

# UKCEH Land Cover<sup>®</sup> *plus*

An overview of the UKCEH Land  
Cover *plus* datasets

Emily Upcott

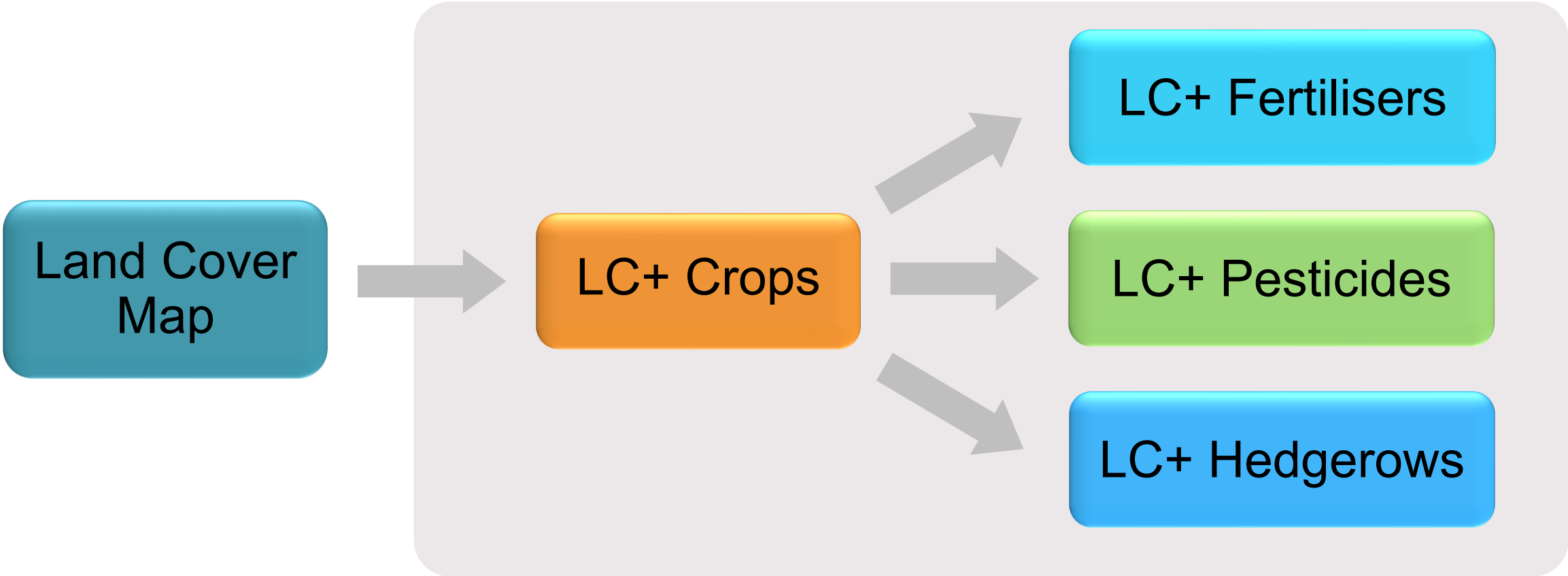
Spatial Ecologist at UKCEH



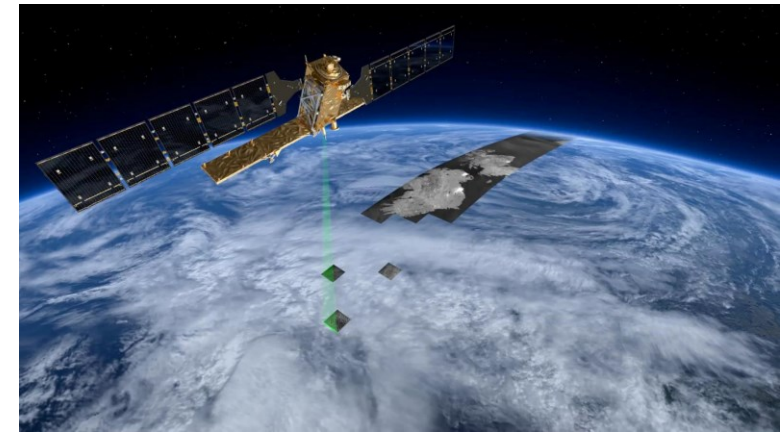
UK Centre for  
Ecology & Hydrology



# UKCEH Land Cover<sup>®</sup> *plus*:



# UKCEH Land Cover<sup>®</sup> *plus*: Crops



2023 data available **now**

First GB-wide field-level crop map

UKCEH & RSAC

Produced annually since 2015

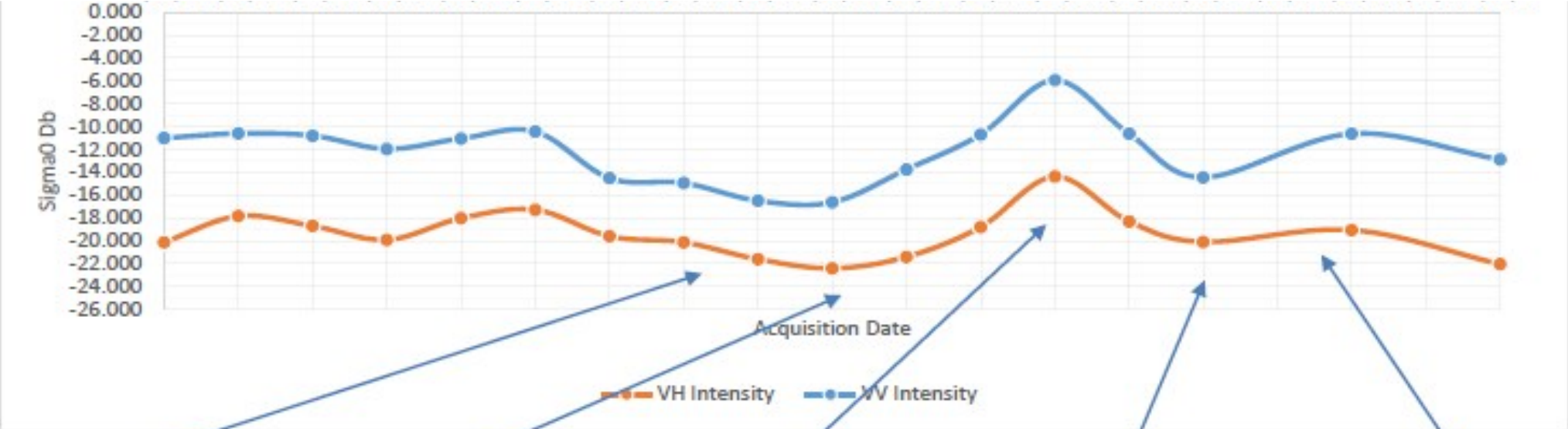
Sentinel 1 backscatter & Sentinel 2 optical

< 2 million fields

Up to 16 crop types classified and verified



# UKCEH Land Cover<sup>®</sup> plus: Crops



06 May 2015



30 May 2015



23 June 2015



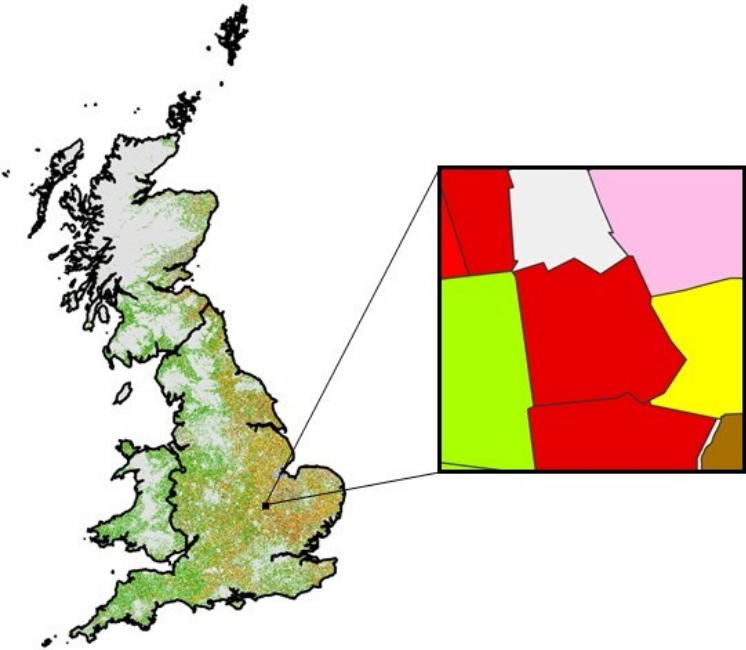
29 July 2015



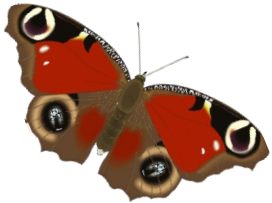
10 August 2015



# Multiple years: many possibilities!



- 2015 field beans
- ↓
- 2016 winter barley
- ↓
- 2017 spring wheat
- ↓
- 2018 oilseed rape
- ↓
- 2019 peas
- ↓
- 2020 spring oats



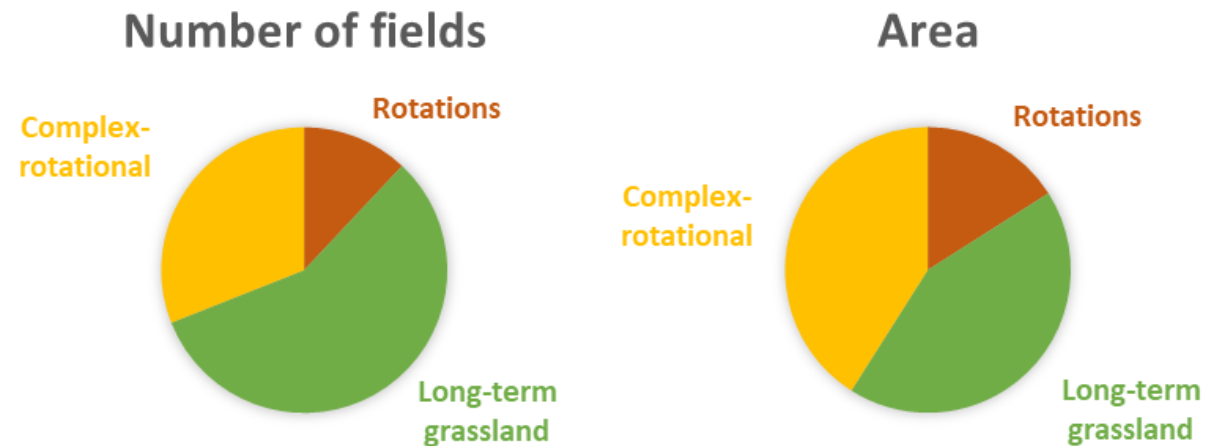
# Crop rotations research

2015-2020

Rotation: sequences that are repeating or starting to repeat

- Do we see crops rotating?
- Can we see spatial patterns when we classify rotations?
- Can we predict the next crop in a rotation?

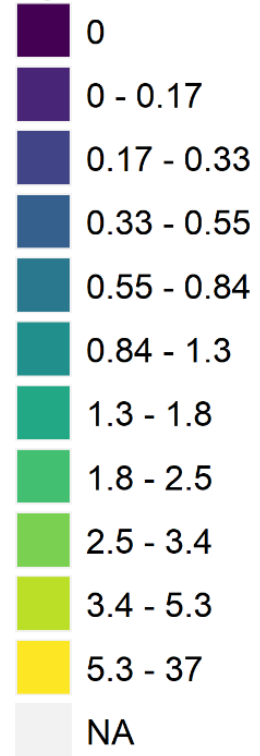
Agriculture = 1.6 million fields, 9.5 million ha  
11,310 unique rotations



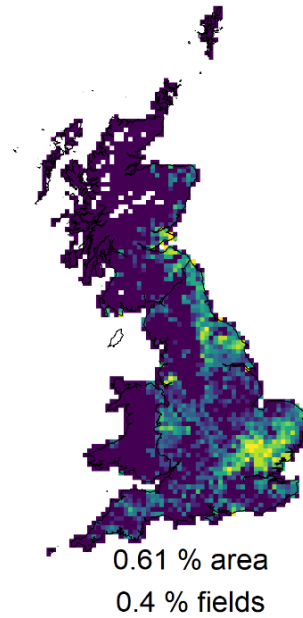
Crop sequences are usually **not** strict rotations

# Rotation types

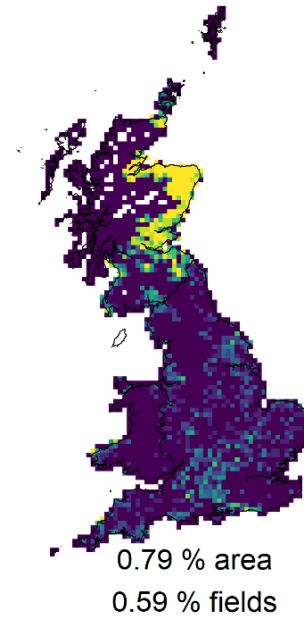
% of total agricultural area



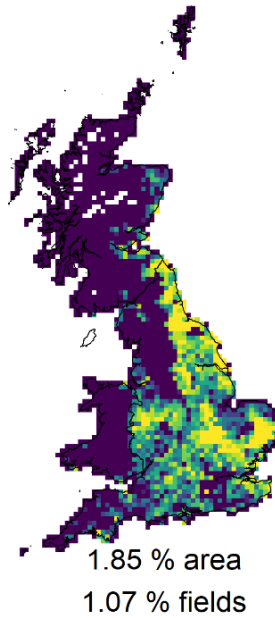
Short winter cereals



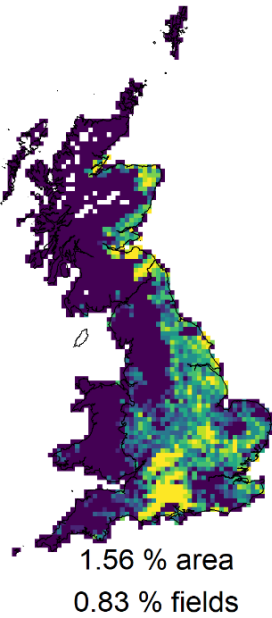
Short spring cereals



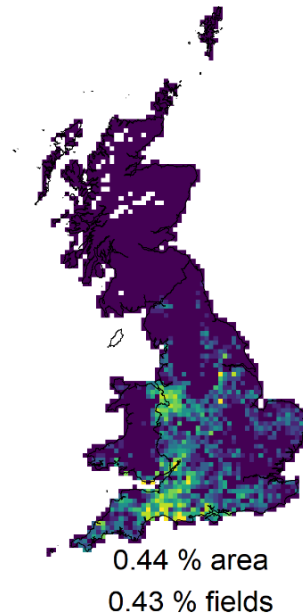
Short winter cereals & OSR



Mixed cereals & OSR



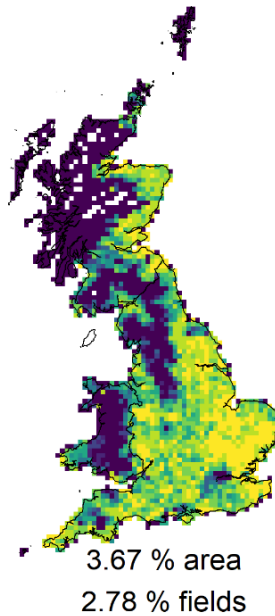
Short maize



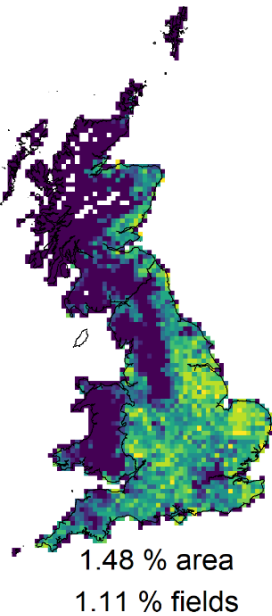
Short roots



Short mixed crops



Long mixed crops



# Predicting rotations

Long-term grassland	Rotation period	Spatial scaling	Spatial smoothing	Spatial classification	National average
Included	3 Years	77.1	74.6	73.9	73.0
	Recent 3 years	80.7	76.4	75.3	74.8
	4 Years	77.7	76.2	68.7	67.1
	5 Years	88.7	80.2	77.6	75.4
Excluded	3 Years	46.3	40.1	38.2	36.1
	Recent 3 years	55.5	44.6	41.8	40.4
	4 Years	59.5	59.5	40.7	39.0
	5 Years	75.7	67.4	47.6	42.1



Longer



More local



# UKCEH Land Cover<sup>®</sup> plus: Fertilisers

Average annual  
fertiliser application

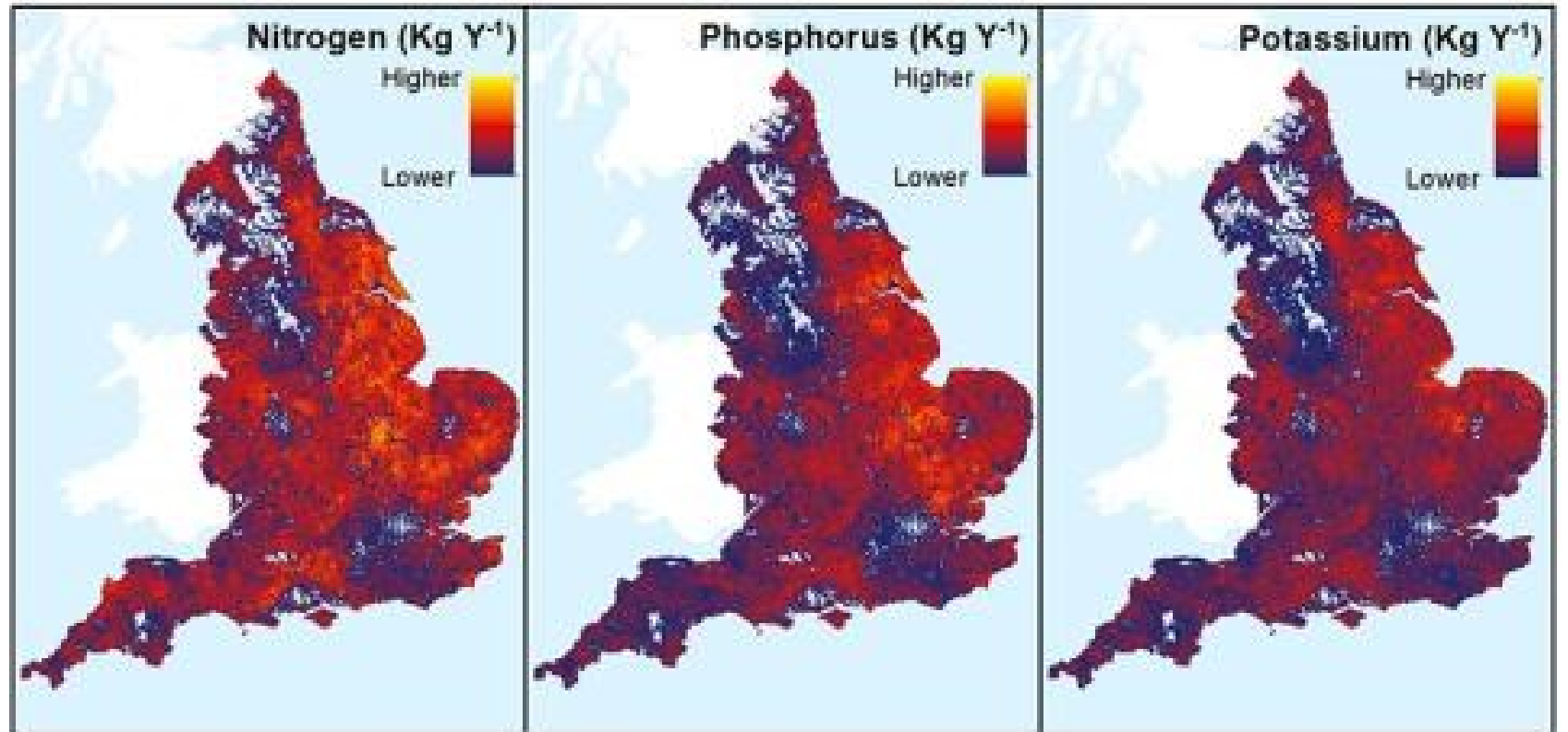
Nitrogen, Phosphorus,  
Potassium

Total kg/km<sup>2</sup>/year

England

2010-2015 snapshot

Application and  
uncertainty maps



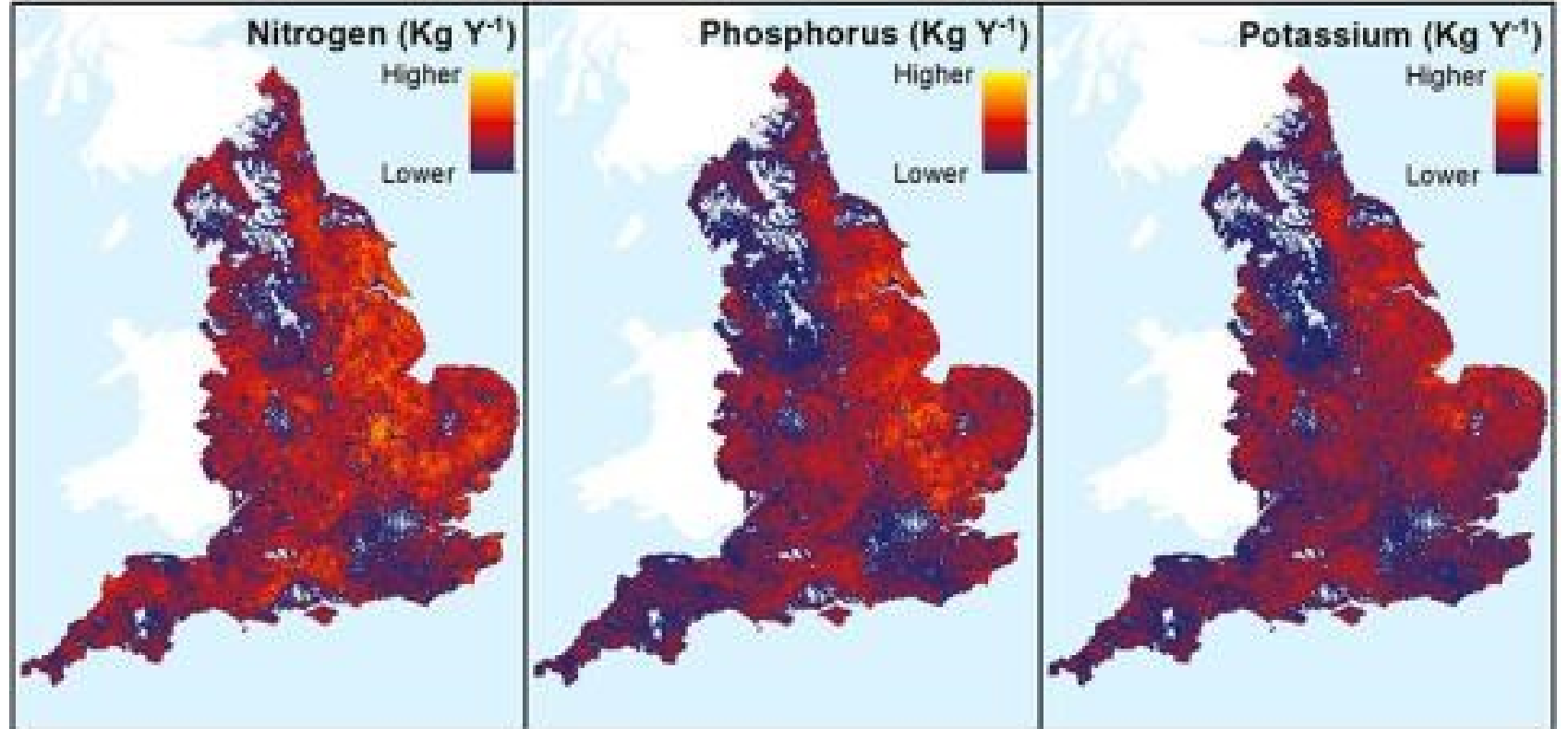
# UKCEH Land Cover<sup>®</sup> *plus*: Fertilisers

## THE BRITISH SURVEY OF **Fertiliser Practice**

FERTILISER USE ON FARM CROPS

Defra and Scottish  
Government

Spatial interpolation  
model + crop area →  
1km applications



# UKCEH Land Cover<sup>®</sup> *plus*: Pesticides

Average annual  
pesticide application

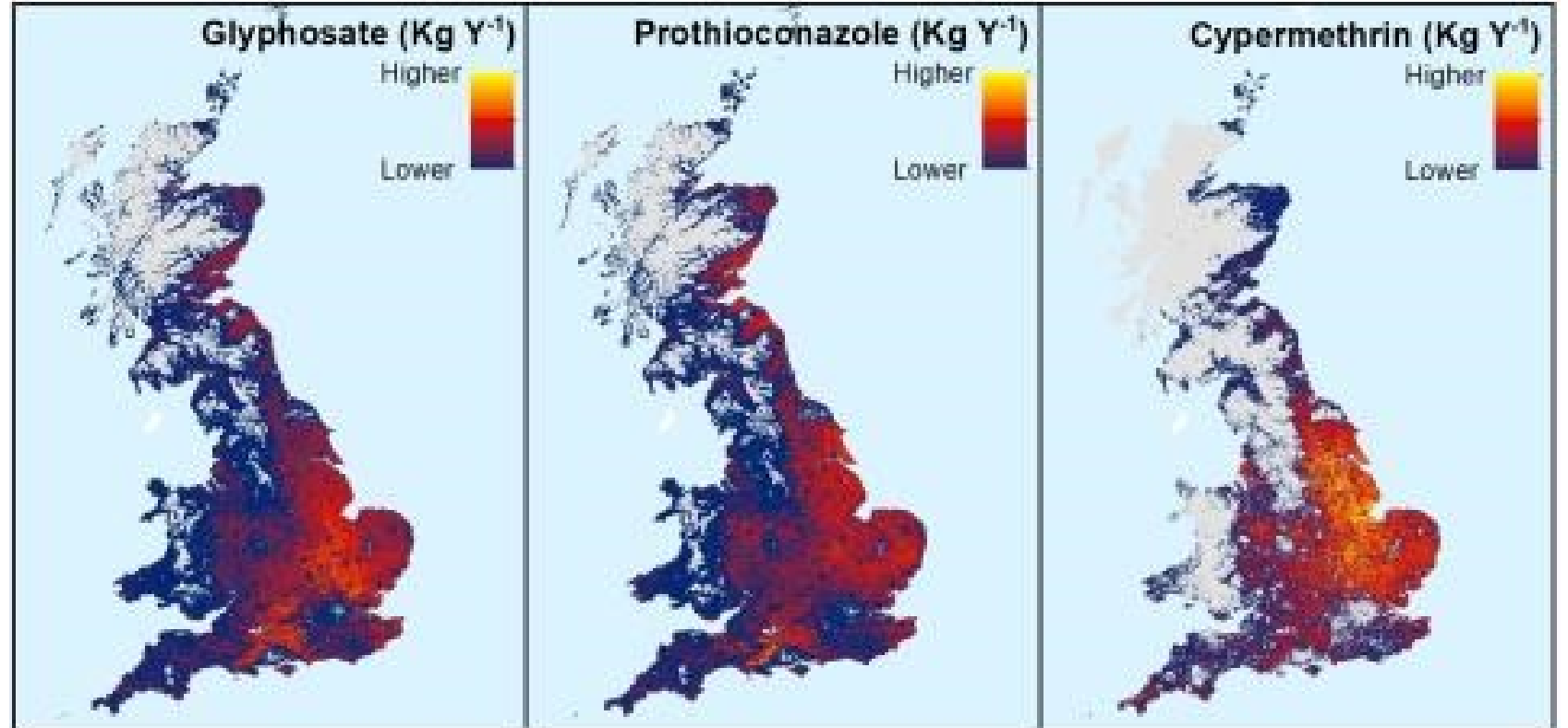
162 active ingredients

Total kg/km<sup>2</sup>/year

England, Wales &  
Scotland

2012-2017 snapshot

Application and  
uncertainty maps



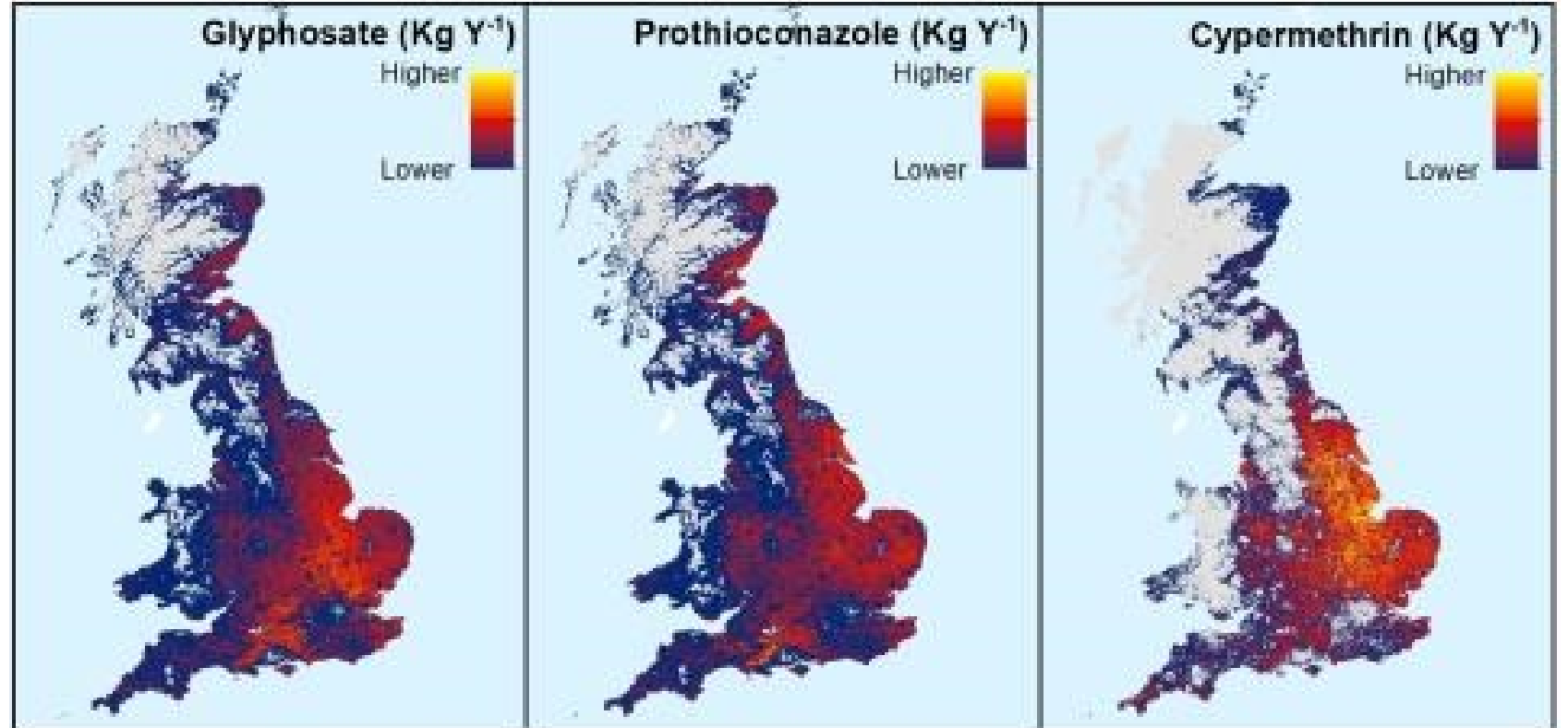
# UKCEH Land Cover<sup>®</sup> *plus*: Pesticides



County-level data from  
Pesticide Usage Survey

Pesticides are crop- and  
location-specific

Crop maps 2015-2017  
in model & filling in gaps



# Potential uses of Pesticides & Fertilisers

Modelling agrochemical runoff

Prediction of environmental impacts

Planning intervention and mitigation

Use as baseline for further development

Updated maps to come...



© John Redhead



# NEW! UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows

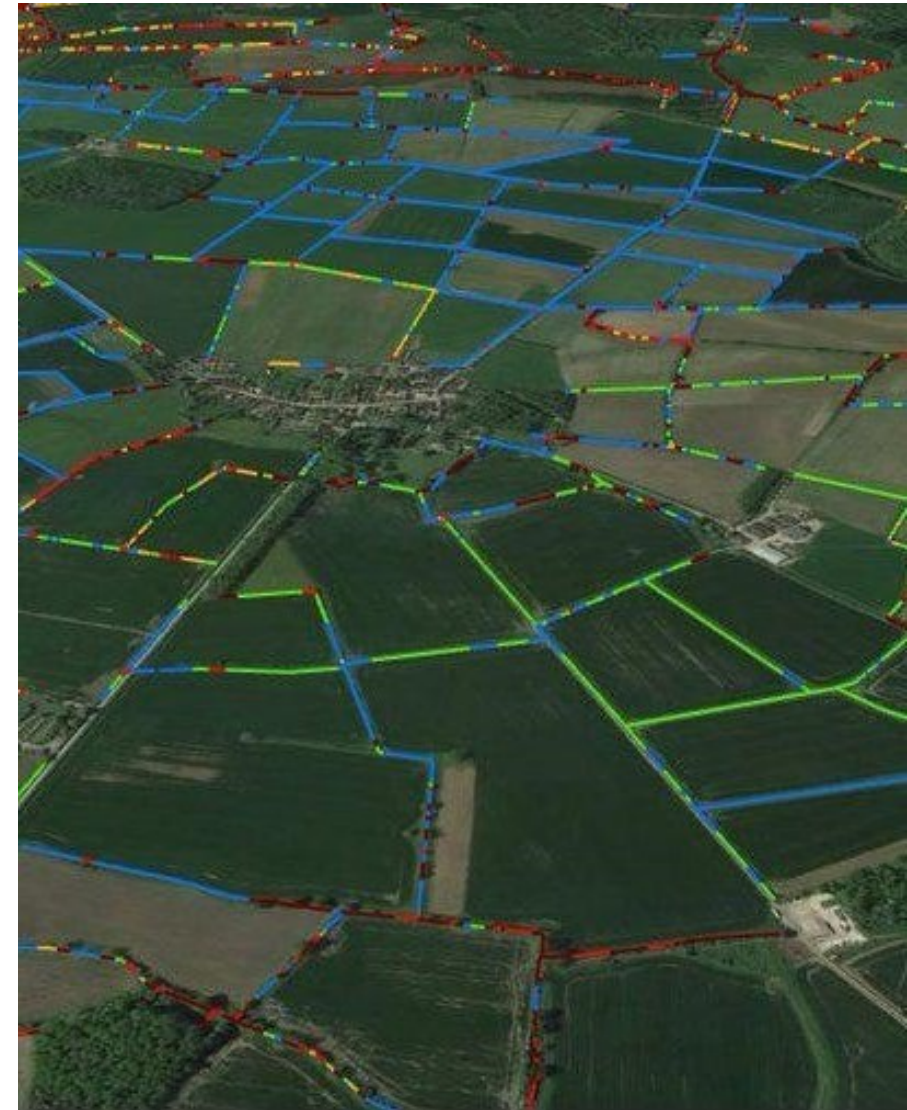
Launched **30<sup>th</sup> January 2024**

2016-2021 snapshot of hedgerows in England

390,000km 1-6m tall

What it can tell us:

- Height: 0.5m –  $\geq$  6m
- Length:  $\geq$  2m
- Feature type: single, double etc.



# NEW! UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows



Environment Agency LiDAR

Spatially integrates with LCM and LC+ products

Compatible with Countryside Survey height classes

Ground-truthing in 2022

80-90% accuracy of length compared to field  
verification



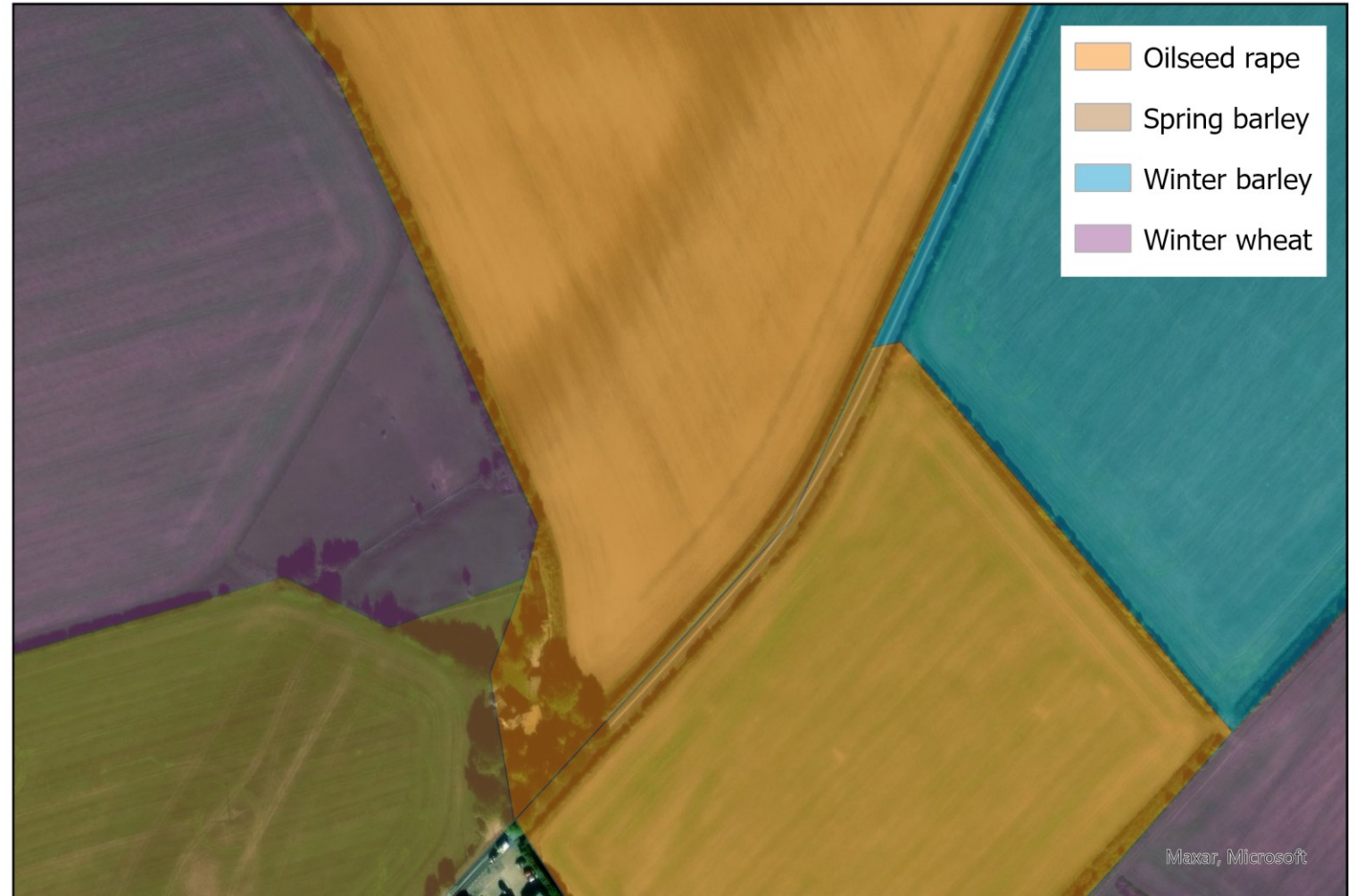


# UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows



# UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows

Crop types 2022





# UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows

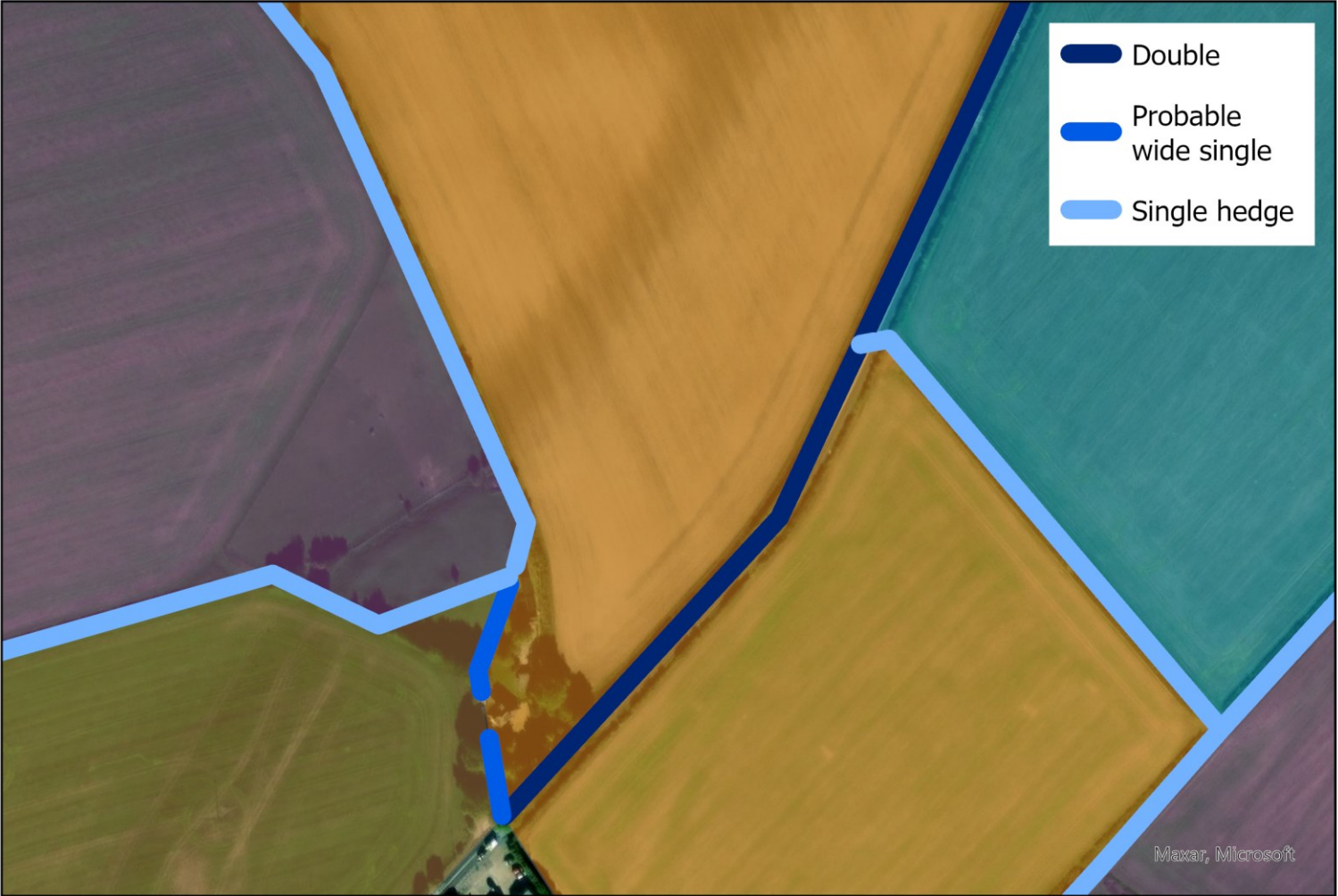
Height classes





# UKCEH Land Cover<sup>®</sup> *plus*: Hedgerows

Width classes



# More on the Hedgerows map

Technology now enables mapping of hedgerow complexity

Benchmark dataset

Could be further developed, e.g. carbon storage

Hedgerow height – infer management

Habitat corridors and connectivity

Podcast: <https://audioboom.com/posts/8448529-hedgelif-390-000>



# Licensing

UKCEH Land Cover<sup>®</sup> *plus*: **Crops**, **Fertilisers**, **Pesticides** and **Hedgerows**

Free for research purposes through Edina, same as LCM vector

# Thank you

For more information  
please contact:

[emiupc@ceh.ac.uk](mailto:emiupc@ceh.ac.uk)

[@UK\\_CEH](#)

[ceh.ac.uk](http://ceh.ac.uk)