Weatherproofing for a smarter, resilient and more sustainable agri-sector

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Outline

1. Current agricultural challenges
2. Project objective
3. Key variables and datasets
4. Example analysis
5. Future work

Current agricultural challenges

Globally

- **Yield plateaus**: wheat, rice and maize
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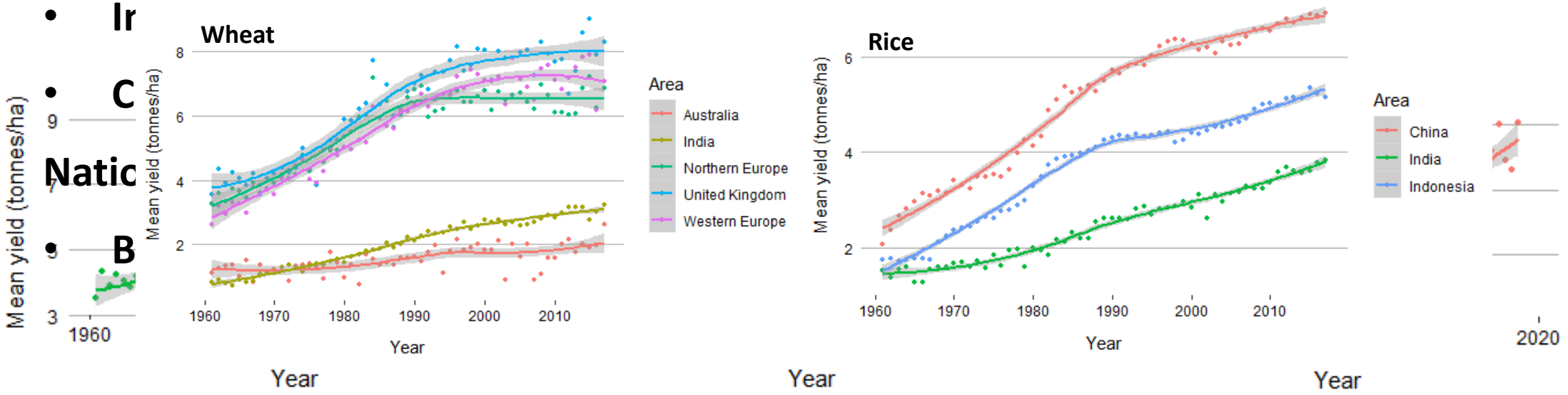

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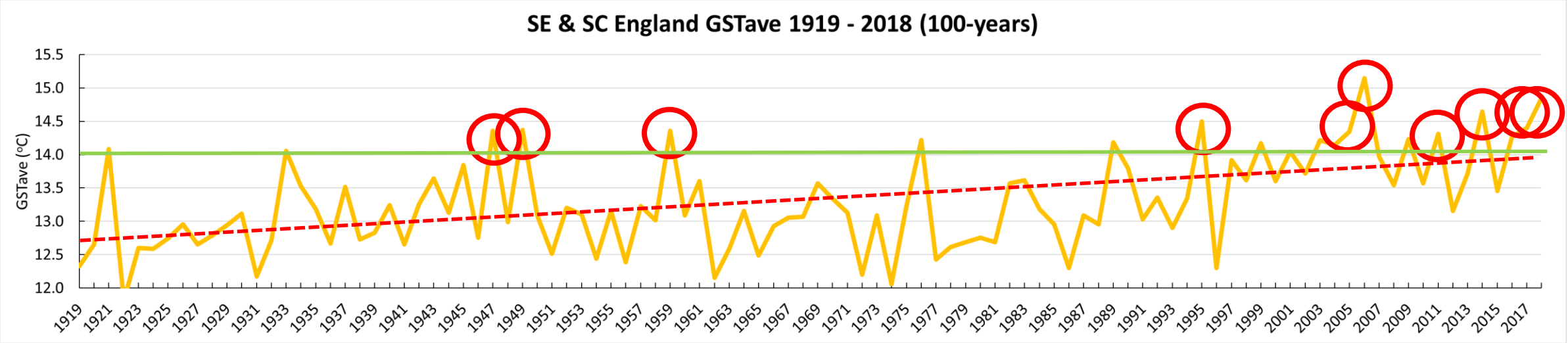
Overcoming these challenges

Globally

- **Yield plateaus**: breeding and choosing better adapted and higher-yielding crops
- **Interannual variability**: selecting varieties with diverse responses to weather
- **Climate change**: grow new crop species better adapted to future climate

Overcoming these challenges



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Overcoming these challenges

Globally

- **Yield plateaus**: breeding and choosing better adapted and higher-yielding crops
- **Interannual variability**: selecting varieties with diverse responses to weather
- **Climate change**: grow new crop species better adapted to future climate

Nationally

- **Brexit**: Increase amount grown in UK and look to countries outside the EU

Objective

Improve current understanding of the **relationship** between **interannual weather and climate variability** and **crop yield variation**, and incorporate this knowledge into crop models and the crop breeding process

The role of weather

- Desirable range for each variable
- Farmers want “average” weather
- Seeing an increase in weather outside these ranges

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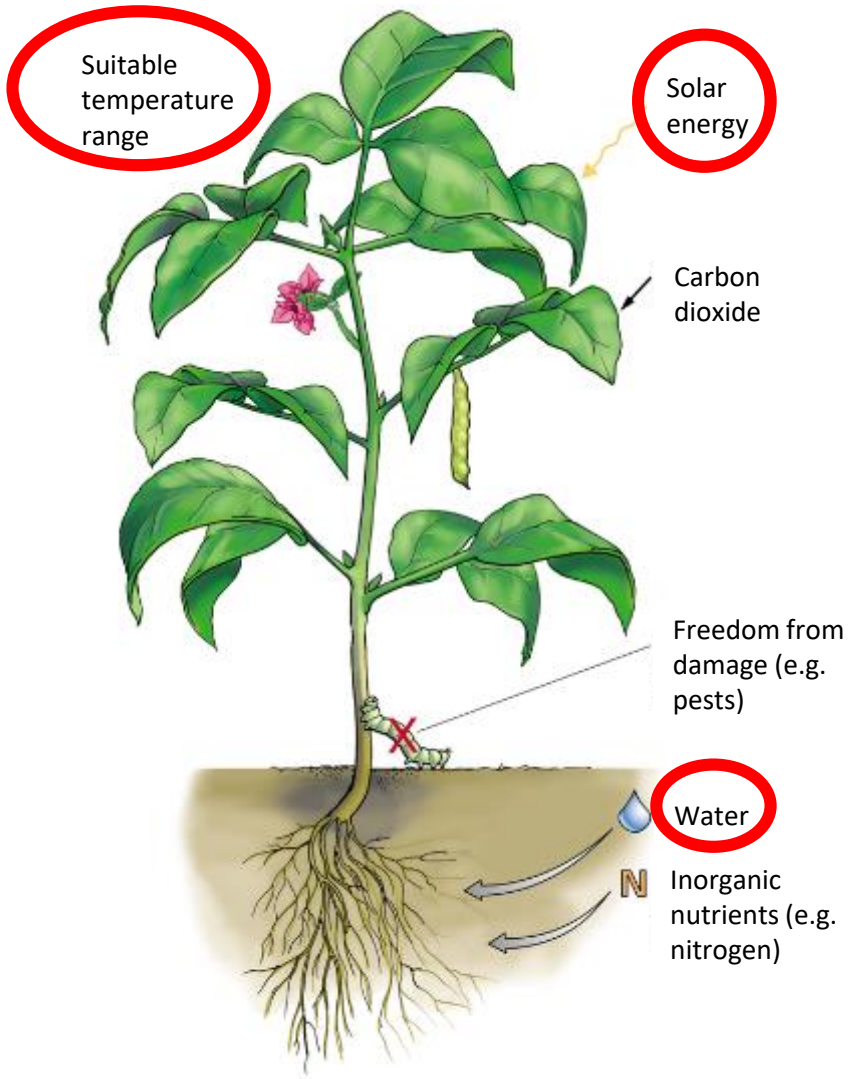
Weather ruins part of sugar beet crop in east

2 February 2011 Share

Frozen ground and wet conditions have ruined a large part of the sugar beet crop in the east.

Beet is grown within 30 miles of sugar processing factories, but this year, to keep them running in the shortage, supplies may have to travel further.

British Sugar contracts farms in Essex, Norfolk, Cambridgeshire, Hertfordshire and



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Crops of interest

Wheat

Oilseed rape

Sugar beet

Maize

Variety trials

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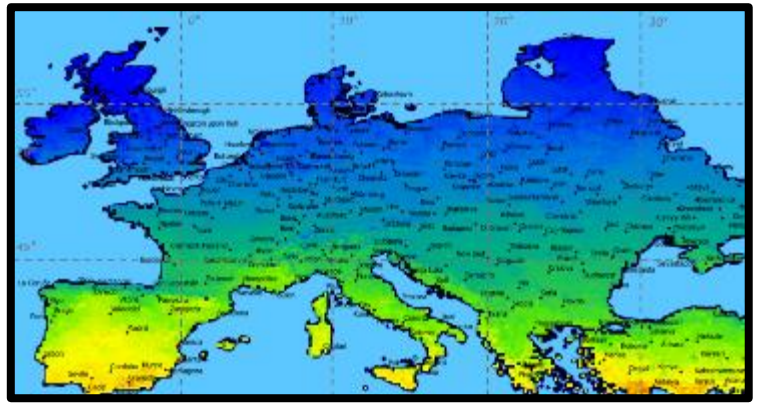
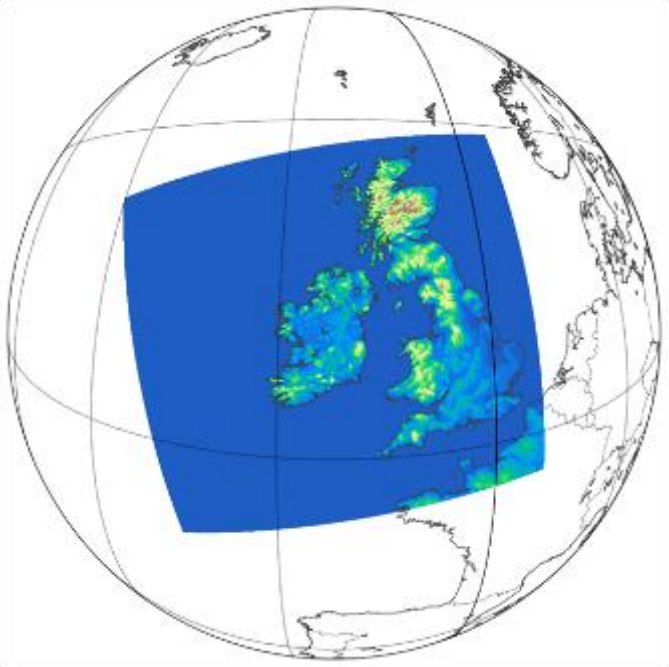
Different data sources

In-situ measurements

Satellite data

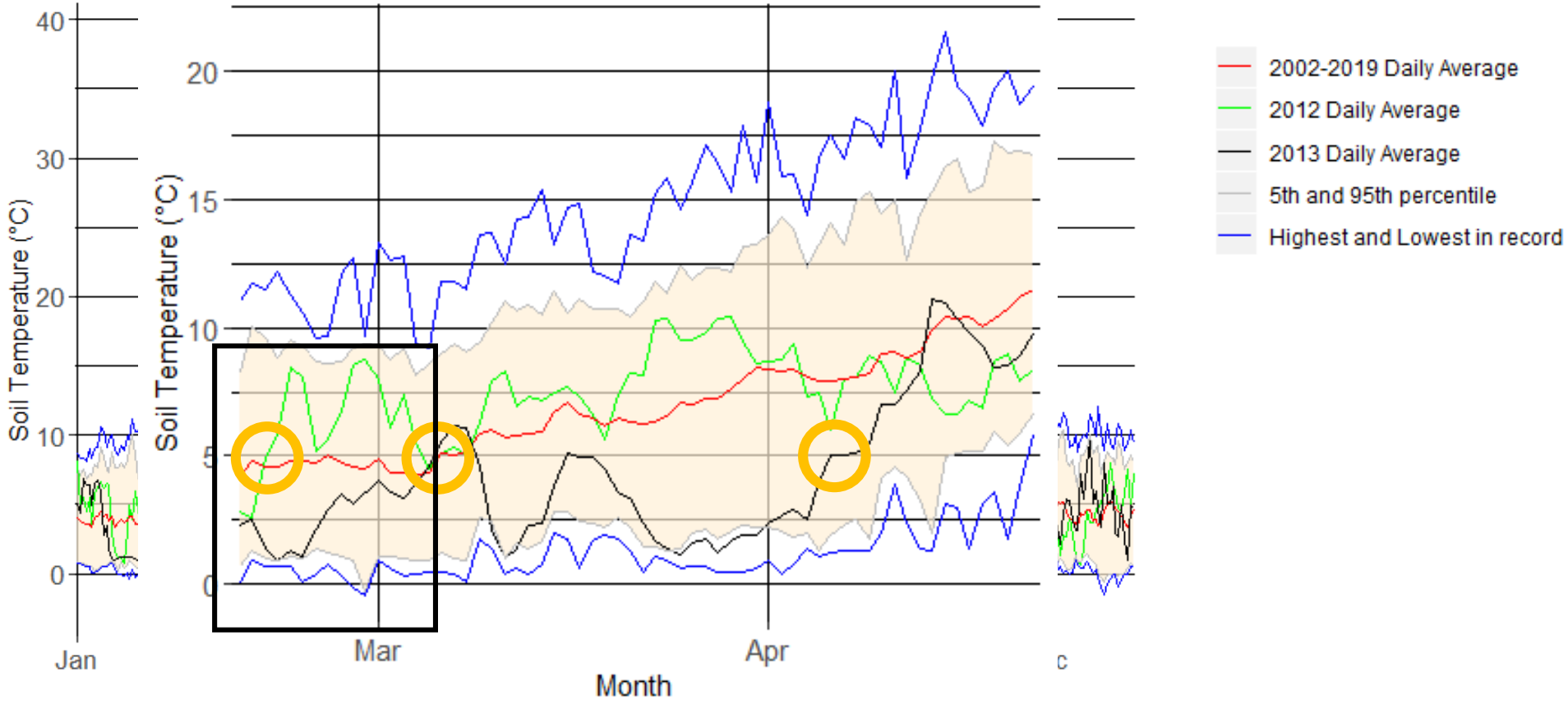


Re-analysis data



Example: Soil temperature

10cm daily mean soil temperature at Marham, Norfolk



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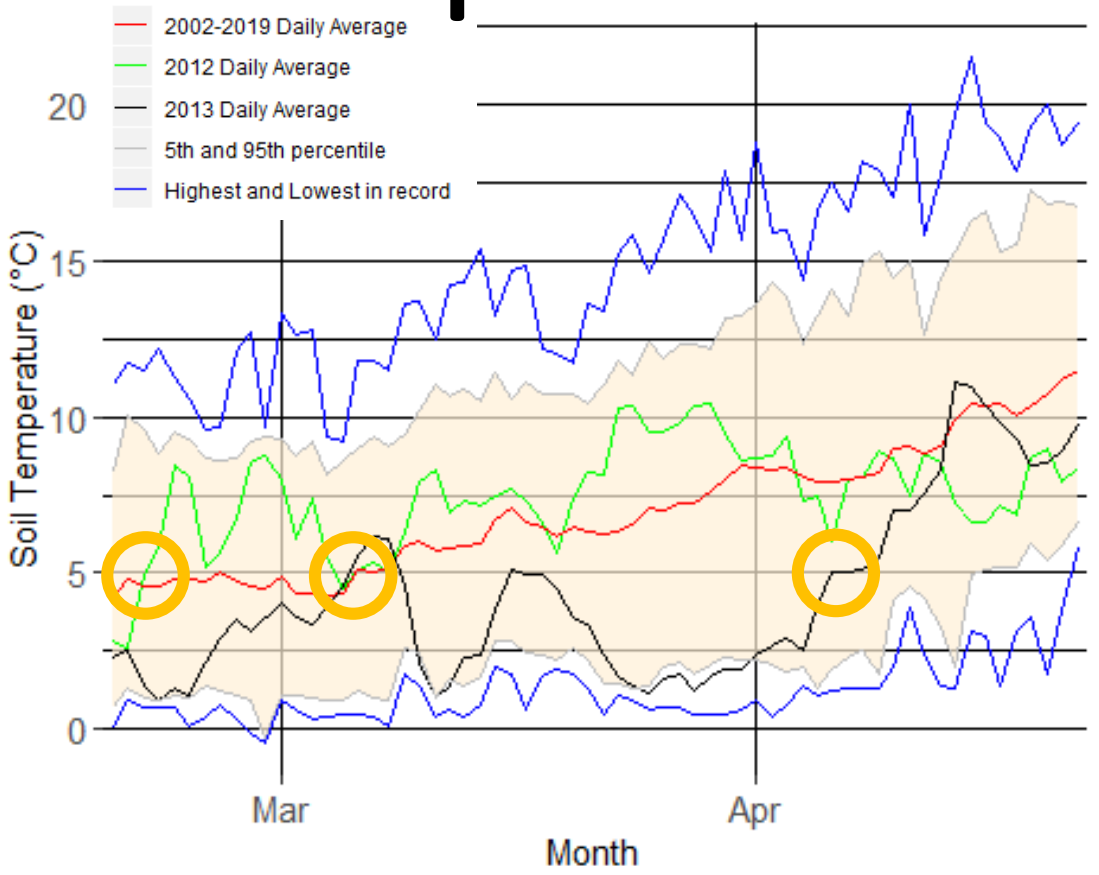
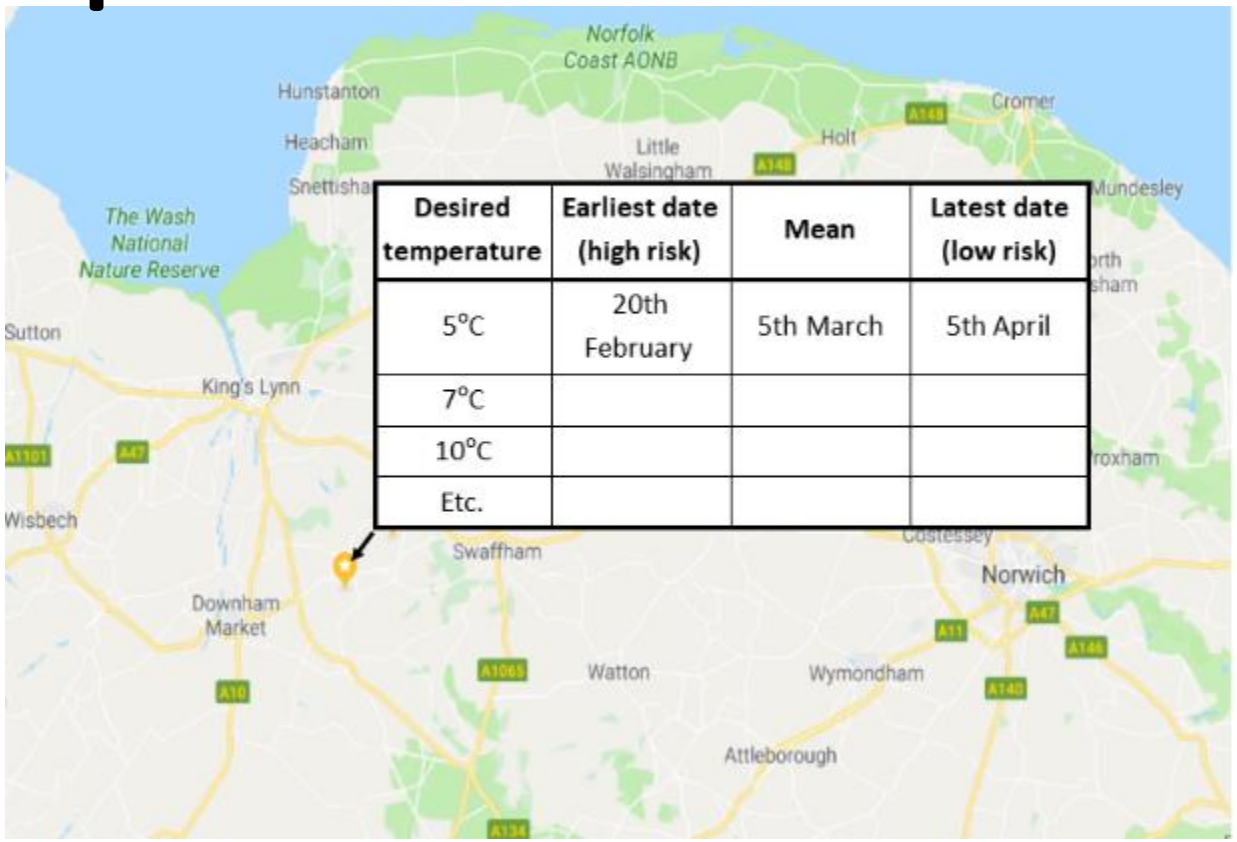
Example: Soil temperature





Desired temperature	Earliest date (high risk)	Mean	Latest date (low risk)
5°C	20th February	5th March	5th April
7°C			
10°C			
Etc.			

Example: Soil temperature

COSMOS-UK analysis

- CEH
- Fincham, West Norfolk
- 2cm, 5cm, 10cm, 20cm, 50cm depths

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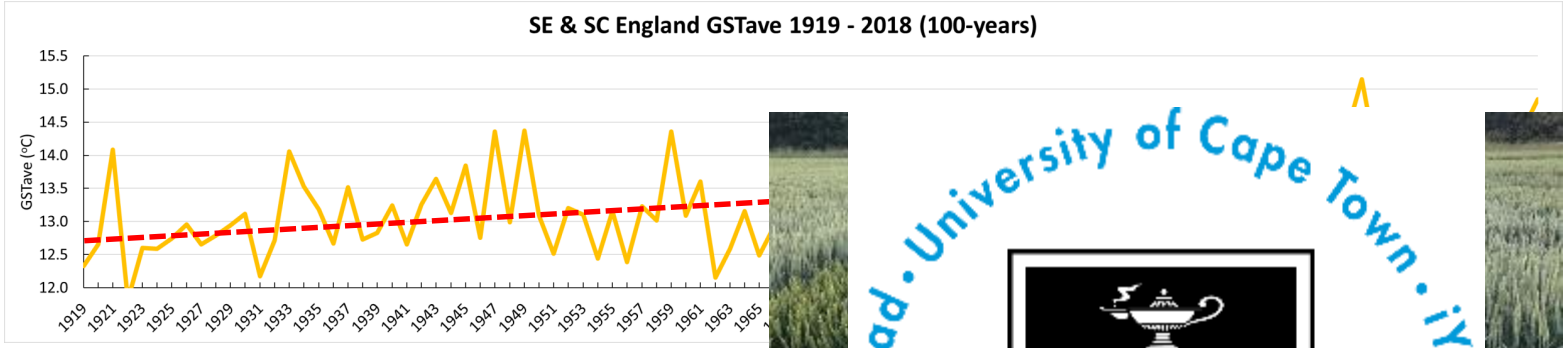
Future work

- Agroclimatology



- Analysis of crop-climate relationships:
  - Data-driven i.e. trials in the UK
  - Process-driven i.e. crop models in Africa

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Summary

The problem:

- High interannual variability, changing regional climates and an increase in extreme weather events are contributing to yield variability and plateaus

What we are doing?

- Combining best available weather and climate data with yield data to investigate crop-climate interactions in the UK and Africa

Our aims:

- To better understand the causes of crop-climate interactions
- Highlight relevant climate data and novel breeding targets for breeders
- Improve crop-climate modelling

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Thank you for listening.
Any questions?

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