

## UK National Climate Crop Modelling Capability (UKNCCC)

# Observations and Monitoring

High-quality, long-term climate and agricultural datasets, delivering decision-ready evidence on climate impacts and food security.

### Call to action:

*By integrating UK and global datasets, UKNCCC aims to build a coordinated national framework that integrates high-resolution, long-term datasets across climate and agriculture. By enhancing data quality, accessibility, and interoperability, we can strengthen UK leadership in climate-crop modelling and deliver robust evidence for monitoring, food security and global assessments.*

### Why we need observations and monitoring in UKNCCC:

- UK agriculture is increasingly impacted by extreme weather events and climate variability
- Observational data is essential for validating models, understanding local impacts and building case studies, national scale monitoring and informing adaptation strategies
- It supports the UKNCCC's goal of delivering robust, consistent assessments of climate impacts on food security
- Coordinating these data sets could also support the UK's food security report and the climate change risk assessment

### Benefits:

Enables tracking of climate trends and variability

Supports real-time and retrospective analysis of crop-climate interactions

Provides foundational data for modelling, forecasting, and decision support

### Alignment with Policy:

This capability supports adaptation planning, and evidence for the UK Climate Change Risk Assessment (CCRA) and UK Food Security Report - by providing robust observational datasets on temperature, rainfall, and extreme events. These datasets support government initiatives such as Farming 2050 and Defra's food strategy by tracking climate trends that affect food security and land management.



### Priority Actions and Recommendations for UKNCCC:

- Improve spatial and temporal resolution of datasets (e.g. more granular soil moisture and crop phenology data)
- Integrate on-farm sensors and crowd-sourced science data
- Make it easier to combine and compare UK climate data with climate data from around the world. So that scientists and decision-makers can more effectively analyse climate impacts and trends across different regions, leading to better-informed choices and strategies

### What are Observations and Monitoring?

This capability involves collecting and curating high-resolution, long-term datasets to monitor climate variables such as temperature, precipitation, soil moisture, and atmospheric pressure. It includes:

- **UK datasets:** [HadUK-Grid](#), Data source: CEDA
- **Additional climate datasets:** e.g. European Centre for Medium-Range Weather Forecasts Reanalysis v5 (ERA5), ERA5-Land provide additional variables (compared to HadUK-Grid), and at increased temporal resolution
- **Agricultural research stations:** Rothamsted and MIDAS (Met Office Integrated Data Archive System); which also has hourly and daily land surface station data
- **Crop yield data:** [Cereal and oilseed rape production - GOV.UK](#) and others

### The Global Long-Term Agricultural Experiment

**Network (GLTEN):** the global long-term agricultural experiment network

The GLTEN is supported by over 50 Long-Term Experiments across the world which represent diverse and contrasting climate regions and environments, as well as multiple crop systems and land management schemes.

### ECN: UK Environmental Change Network

The ECN measures air, soil, water, plants, and animals to track environmental changes over decades.

Data collected includes:

- Weather and climate variables (near real-time weather data available for Harpenden), Soil moisture (via COSMOS-UK sensors), Ecosystem services variables (73 indicators covering provisioning, regulating, and cultural services such as air quality, pollination, erosion control, etc.)





### Relevant study:

#### [Resilience of UK crop yields to compound climate change](#)

Recent evidence shows UK wheat yields have become more volatile since the 1990s, driven by compound extremes (e.g., frost with heavy rainfall). Stageaware, high-resolution observations (2.2km UK climate projections - UKCP Local) are therefore essential to detect these joint hazards across key wheat growth stages (foundation, construction, and production) and to validate models that link climate variability to yield outcomes.

This study assessed how climate variability and compound weather extremes have influenced UK wheat yields historically and how these conditions may change in the future under climate projections. The findings indicate that during the foundation growth stage (1 October–9 April), conditions are expected to become warmer and wetter. In contrast, both the construction growth stage (10 April–10 June) and the production stage (11 June–26 July) are projected to experience warmer and slightly drier conditions. According to this study, climate change may provide greater benefits to UK wheat yields at the regional level than previously considered. However, it also means that wheat farming will shift beyond its traditional climate zones and face new, unfamiliar weather patterns.

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