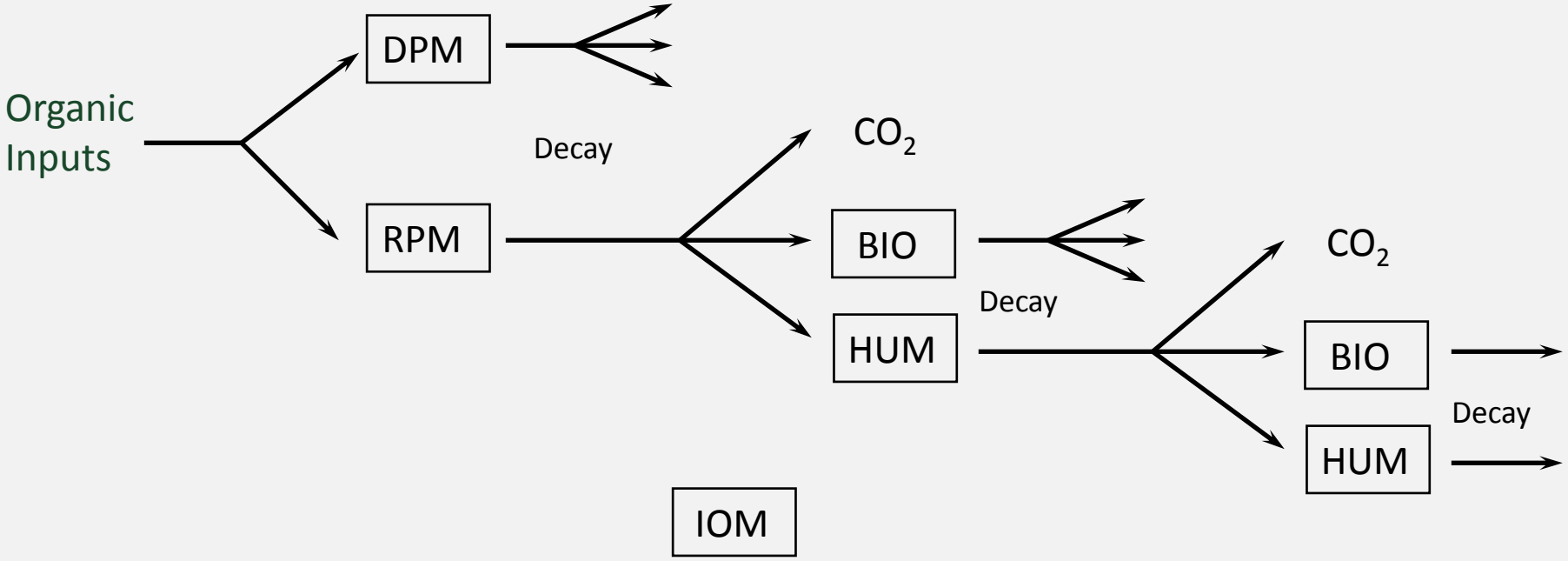
ROTHAMSTED RESEARCH

Soil Water

- Based on ‘Tipping bucket’ approach
- Uses a daily time step
- Inputs averaged daily; outputs summed up by monthly
- NO_3N moves with water flows



Soil organic carbon and N (ROTH-C &N)



RPM : Resistant Plant Material

DPM : Decomposable Plant Material

BIO : Microbial Biomass

HUM : Humified OM

IOM : Inert Organic Matter

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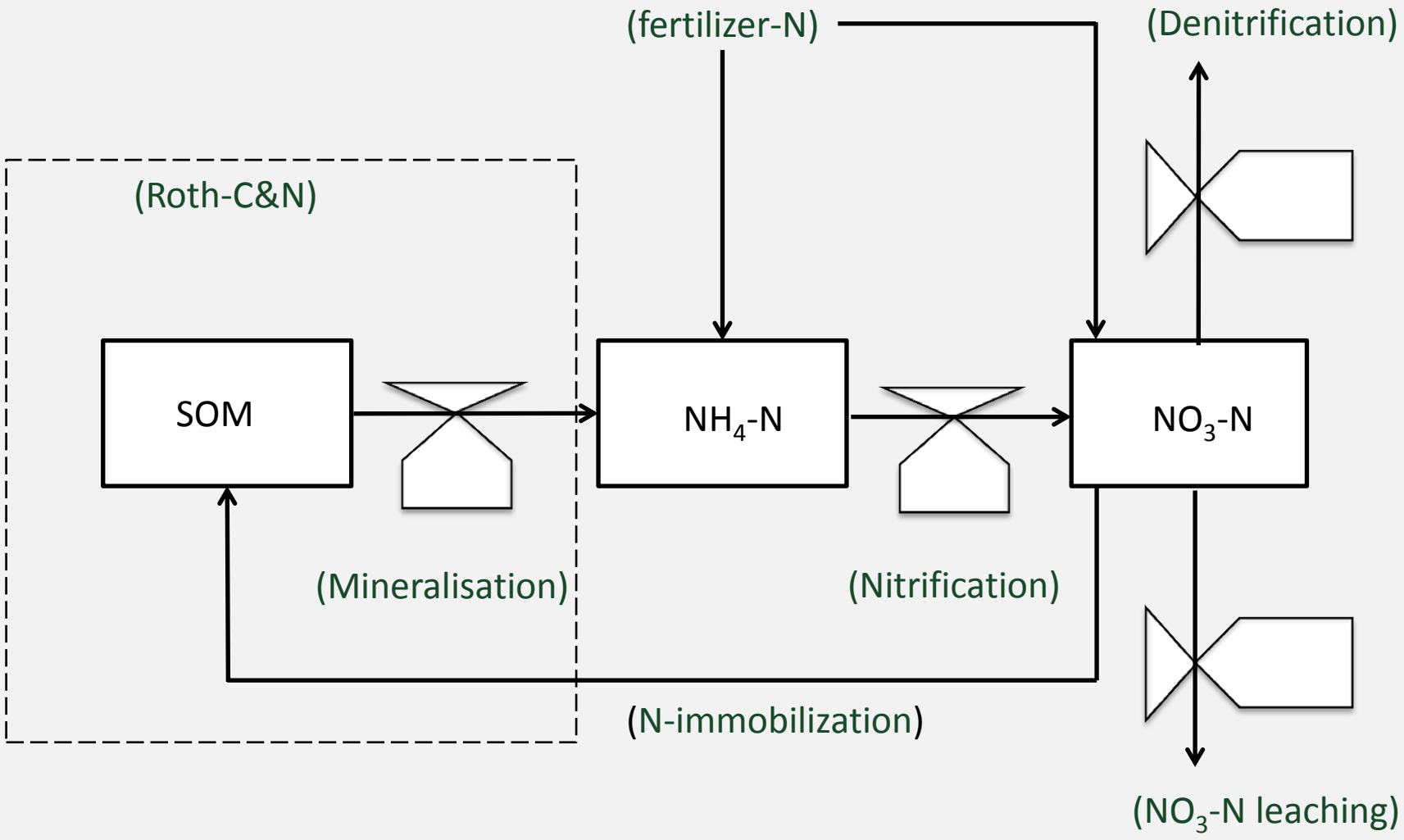
ROTHAMSTED RESEARCH

Mineral N



SOM : Soil organic matter NH4-N : Ammoniacal N NO_3-N : Nitrate N

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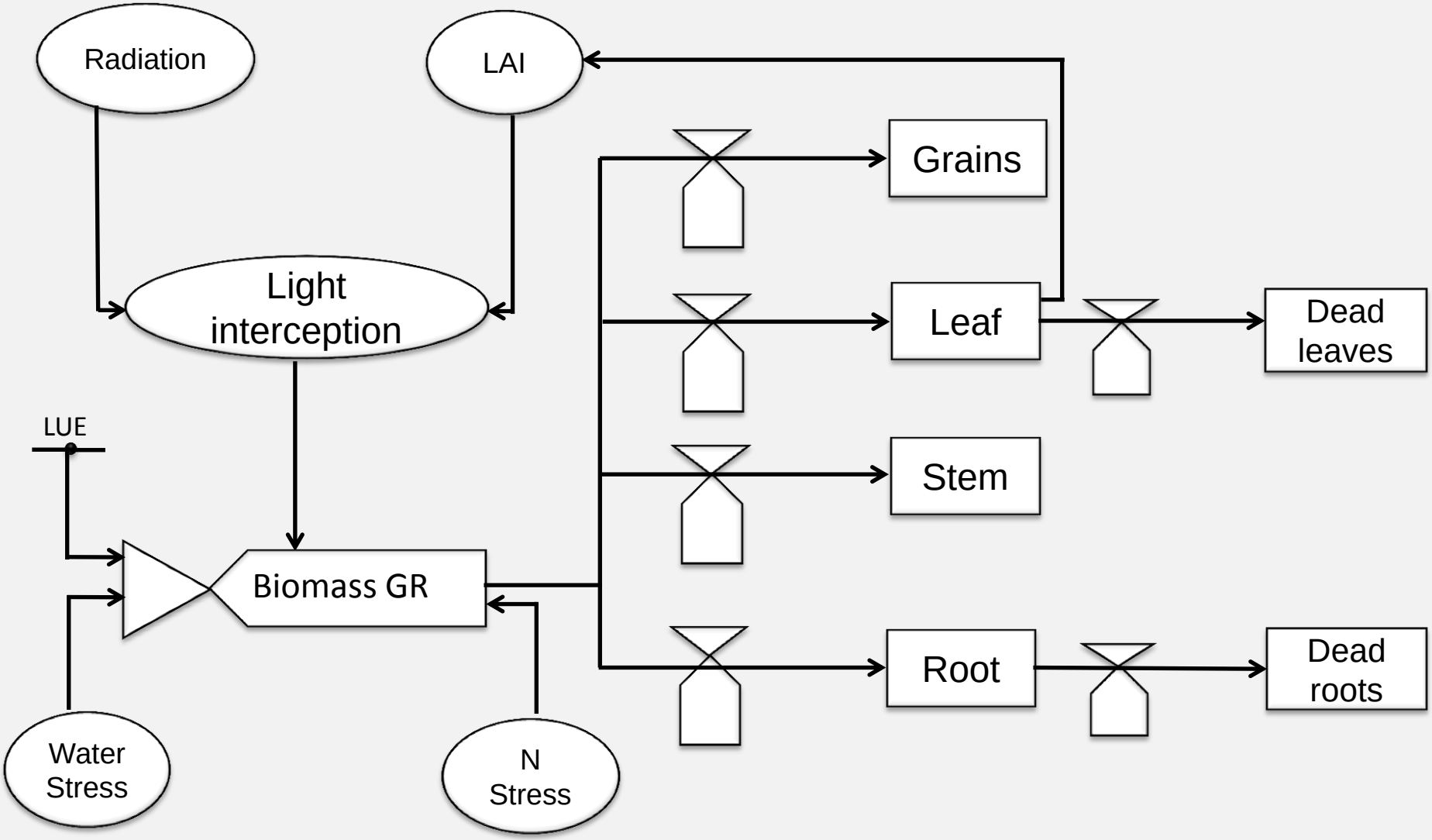
ROTHAMSTED RESEARCH

Crop growth



LUE: Light use efficiency

LAI: Leaf area index

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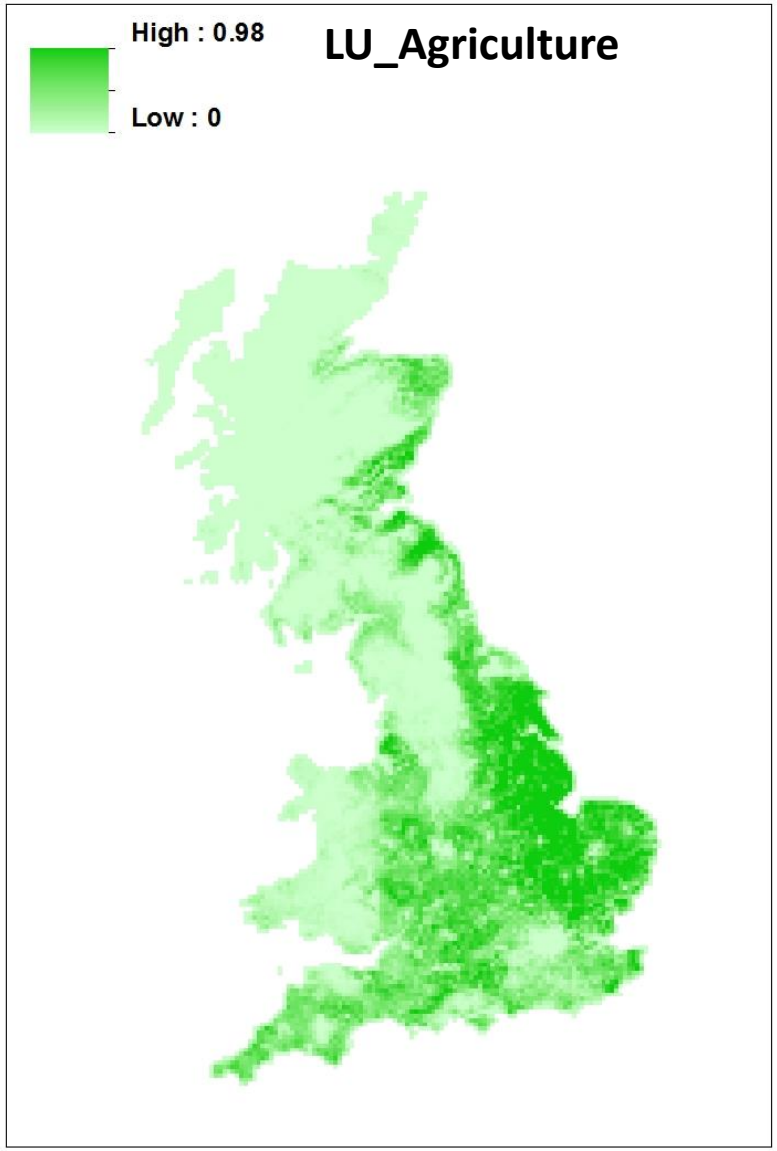
ROTHAMSTED RESEARCH

Model simulation

- Run the model for 35136 grids (5 x 5 km)
- Model was run for 1971-2000
- Used the agricultural Landuse information from Landcover map 2007
- Soil map from HWSD, Outputs from semi-natural system
- Met data from UKCP09 –gridded monthly
- Model was run for winter wheat



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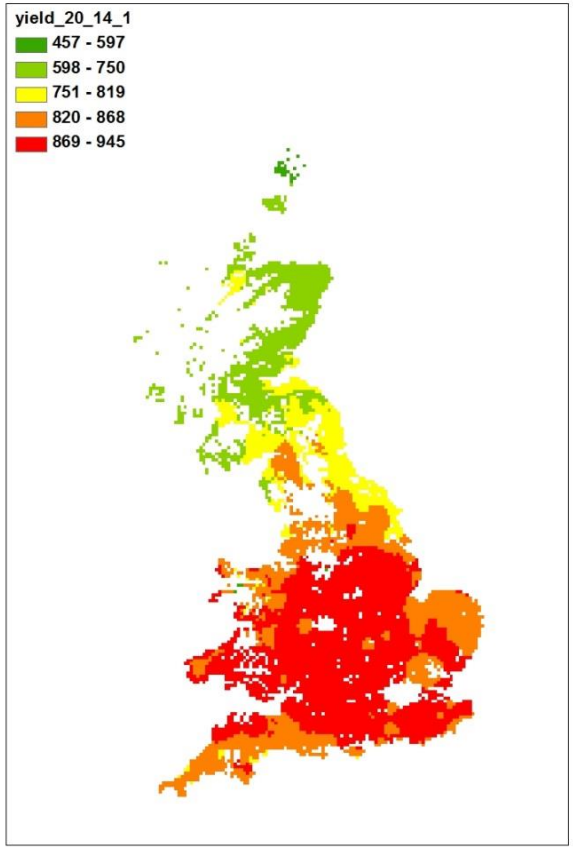
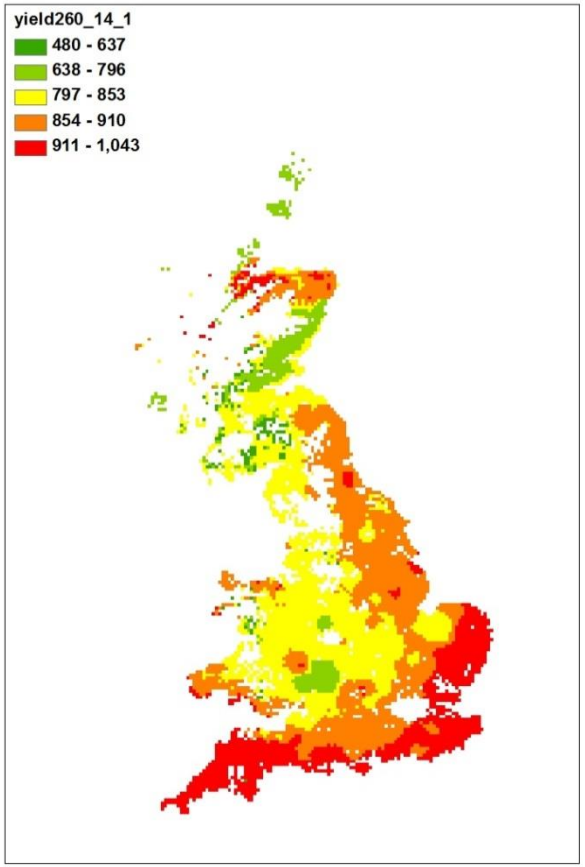
ROTHAMSTED RESEARCH

Wheat yield

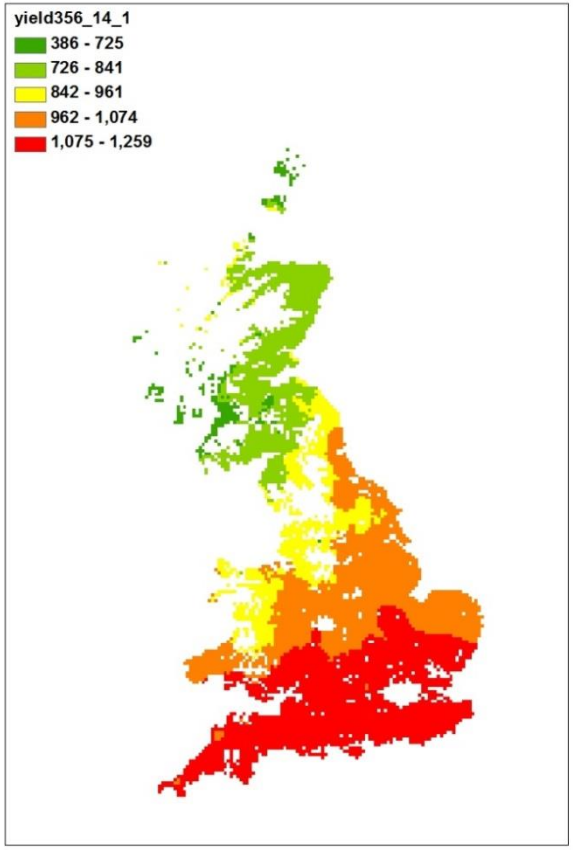
1972



1992



2000



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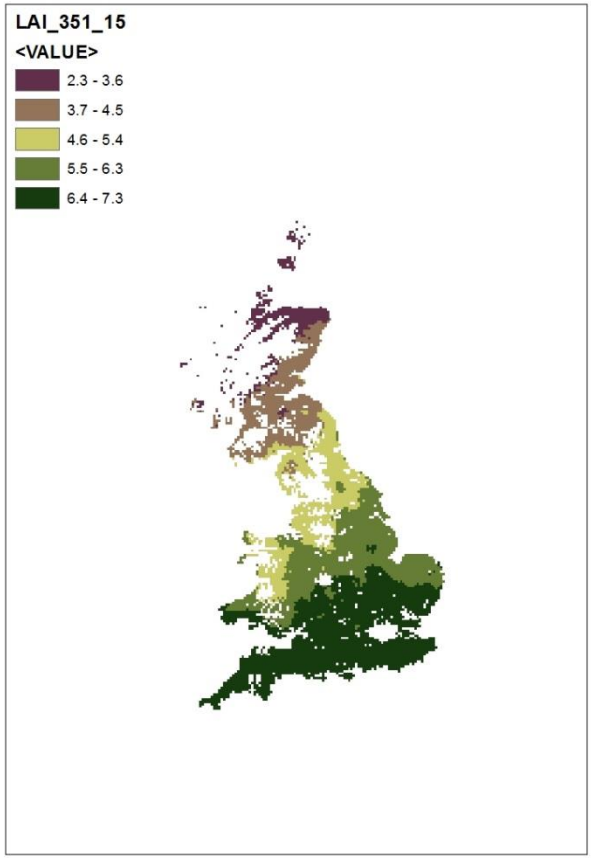
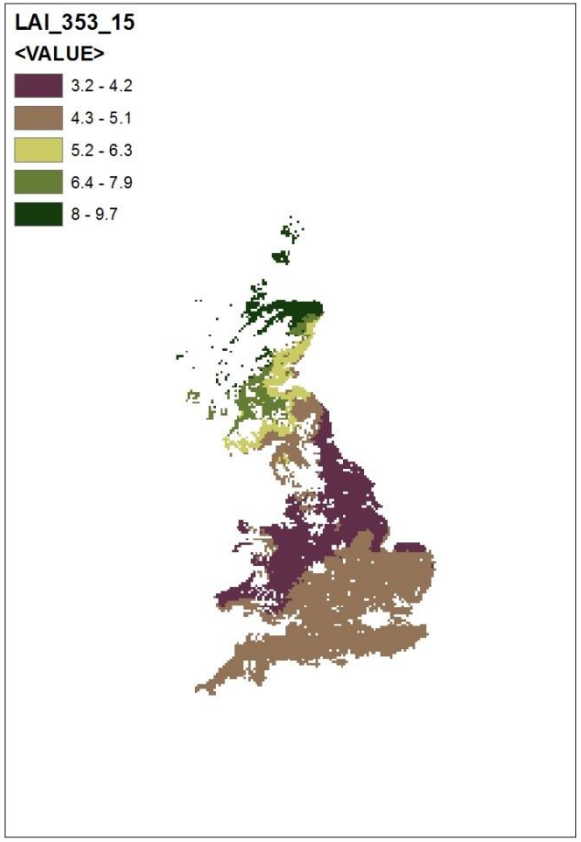
ROTHAMSTED RESEARCH

Leaf area index

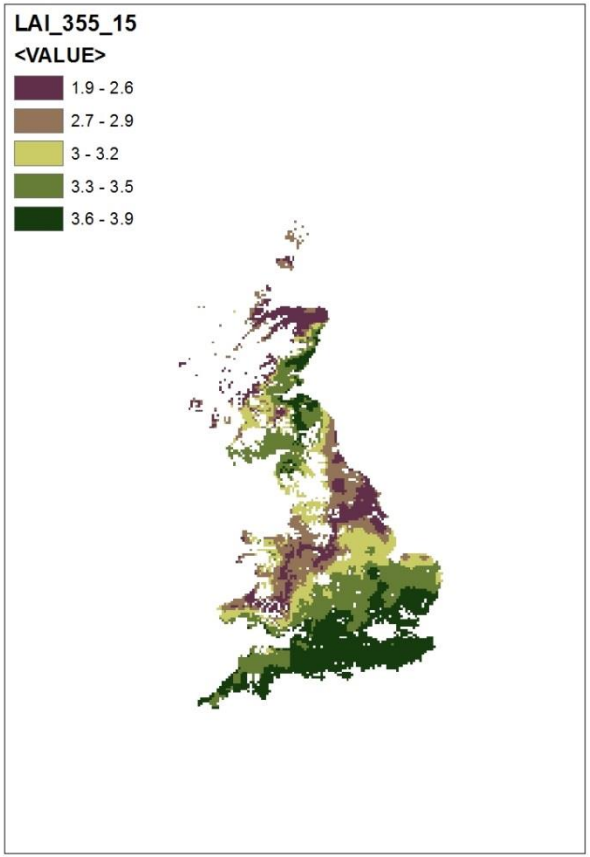
March 2000



May 2000



July 2000



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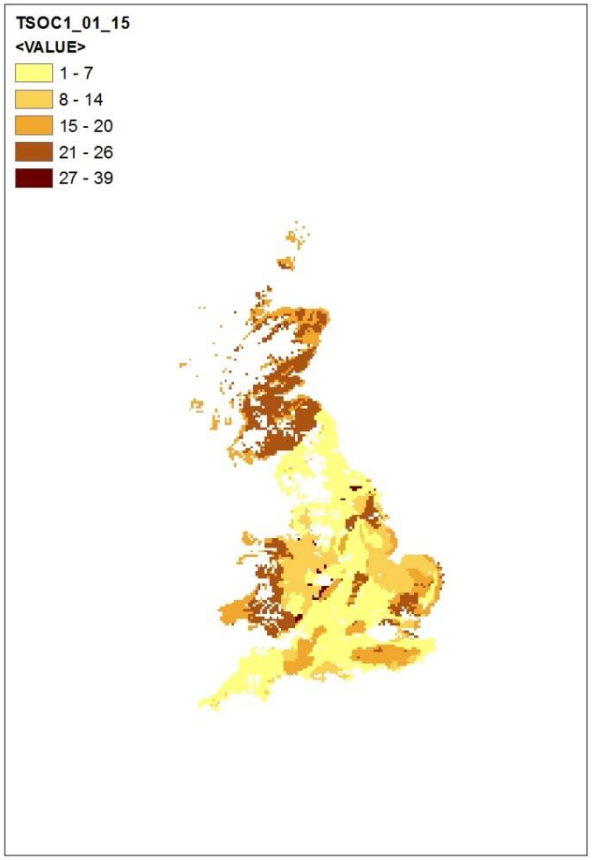
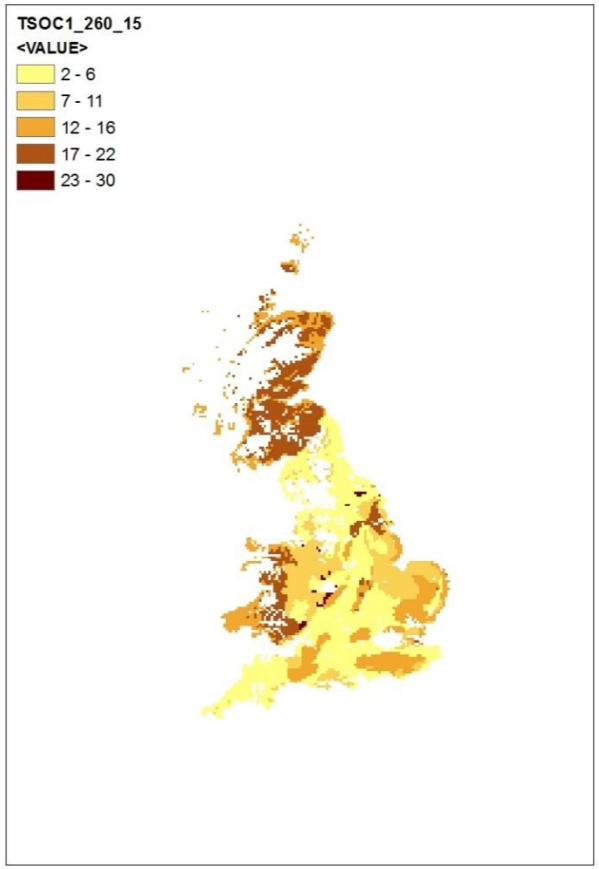
Soil organic carbon

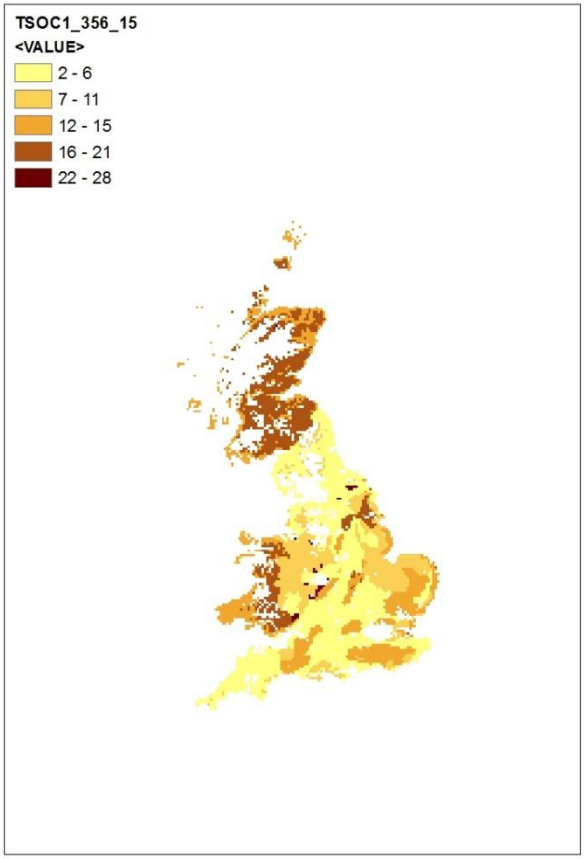
1971



1992



2000



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ROTHAMSTED RESEARCH

NO3-N leaching

January 2000

May 2000

September 2000

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To do next

- Include DOC
- Include grassland model
- Include Phosphorus model

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