

IMPROVING EMISSION INVENTORIES WITH EO

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Topic and context

- Countries have to report their greenhouse gas (GHG) emissions to the UN, including emissions from diffuse sources such as agriculture
- The UK wants to use more sophisticated methods which require information with higher spatial and temporal resolution
 - E.g. land cover type, land use, soil moisture
- This is expensive/not really possible using traditional survey methods – EO can help!

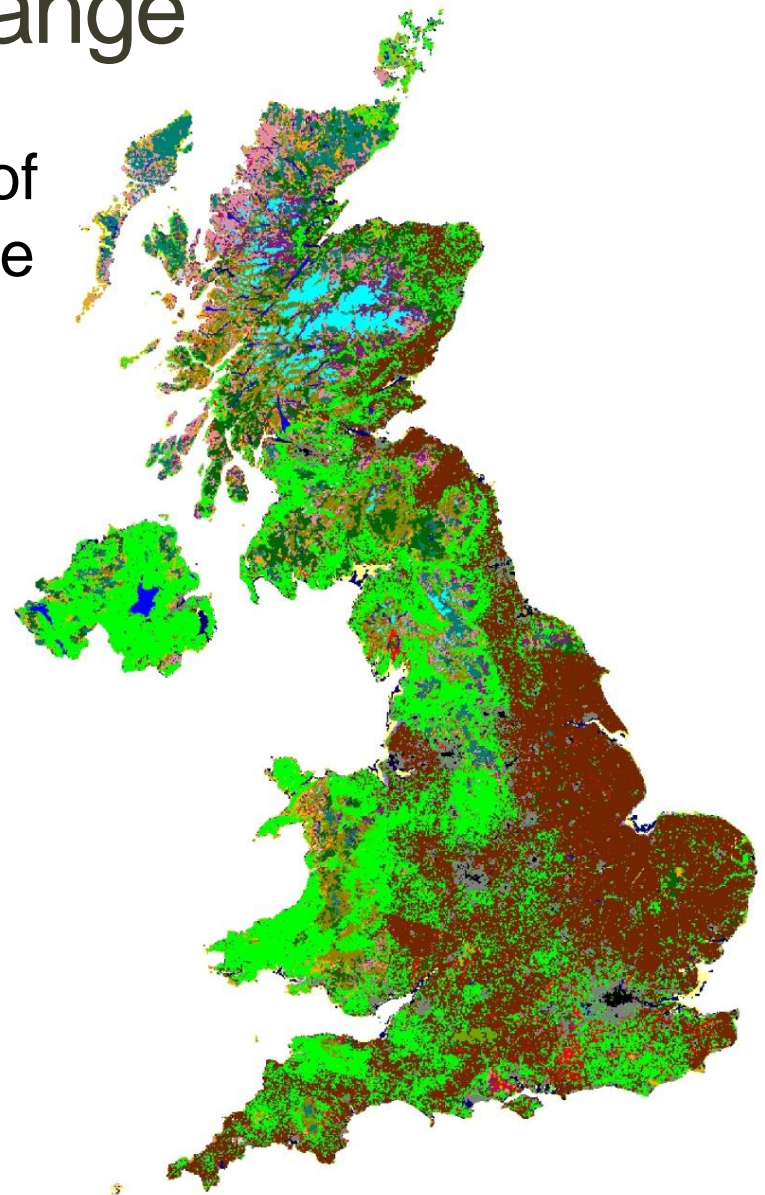
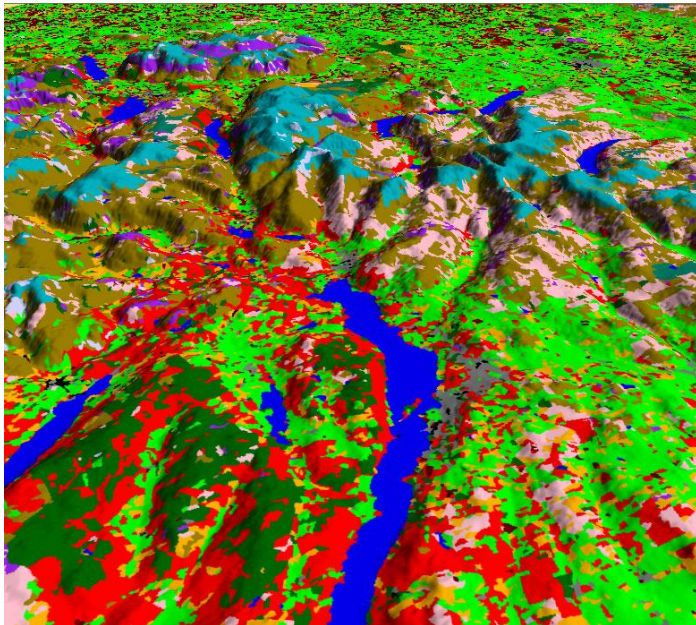


Issues we will address

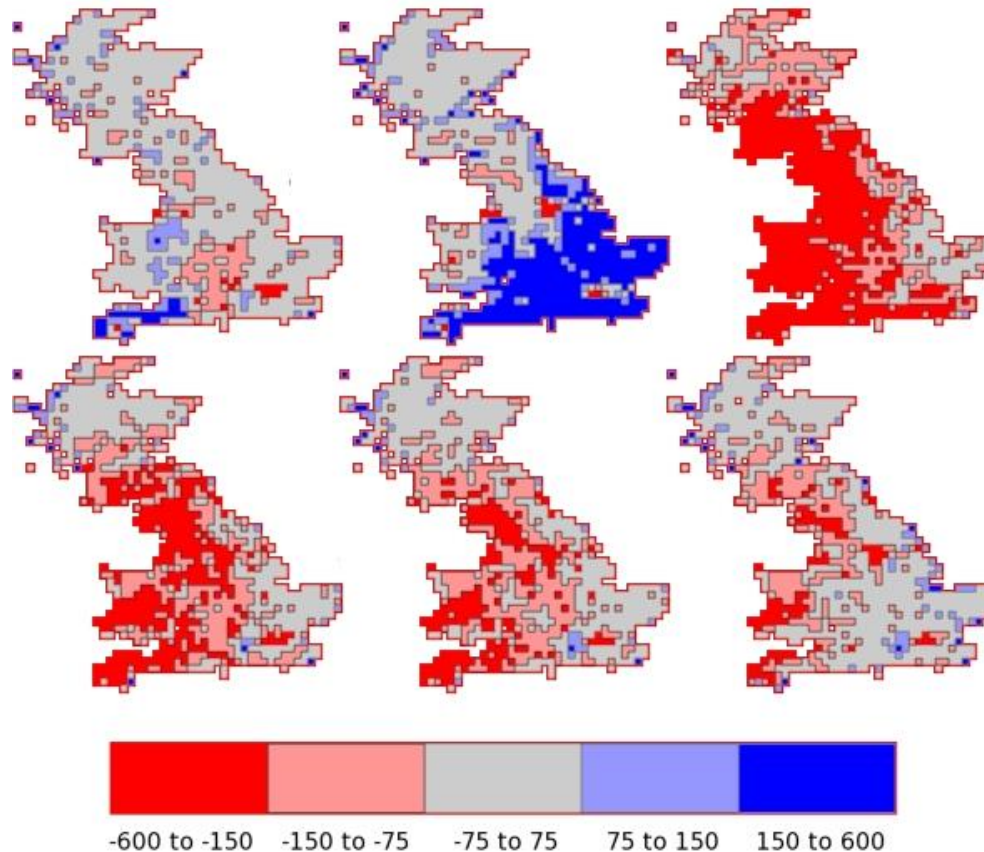
- Need for higher temporal and spatial resolution information on land cover and soil moisture
- Better understanding of uncertainties
- Direct interaction with data for end users, rather than just reports
- Highlighting the relevance of EO for policymaking more broadly
- Need to be aware of issues of confidentiality and identifiability for some data sources

Land cover / land use change

- Use EO to produce annual maps of UK land cover to span between the existing maps
 - Train on LCM2000
 - Verify using LCM2007



Understanding uncertainties



Bias in modelled estimates of gross carbon uptake for the UK under different assumptions of underlying land cover [gC/m²]

Understanding uncertainties

- Land cover
 - Quantify the uncertainty from previous attempts at estimating land use change with EO by using high-resolution data collected by the devolved administrations of the UK Government as ground truth.
 - Spatialise the uncertainty estimates to provide the information on a scale relevant to the inventories.
- Soil moisture
 - Currently emissions of nitrous oxide (N_2O), a powerful GHG, are calculated based on fixed agro-climatic zones
 - Estimate the contribution of year-to-year or month-to-month variability of soil moisture to uncertainties in N_2O emissions

Interacting with data

- We will work with WP2 to develop a portal to enable other scientists and policymakers to interact with our data during the project
 - Visualization as maps and time series
 - Comparison of datasets, examining uncertainties
 - Asking policy scenario questions ([Tangle example](#))
 - Little, if any, processing required.
- We will investigate ways to make this portal available after the lifetime of the project
 - E.g. CEH's Information Gateway

Main Users

- This service will directly feed into the UK national emissions inventory submitted to the UN under international obligations.
- Luke Spadavecchia, Defra
 - Manages Defra's research on agricultural efficiency, relating to food production and climate change.
- Tom Misselbrook, Rothamsted Research
 - Lead scientist on UK agricultural emission inventory submissions

Data inputs

- UK Land Cover map 2000, 2007 (CEH);
- In situ UK soil moisture measurements (current and historic)
- Observed (e.g. CCI) and modelled (e.g. CHESSE) soil moisture info
- EO: MODIS, then investigate other sources e.g. MERIS, SPOT-VGT, Landsat, GMES Geoland2?
- Meteorological reanalyses;
- Defra and CEH open data archives;
- High resolution data on land use collected by UK government and related bodies (some confidential)
- Agricultural and other activity data from data.gov.uk.

Data outputs

- New annual land cover maps and their associated uncertainties;
- Database of freely-available current and historic soil moisture measurements made in the UK;
- Make these all available as linked open data?

Timeline

- Year 1:
 - Work with users to develop ideas for the portal
 - 1st version of data outputs
- Year 2:
 - Develop portal to work with the new data
 - Revise the data outputs
- Year 3:
 - Revised portal
 - Work with Sustainability WP to investigate feasibility of extending the methodology to whole of EU