

Rate Stability when Using ASC

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Application Rate Stability when Implementing Automatic Section Control on Ag Sprayers


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Today's Discussion


- Motivation
 - Field variability
 - Control technology
- Methodology
 - Static tests
 - Field tests
- Results
- Final thoughts



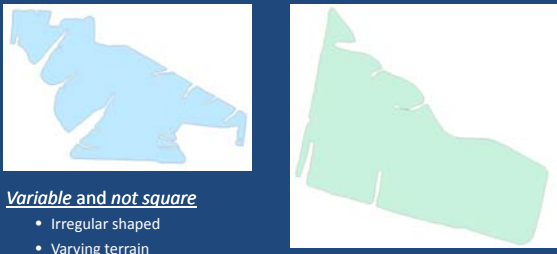
Trend Towards Larger Equipment



Field Variability




Field Boundaries in the South

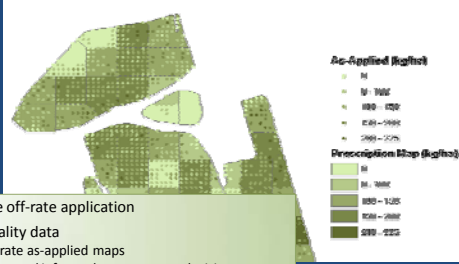


Variable and not square


- Irregular shaped
- Varying terrain
- Environmental structures (waterways, terraces, buffer strips, etc.)



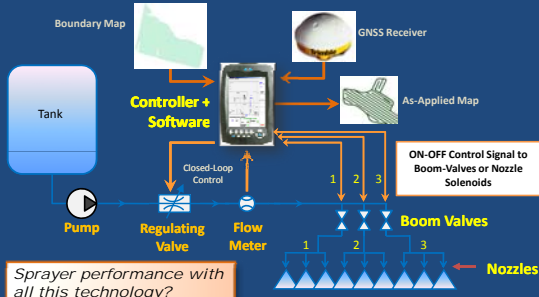
Management Resolution




- Minimize off-rate application
- Need quality data
 - Accurate as-applied maps
 - Make good informed management decisions.
- Environmental stewardship / public education



Modern Spray Control Systems





Sprayer performance with all this technology?



Objective

- To evaluate application rate stability when utilizing automatic section control on agricultural sprayers.

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Methodology

- Data acquisition system
 - National Instruments boards
 - Labview
- Measure
 - System flow rate
 - System pressure
 - Nozzle pressure then convert to tip flow
 - 5-Hz for field data
 - 50-Hz for static data
- GPS – location and speed

Field Testing



- 100-ft swath
- 30 channel control
- Capstan nozzle solenoids
- Wet-boom setup
- Post-herbicide application

Static Testing

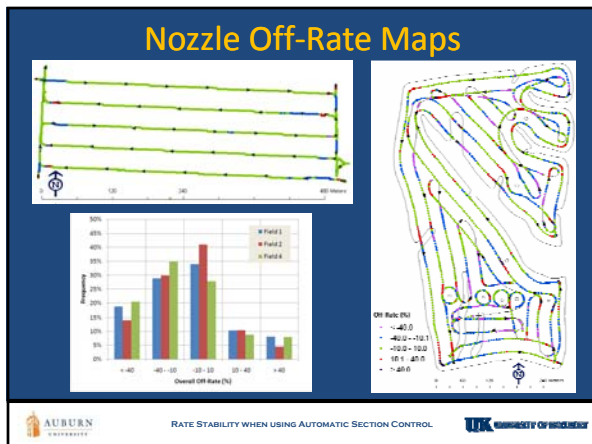


- 120-ft swath
- 7 boom-sections (auto-boom)
- Wet-boom setup
- Post herbicide application

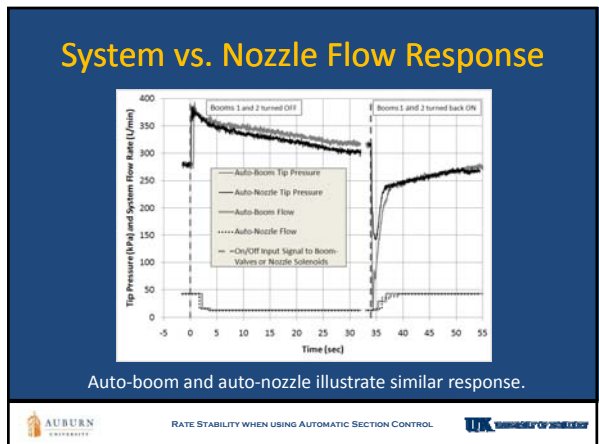
RESULTS



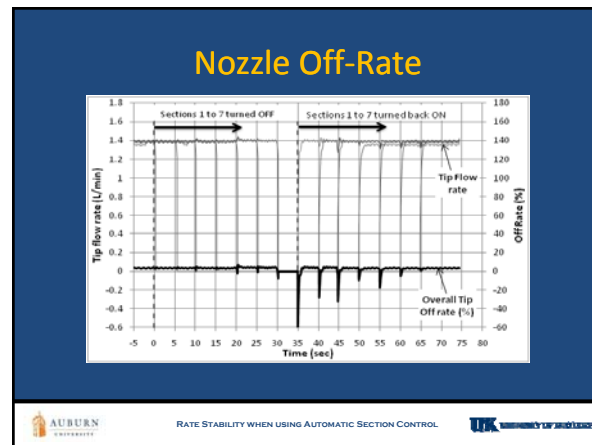
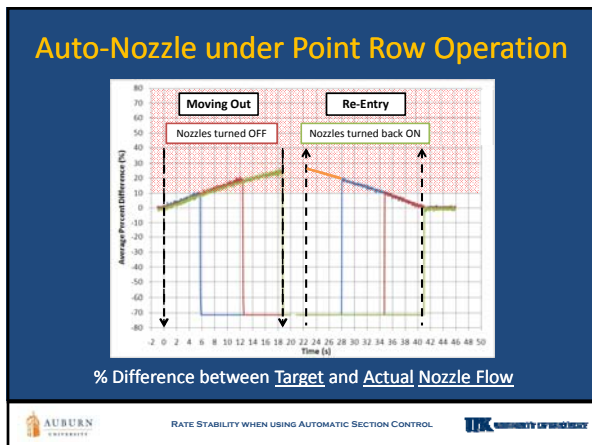
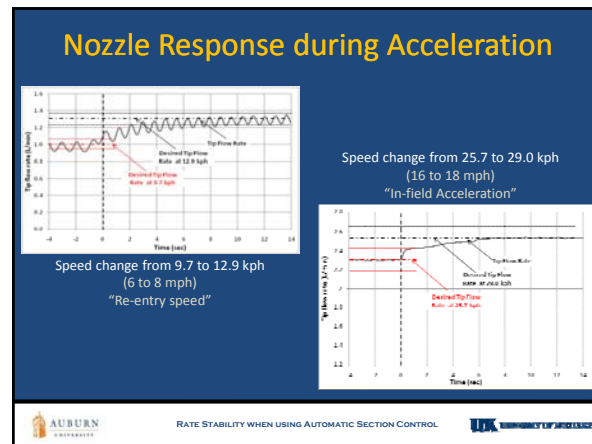
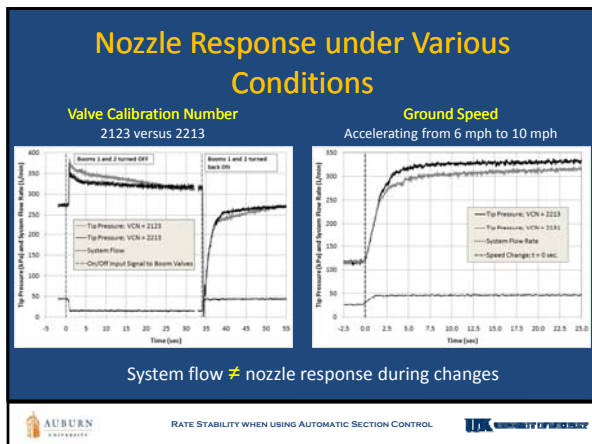
Nozzle Off-Rate Maps



System vs. Nozzle Flow Response



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Results

- Off-rate can occur more frequently than expected
- Extended nozzle, flow stabilization times
 - Several seconds in some operating conditions (2 to 30 sec.)
 - System flow does not necessarily represent nozzle response
- System response impacted by:
 - ✓ Acceleration
 - ✓ Auto-swath technology engagement (resolution)
 - ✓ Valve control number (VCN) / Setup

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Final Thoughts...

- As control resolution decreases (section vs nozzle):
 - More demand and response on control system
 - Move feedback closer to point of application
- Nozzle pressure variation (drift?)

- Further advance control algorithms/hardware to reduce errors (application efficacy)

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Thank-You

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