Fire safety

Water Closets / fobs

Tea, coffee, lunch in the atrium

Evening meal at Lancaster House Hotel

Introductions

The Macronutrient Cycles Programme

NERC-funded (£9.5m) + Scottish Government

http://macronutrient-cycles.ouce.ox.ac.uk

MACRONUTRIENT CYCLES
A Science Meeting at the Royal Society of London on June 15th and 16th , 2016

LTLS is one of four Consortia
It ran from 2012-2015   *…but continues…*

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LTLS   *www.ltls.org.uk*

Website lists all participants

NERC Macronutrient Cycles Programme
Consortium Grant

LTLS

Analysis and simulation of
Long-Term / Large-Scale interactions
of C, N and P
in UK land, freshwater and atmosphere

E Tipping *CEH*
JF Boyle *U Liverpool*   **RC Helliwell** *JHI**
J Quinton *Lancaster U*   **NL Rose** *UCL*
ME Stuart *BGS*   **S Ullah** *U Keele*
AP Whitmore *Roth Res*   **CL Bryant** *NERC RCF*

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* Funded by the Scottish Government

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LTLS questions

- Over the last 200 years, what have been the temporal responses of soil C, N and P pools in different UK catchments to nutrient enrichment?

- What have been the temporal responses of C, N and P transfers from land to the freshwater systems and estuaries?

- How has freshwater and estuarine biodiversity responded to increased ecosystem productivity engendered by nutrient enrichment at different locations?

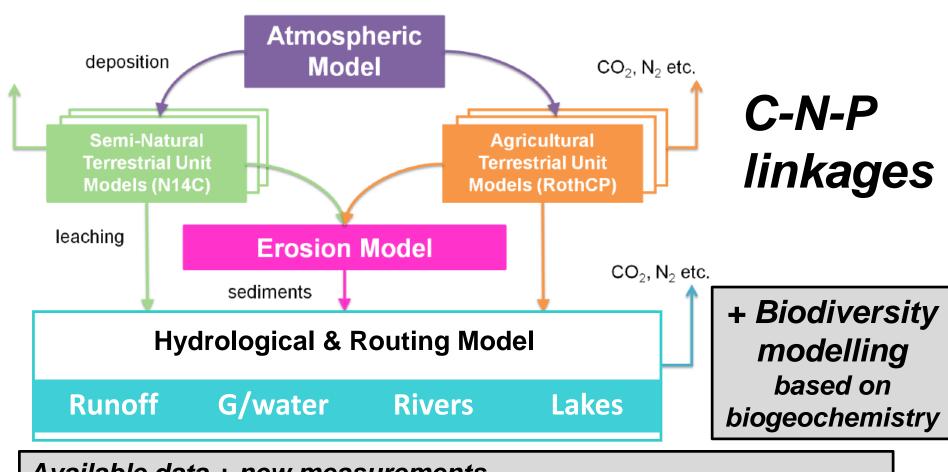**...or, how did we get to where we are today?**

Answered by:

integrated modelling analysis,
aimed at accounting for observable present element
pools and fluxes in different UK catchments
in terms of their nutrient enrichment histories

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LTLS research activities

Atmospheric Model

deposition

CO_2, N_2 etc.

Semi-Natural Terrestrial Unit Models (N14C)

Agricultural Terrestrial Unit Models (RothCP)

leaching

Erosion Model

sediments

CO_2, N_2 etc.

Hydrological & Routing Model

Runoff   **G/water**   **Rivers**   **Lakes**

C-N-P linkages

+ Biodiversity modelling based on biogeochemistry

Available data + new measurements

soil denitrification	*soil survey (^{14}C)*
river transport (^{14}C)	*lakes*
fuel experiments	*bracken survey*
NPP	*peat survey*

LTLS scale and resolution

5 km x 5 km Square

Sub-divided by land cover

Timesteps

Atmospheric deposition	annual
Semi-natural terrestrial	3-monthly
Agriculture terrestrial	monthly
Erosion	monthly
Rivers, lakes	2-hourly / monthly
Groundwater	annual

UK
244,000 km^2
~ 10,000 squares

Time-period
-10000 $\rightarrow$ 1800-2100

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Some issues we might be dealing with

- Response of soil C storage to N, P, climate
- Terrestrial plant species richness
- Upland surface waters – DOC, NO_3-N, pH
- Effects of land use change e.g. afforestation
- Land-atmosphere GHG exchange
- Agricultural impacts on river nutrients
- Sewage impacts on river nutrients
- Responses of river ecology to macronutrients
- Impacts of macronutrients on lakes, and lake processing
- Nutrient loads to the sea

Please bear these points in mind!

- This modelling is a first step

- Our models are simple, and driven by minimal data

- The predictions are "blind"

- Analysis and publication of results is still in progress

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