

# Real-time model predictive control of surface irrigation for cotton: setup of field trial

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## Adaptive irrigation control

- (1) Adaptive control strategies have been developed for real-time management of irrigation. A closed-loop or timing
- (2) actuator hardware to adjust irrigation application

## 'VARIwise' simulation software

'VARIwise' framework irrigation control system requires:

- (1) some combination of weather, soil, plant and irrigation data

control strategy to determine irrigation application and/develops and simulates site-specific irrigation control strategies. VARIwise has been adapted to determine site-specific irrigation requirements of cotton.

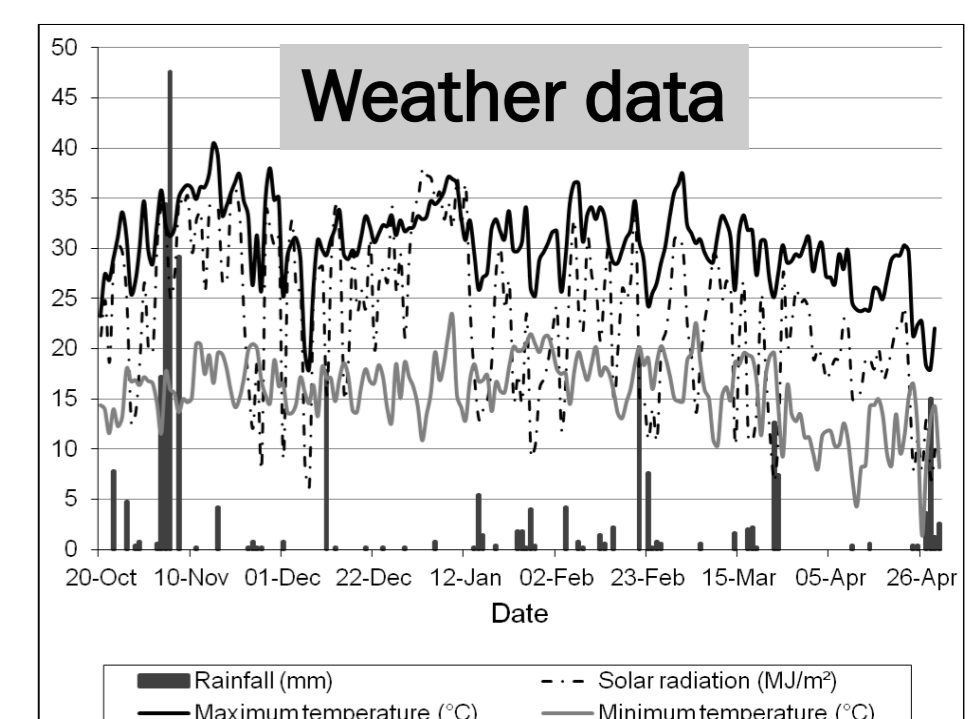
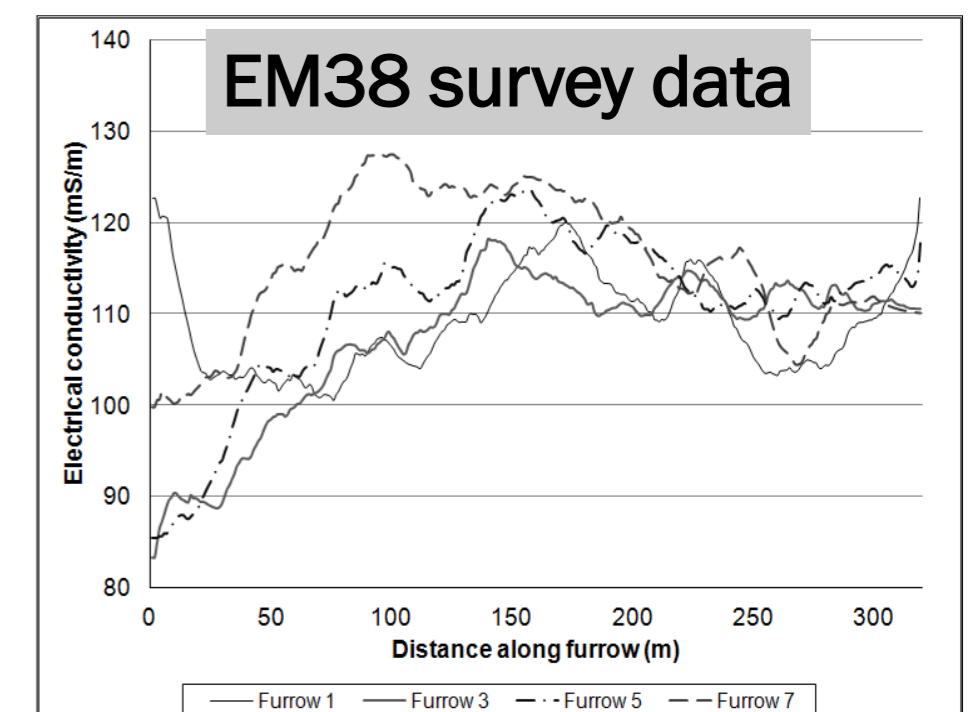
## Model-based control of surface irrigation

A model predictive control strategy has been applied to surface irrigation by:

- calibrating a crop production model using the available weather, soil and plant data
- using the crop model to predict the irrigation timing and/or volume that produces the desired performance
- using the surface irrigation model SISCO to determine the irrigation flow rate and advance trajectory that best corresponds to the optimal irrigation distribution

## 1. Soil moisture, cotton growth and weather measurement

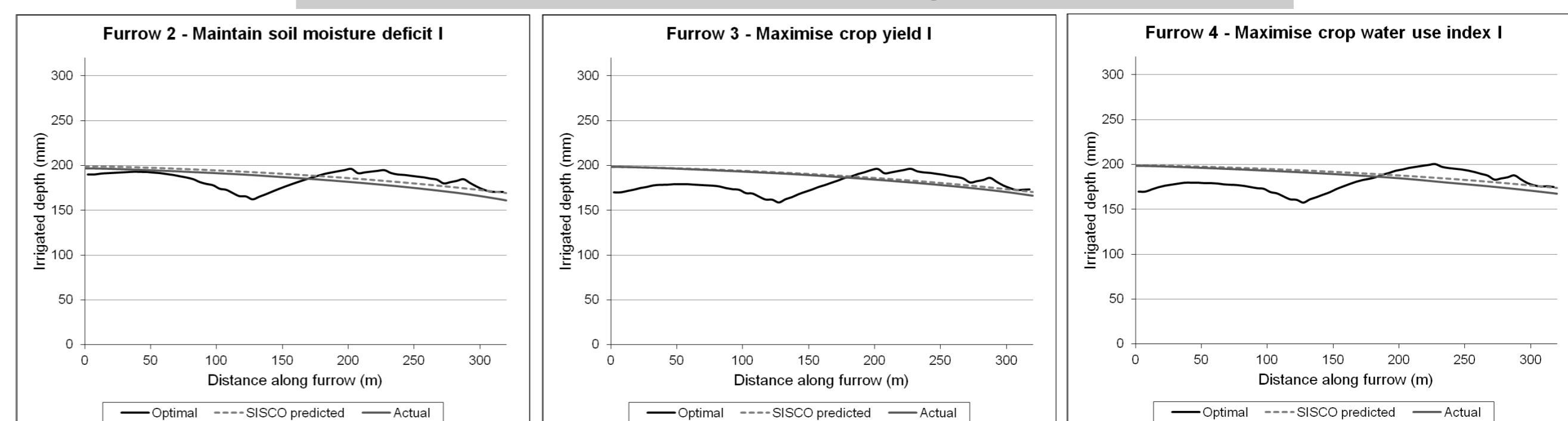
Field data from a weather station, EM38 surveys, soil moisture probes in each furrow and on-the-go plant sensing apparatus are collected.



## 2. VARIwise model-based irrigation control strategy

The field data and irrigation control strategy determine the optimal site-specific irrigation volumes, and the hydraulic model predicts the closest achievable surface irrigation distribution and advance trajectory.

### Optimal, predicted and actual irrigation distributions



## 3. Real-time surface irrigation control

The flow rate is measured and adjusted using controllable valves during the irrigation event to minimise the difference between the measured and optimised advance trajectories.

