Real-time pest detection, monitoring and forecasting

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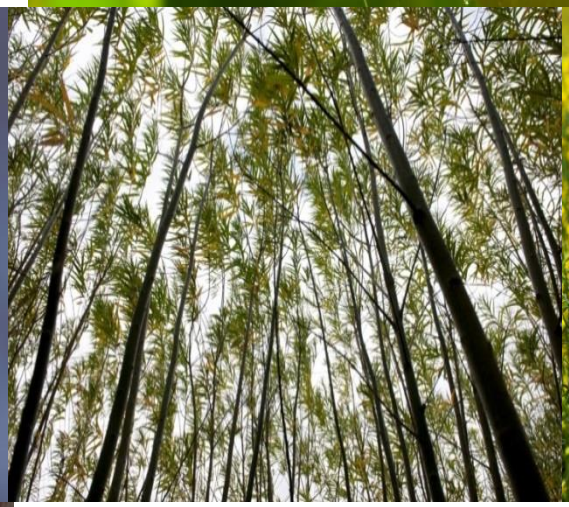
1. Introduction to Rothamsted Research

Introduction

550
researchers

3
campuses



3 agricultural systems

Areas of expertise

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- Plant Biology and Crop Science
- Biological Chemistry and Crop Protection
- Agronomy and Crop Physiology
- Agroecology and Environmental Science
- Soil Biology and Physics
- Grassland and Livestock Systems
- Modelling, statistics and bioinformatics

BBSRC bioscience for the future

industry:academia collaborations

Our scientists collaborate with companies of all sizes and from across the whole agri-food supply chain e.g.

- Trait discovery companies
- Seed businesses
- Manufacturers of biostimulants
- Crop protection manufacturers
- Crop nutrition companies
- Agronomy groups
- Food manufacturers
- Food retailers
- ICT companies
- Sensor manufacturers
- Remote sensing companies
- Energy companies

2. Examples of our interest in IoT

High-throughput phenotyping

Imaging sensors and lasers for measuring crop traits

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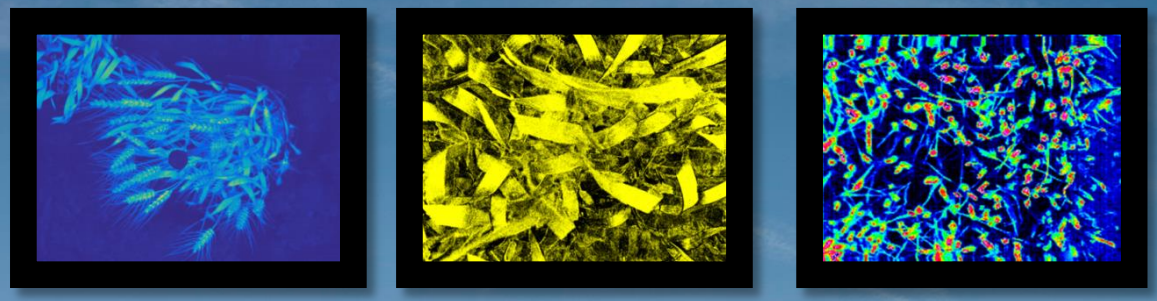

Soil sensors

Measuring soil drying and the matric potential of soil water

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Livestock sustainability from pasture

Environmental sensors for studying emissions from grassland systems

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Precision pathology

Sensors for real-time disease detection and forecasting

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Real-time pest monitoring and forecasting

Radars for studying insect movement and ecology

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3. Case study

“Cloudy with chance of Moths”
Real-time pest detection, monitoring and forecasting

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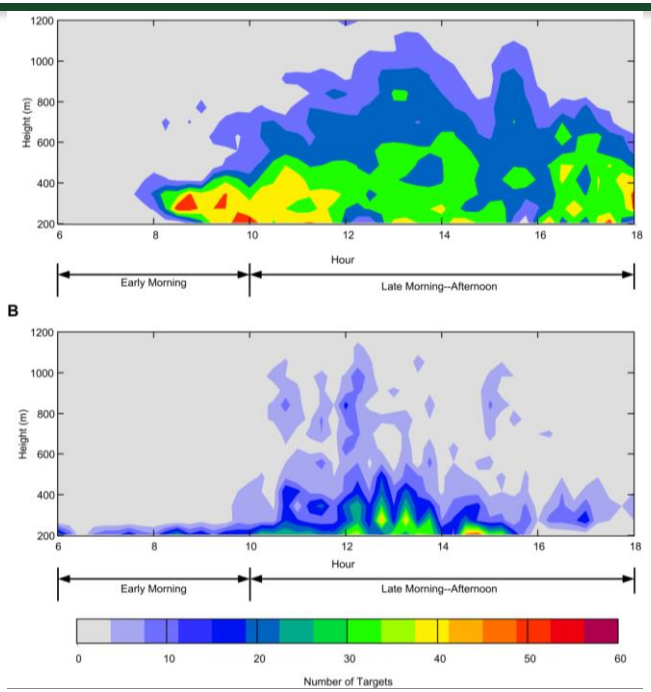
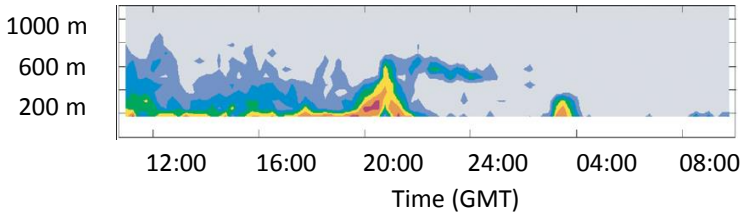
April 2016

Case study

International insect migration radar network





We have four projects deploying this technology in the EU, US and CN and we are currently developing opportunities in

Journal of Animal Ecology

In Focus

Flying with the winds: different migration strategies in relation winds in moth and songbirds

Susanne Åkesson

PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Predicting Insect Migratic Convective Boundary Lay

James R. Bell, Prabhuraj Aralimarad, Ka-Sing

Current Biology

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Volume 25, Issue 17, pR751–R752, 31 August 2015

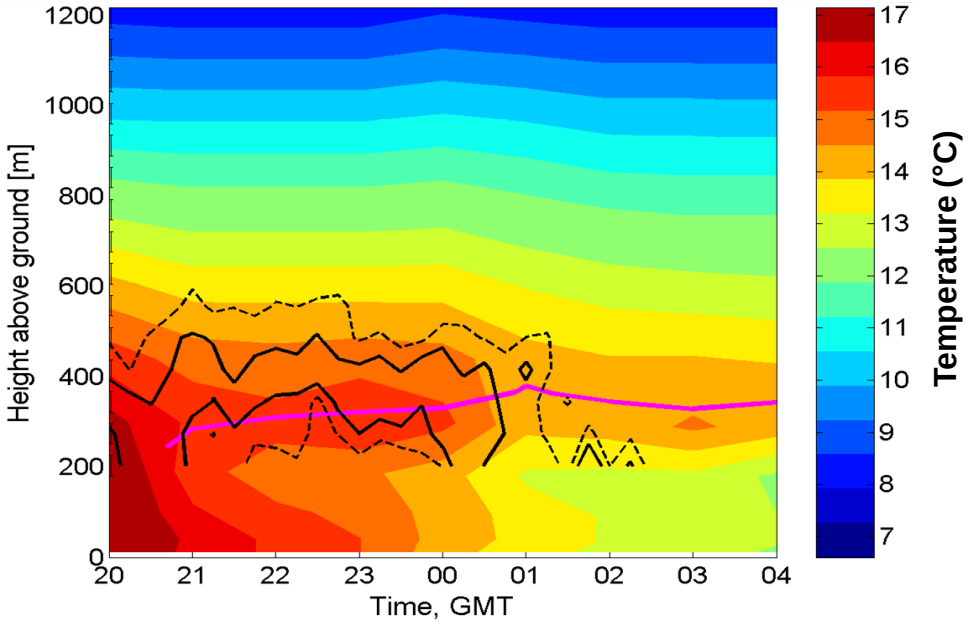
Correspondence

Detection of flow direction in high-flying insect and songbird migrants

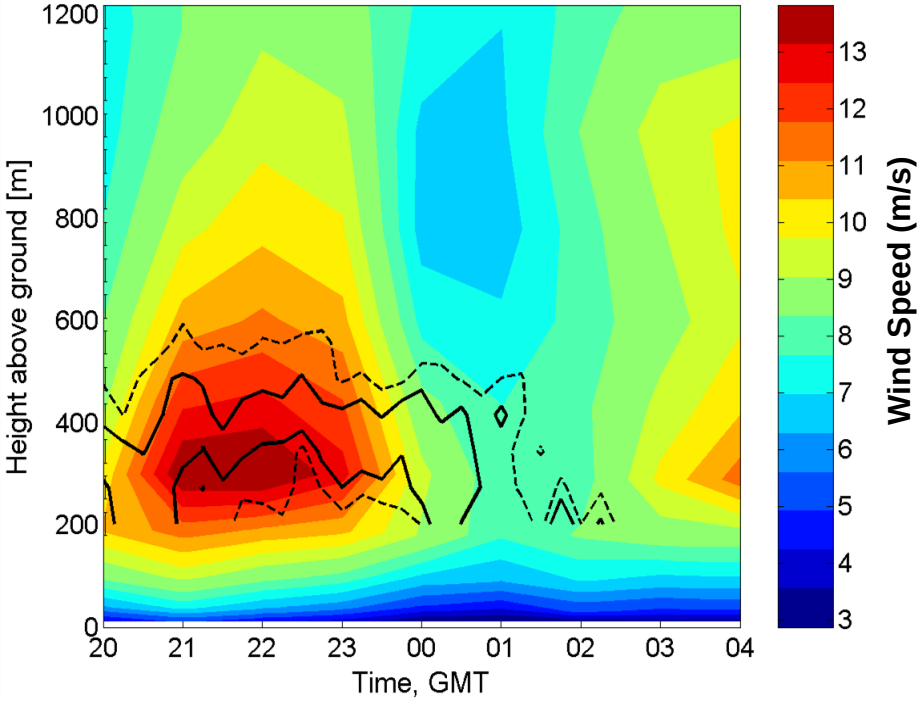
Jason W. Chapman†, Cecilia Nilsson†, Ka S. Lim, Johan Bäckman, Don R. Reynolds, Thomas Alerstam, Andy M. Reynolds

† These authors contributed equally.

Nocturnal Temperature Inversion



Nocturnal Wind Jet



Wood et al (2007) *Internal Journal of Biometeorology* 50: 194–204
Wood et al (2009) *Bulletin of Entomological Research* 99: 525–35
Wood et al (2010) *Agricultural & Forest Entomology* 12: 113–21

Wood et al (2007) *Internal Journal of Biometeorology* 50: 194–
Wood et al (2009) *Bulletin of Entomological Research* 99: 525–
Wood et al (2010) *Agricultural & Forest Entomology* 12: 113–2

Temporal Patterns & Aerial Density

Biomass

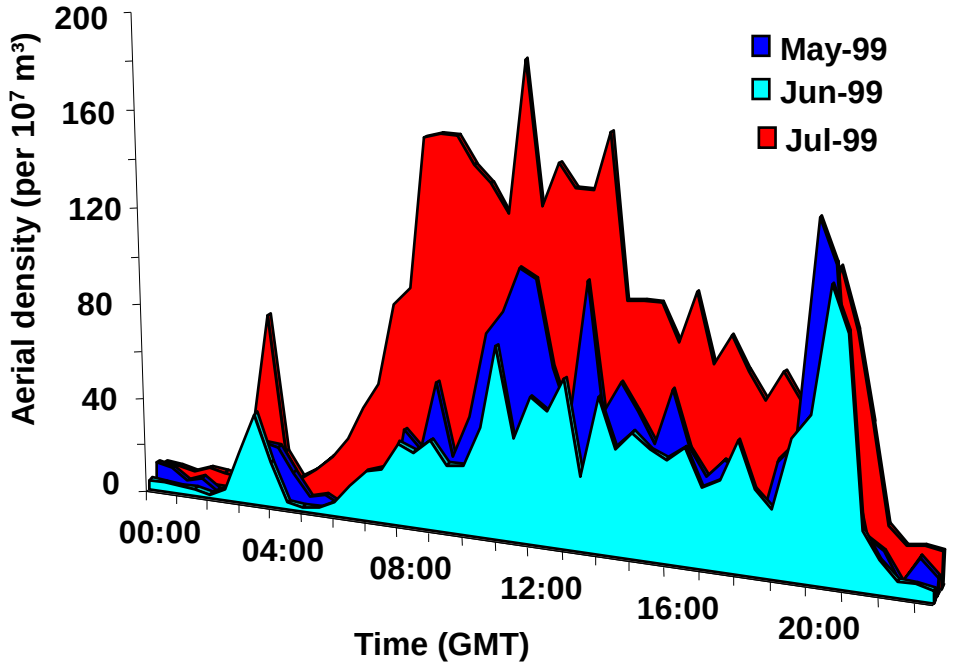
Vertical-Looking Radar, UK summer day:

- 10,000 large insects

1 km² 'window', 1 month:

- 35 Million large insects
- 3.5 Billion micro-insects
- 1 Metric Tonne

Periodicity



Chapman et al (2003) *Bioscience* 53: 503–11

Real-time pest monitoring and forecasting

Radars for studying insect movement and ecology

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Thank you!

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