

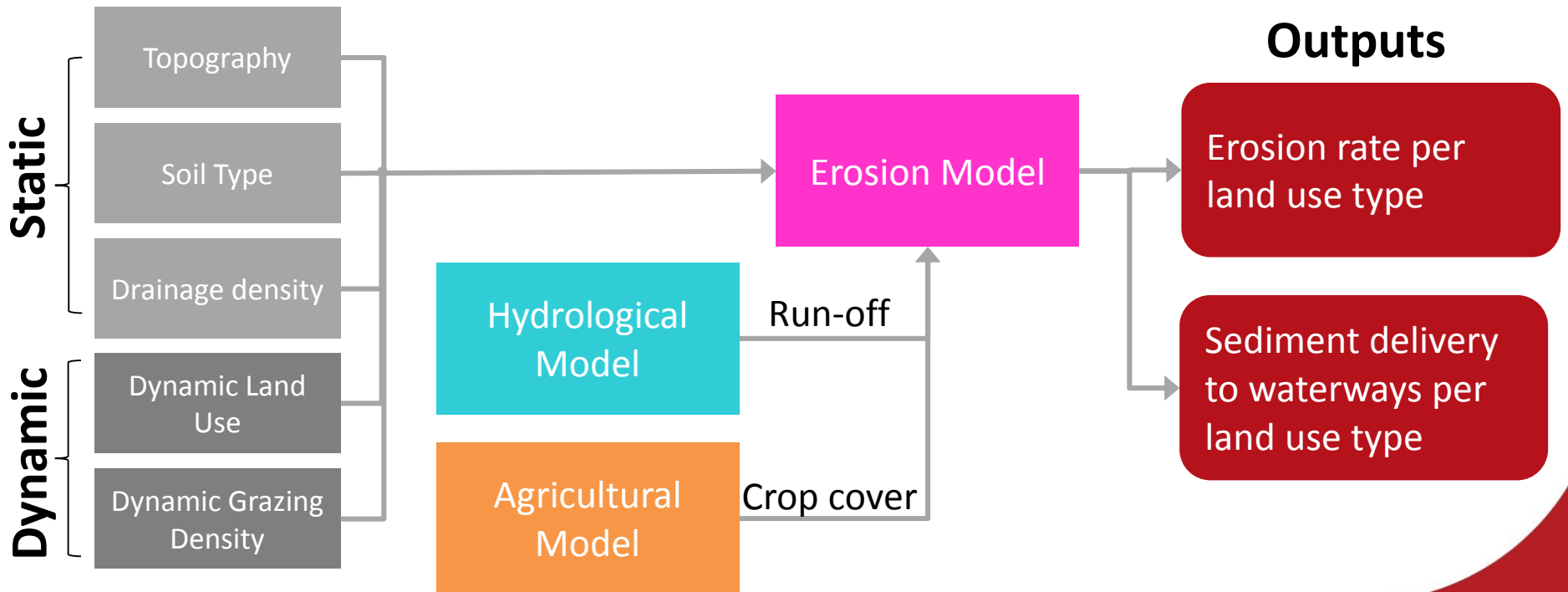


# Past and future UK soil erosion change

15-16 March, LTLS stakeholder meeting  
Jess Davies, John Quinton, Lancaster University

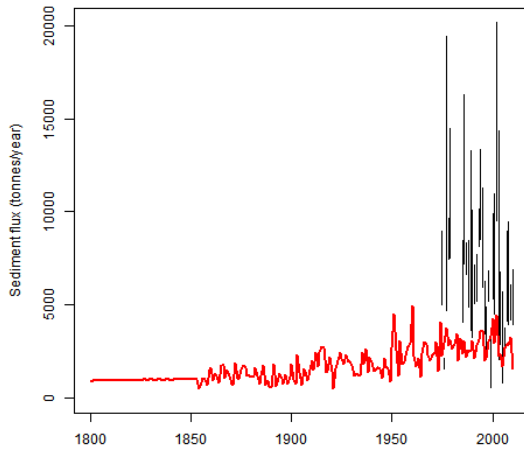
# LTLS Erosion Model Summary

- Simple semi-empirical energy based model
- Not calibrated – few simple parameters
- Grazing represented by relating plant coverage to stocking density



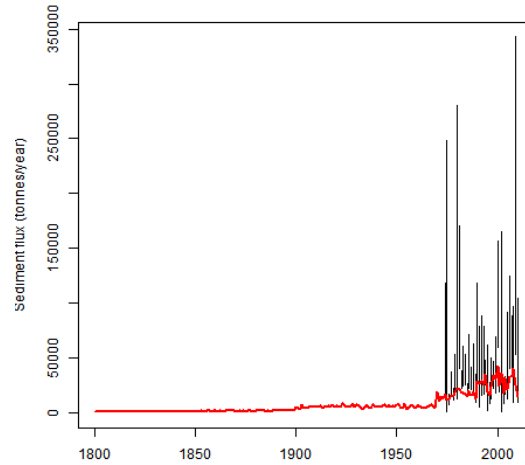
# Erosion model testing: Blind testing – in progress

HMS 8100 AVON at KNAPP MILL PIPE BRIDGE



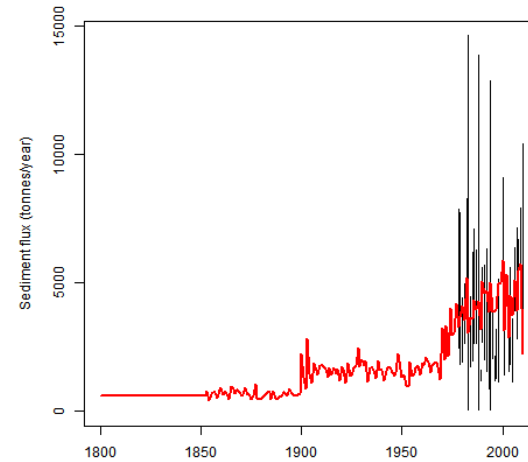
HMS 95% CI black bars; IM red line

HMS 1008 RIBBLE at SAMLESBURY



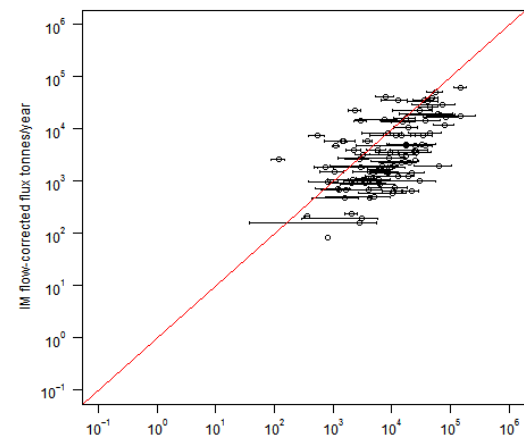
HMS 95% CI black bars; IM red line

HMS 16005 DEE at GLENLOCHAR GAUGING STATION



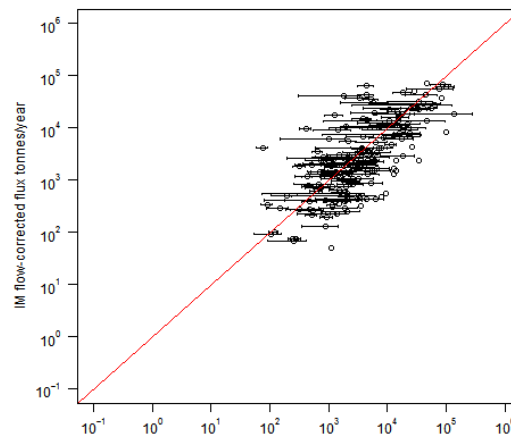
HMS 95% CI black bars; IM red line

Sediment - 1974



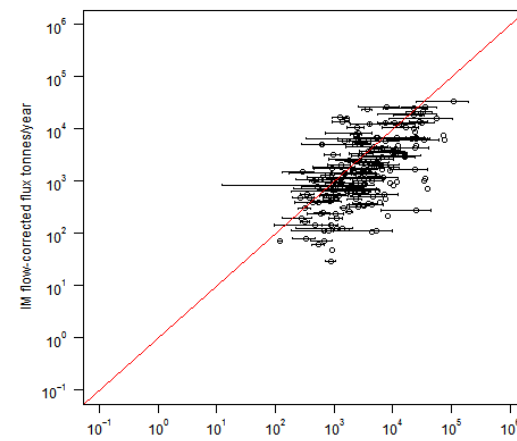
HMS measured flux tonnes/year

Sediment - 1991



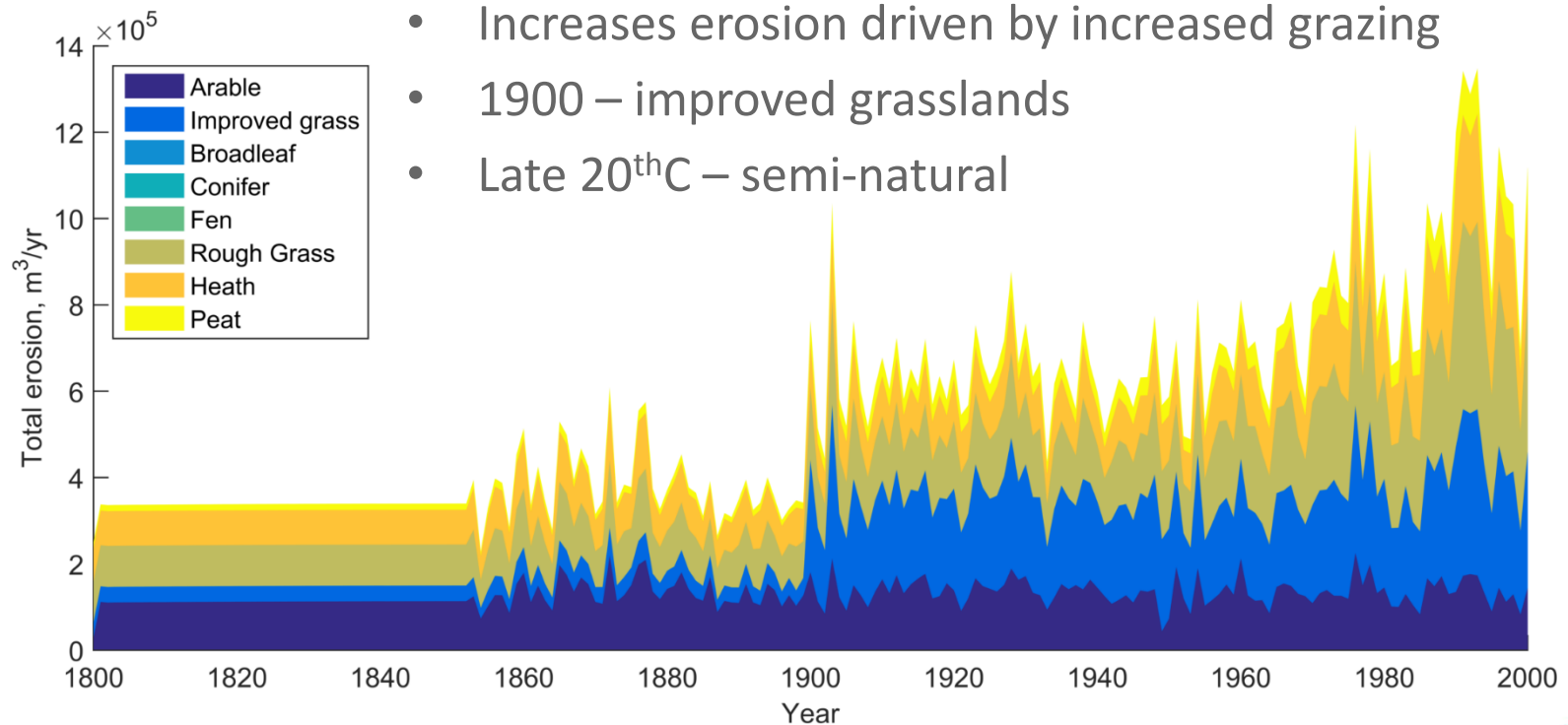
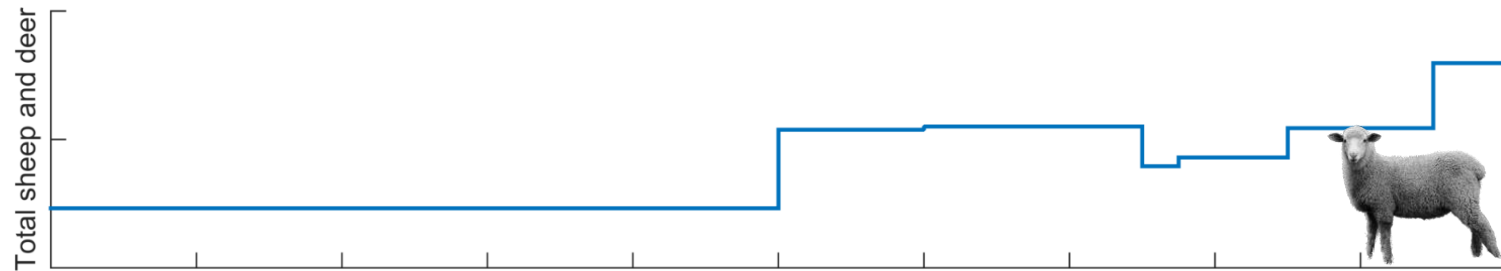
HMS measured flux tonnes/year

Sediment - 2010



HMS measured flux tonnes/year

# Past transfer of soil from land to water via erosion: UK Total



- Increases erosion driven by increased grazing
- 1900 – improved grasslands
- Late 20<sup>th</sup>C – semi-natural

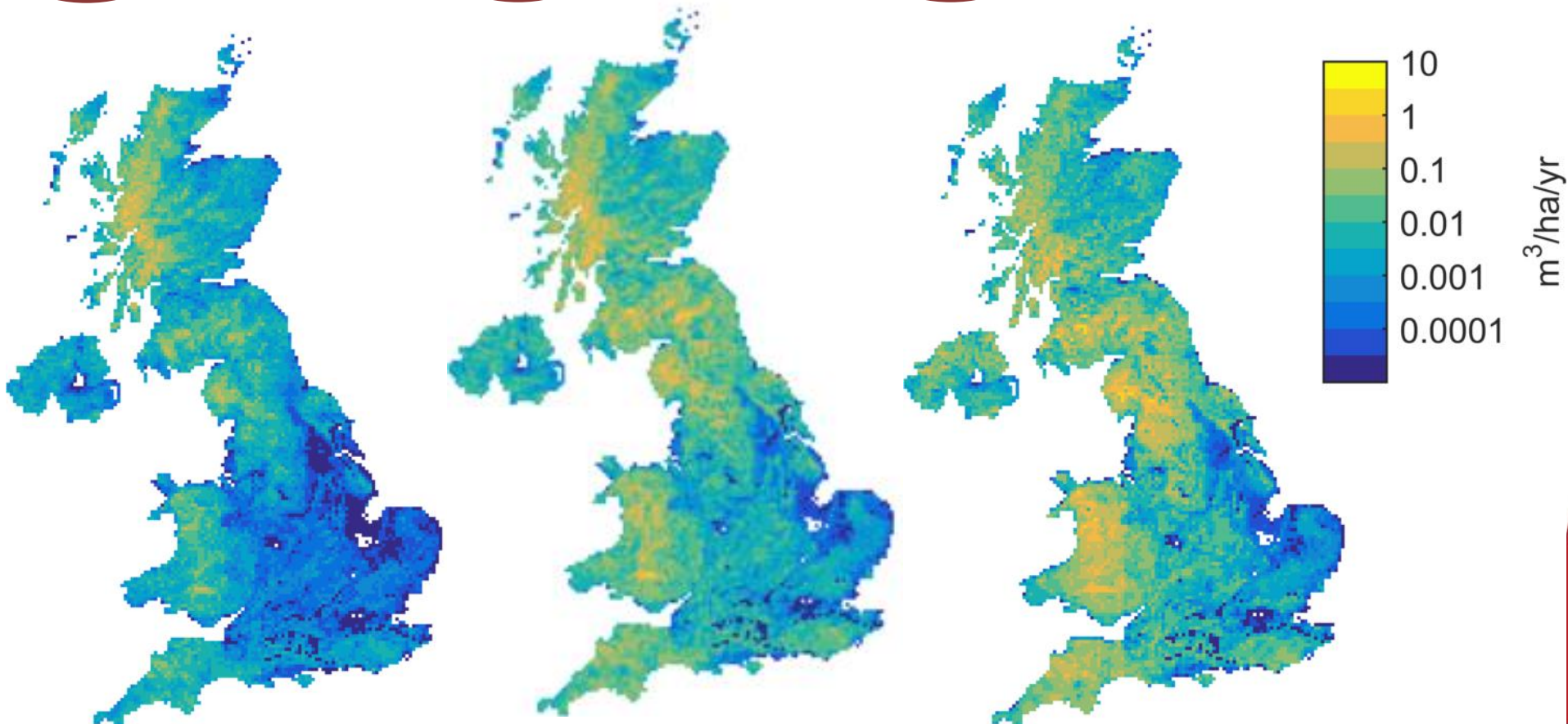
# Past transfer of soil from land to water via erosion

Mean sediment flux on 5km grid

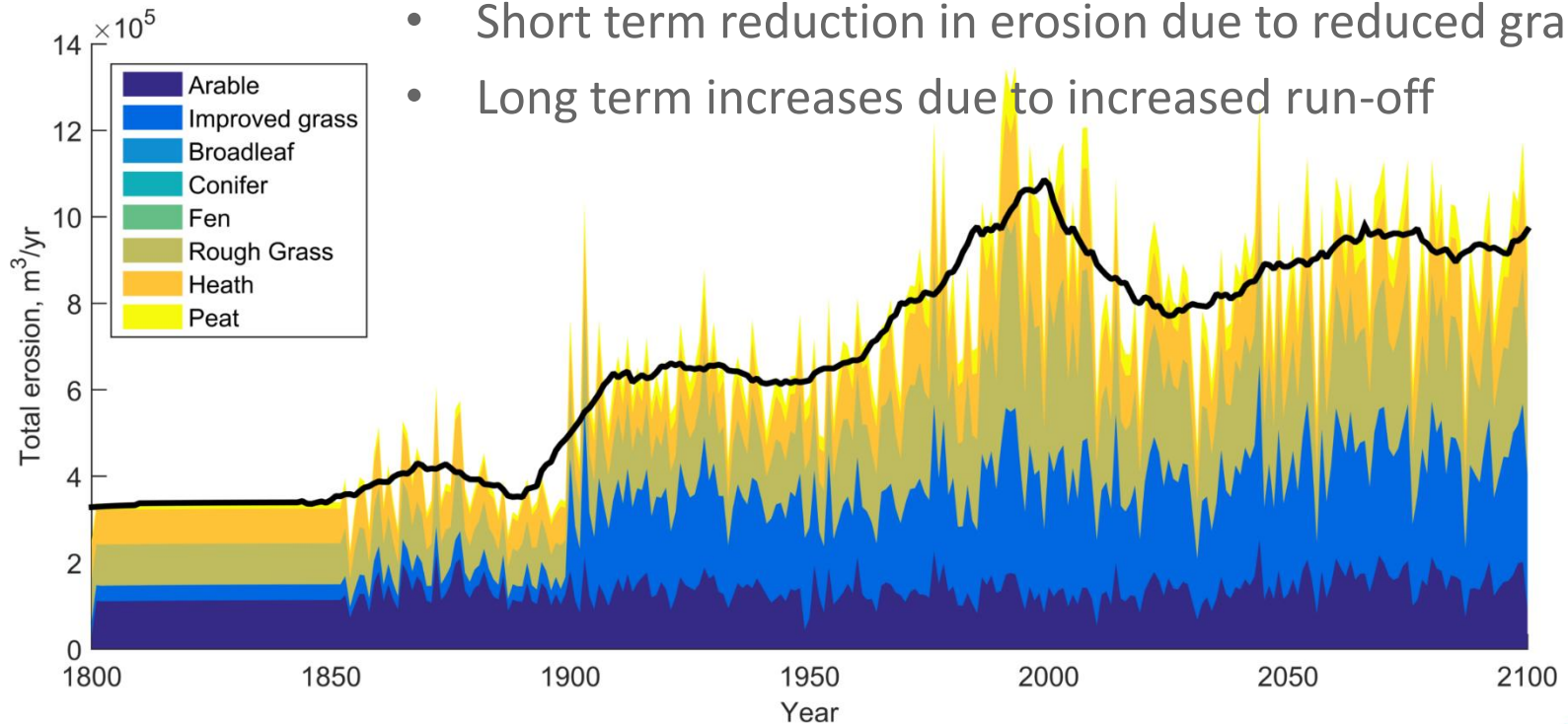
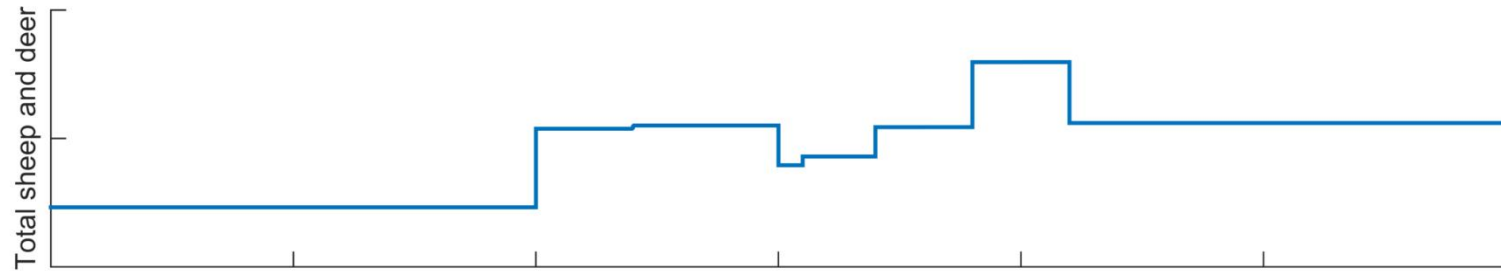
1800

1900

2000



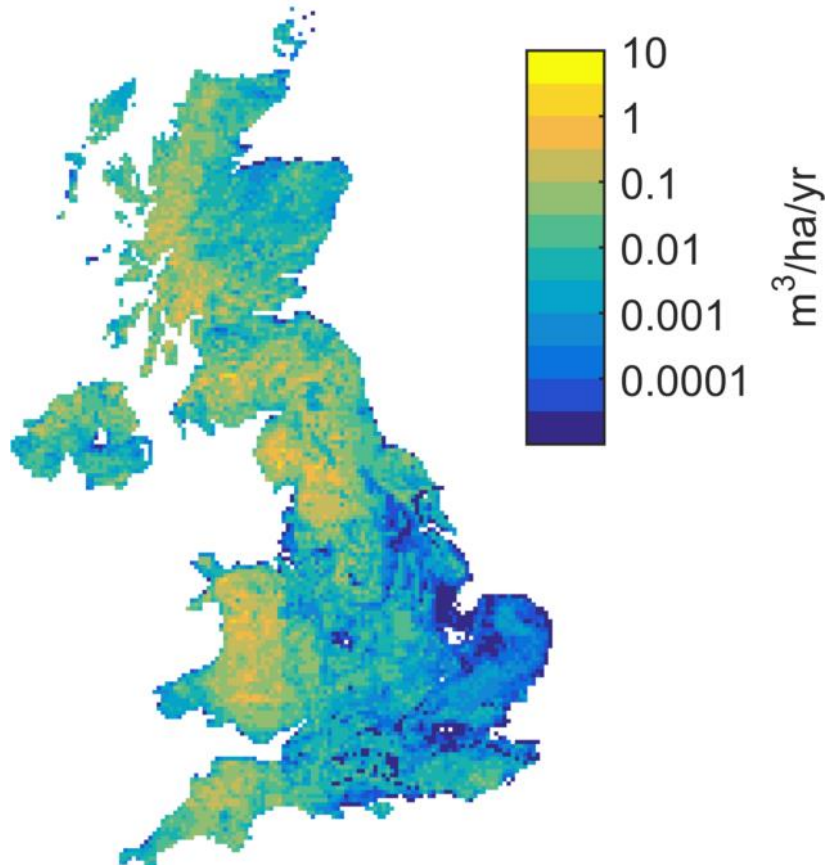
# Future transfer of soil from land to water via erosion: UK Total



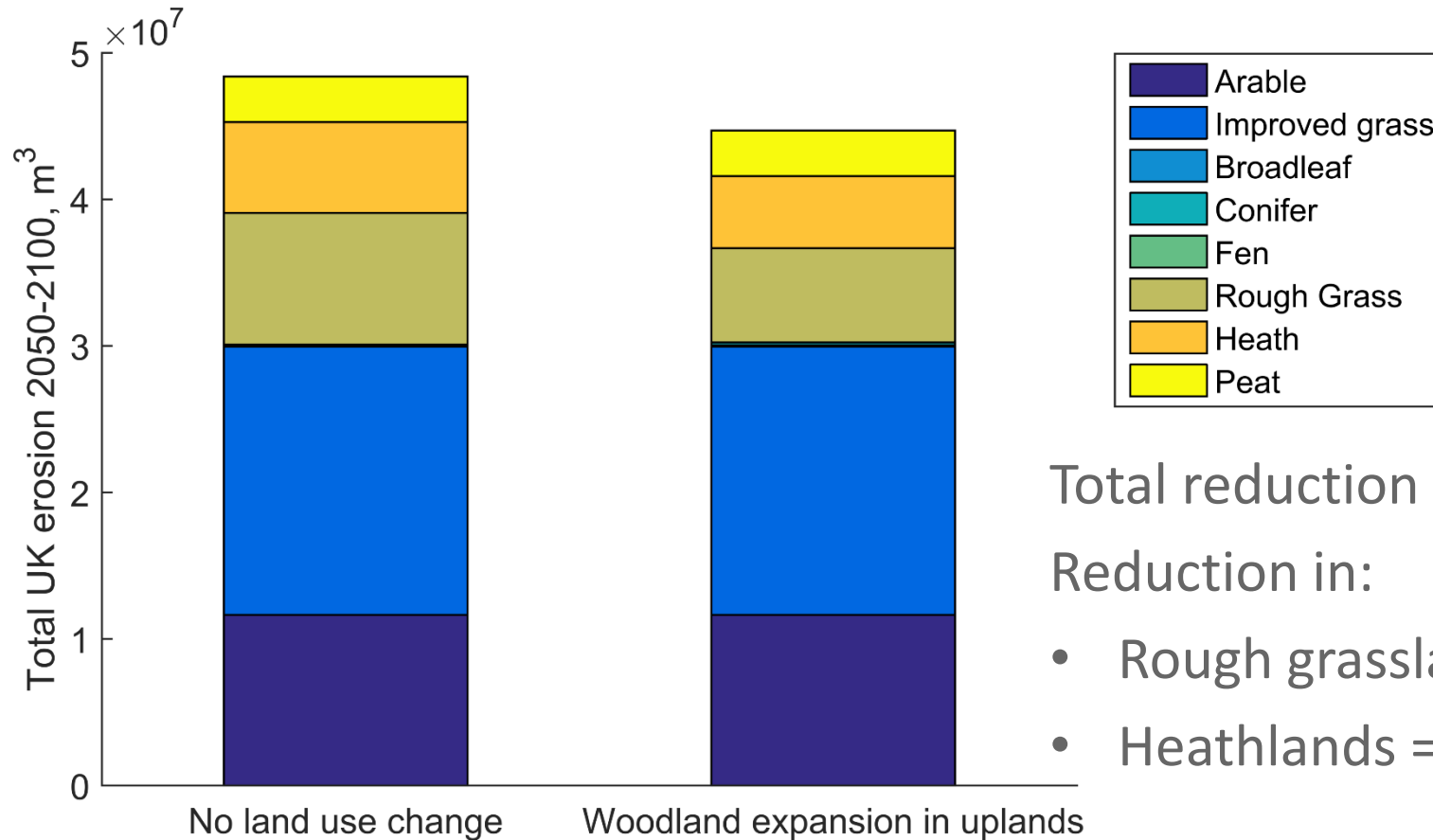
# Future transfer of soil from land to water via erosion

Mean sediment flux

2100



# Future total erosion: Woodland expansion scenario



Total reduction = 7.6%

Reduction in:

- Rough grassland = 28.4%
- Heathlands = 20.7%

Note: No plantation disturbance effects, but could be incorporated



# Summary

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The model suggests that:

- Increases in grazing density have significantly increased erosion
  - Fluxes increases between 1800-2000 of:
    - ~8 fold improved grasslands
    - ~6 fold peatlands
    - ~3.5 fold rough grasslands
- Recent decreases in grazing have reduced present day erosion
- Increases in future run-off may increase erosion by ~30% 2010-2100
- Woodland expansion in the uplands could reduce erosion from rough grasslands and heathlands by 28% and 21% respectively compared to a no expansion scenario