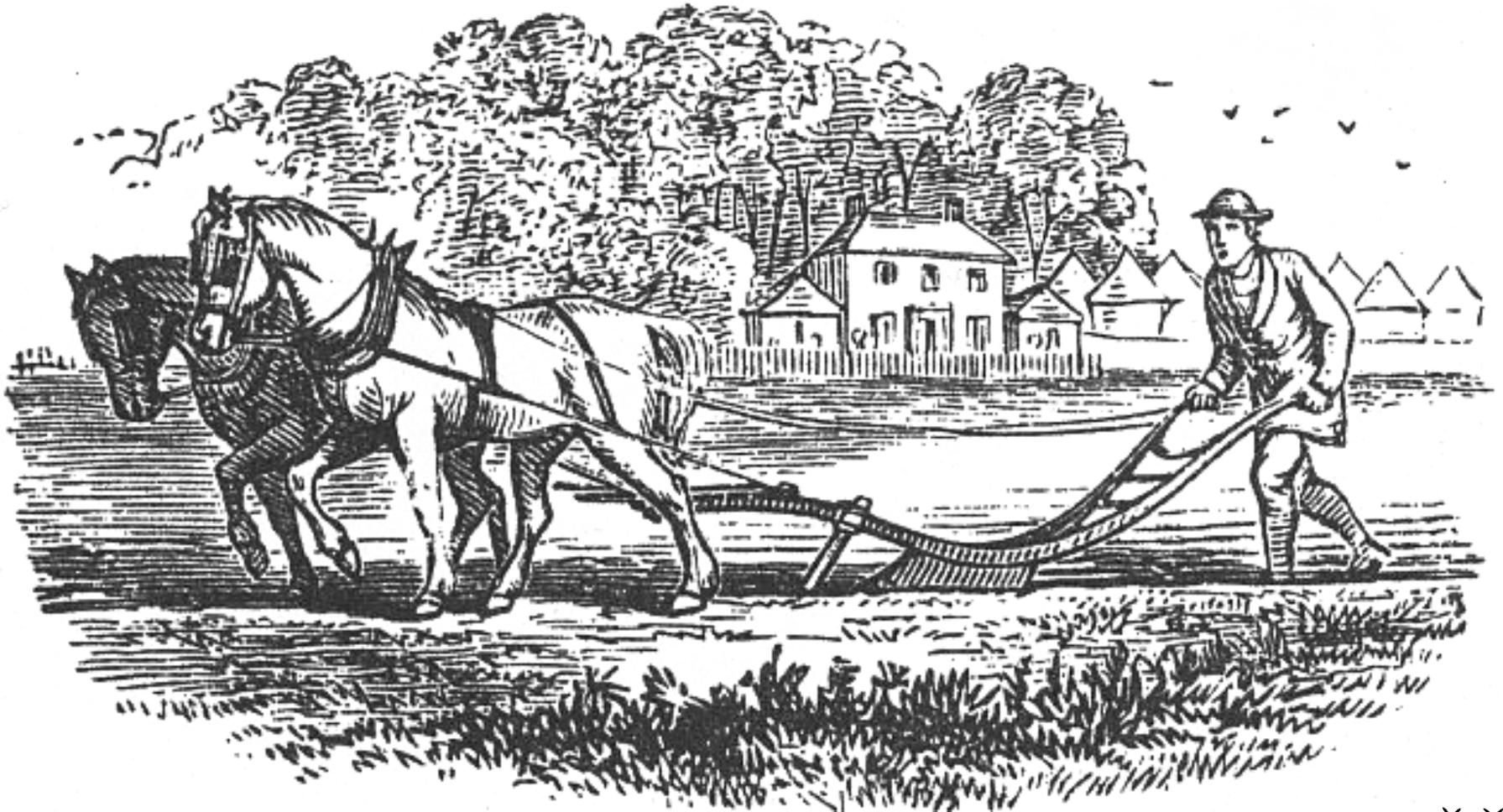


BEYOND THE “WOW” FACTOR

UAV Technology In Agriculture
Past, Present, and Future



The Past



The Present

- Crop Scouting Tool
 - Eye in the sky
 - Detection of plant stress
 - Insect and disease pressures
 - Equipment and weather related problems
- Digital Elevation Models/Topography
 - Drainage planning
- Yield Estimator

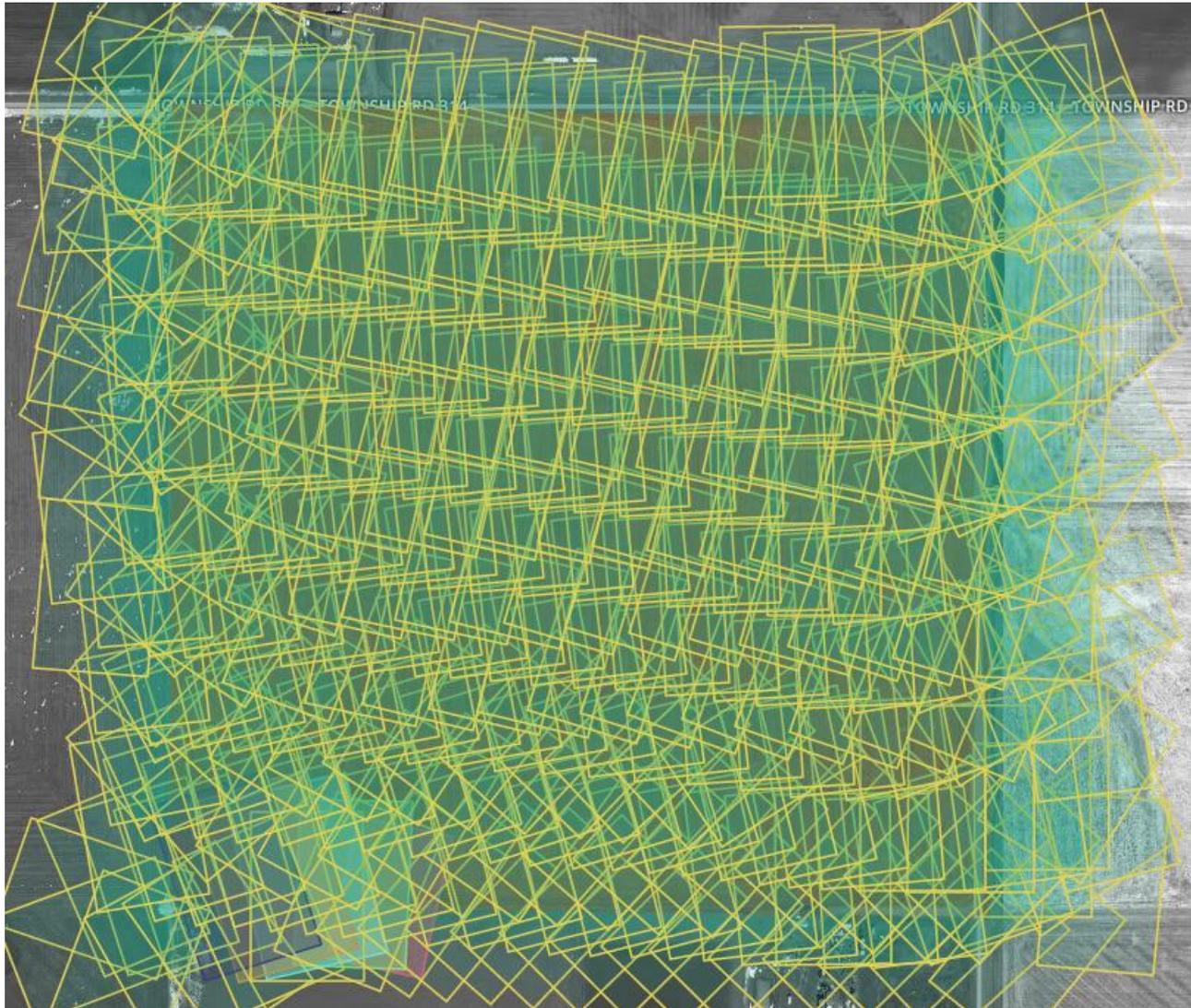
Tiled vs. Untiled



Flight Planning



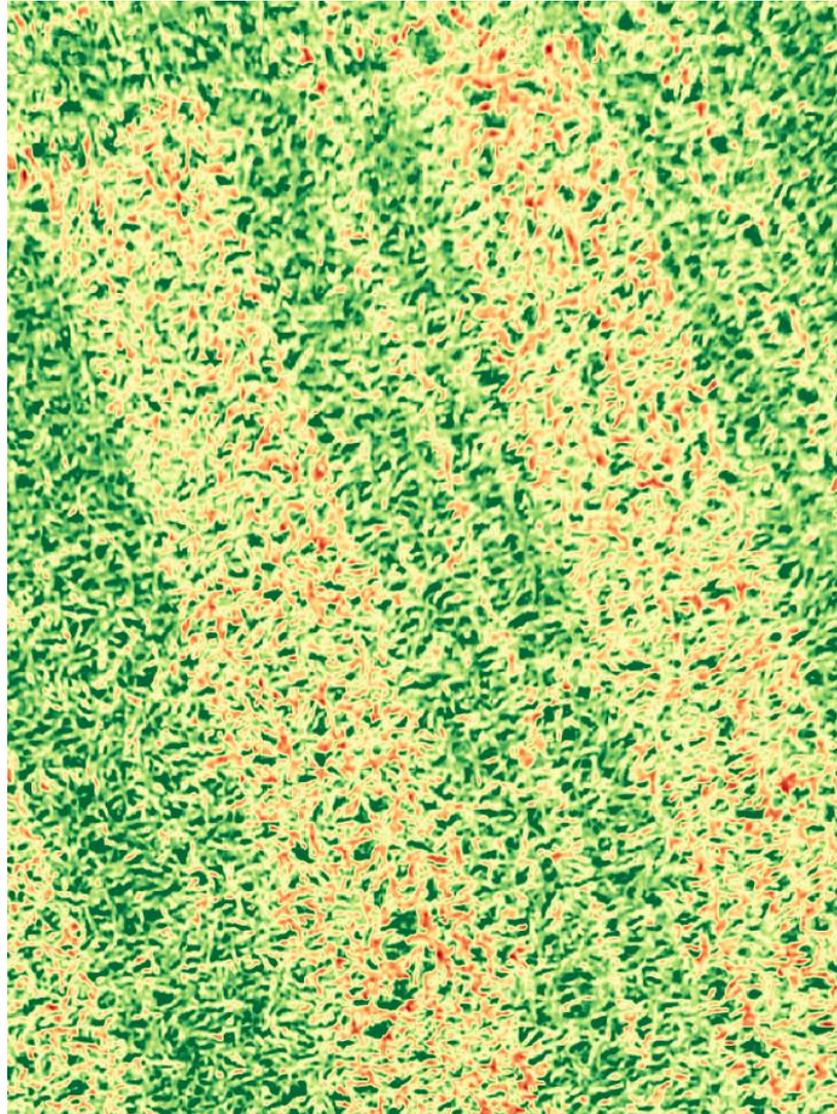
Stitching



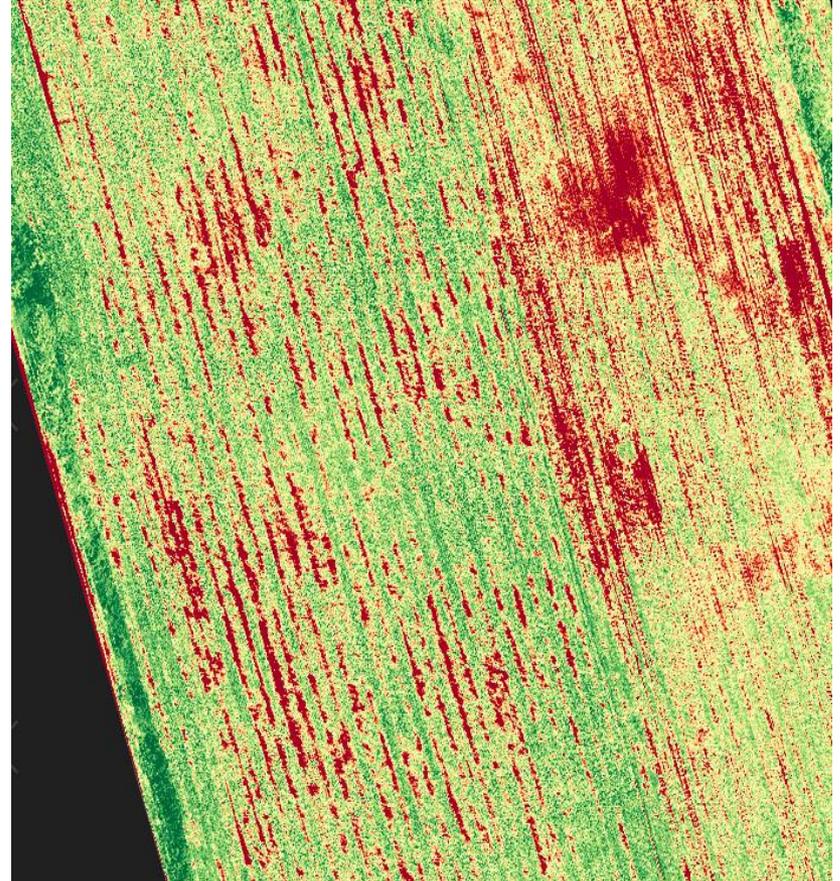
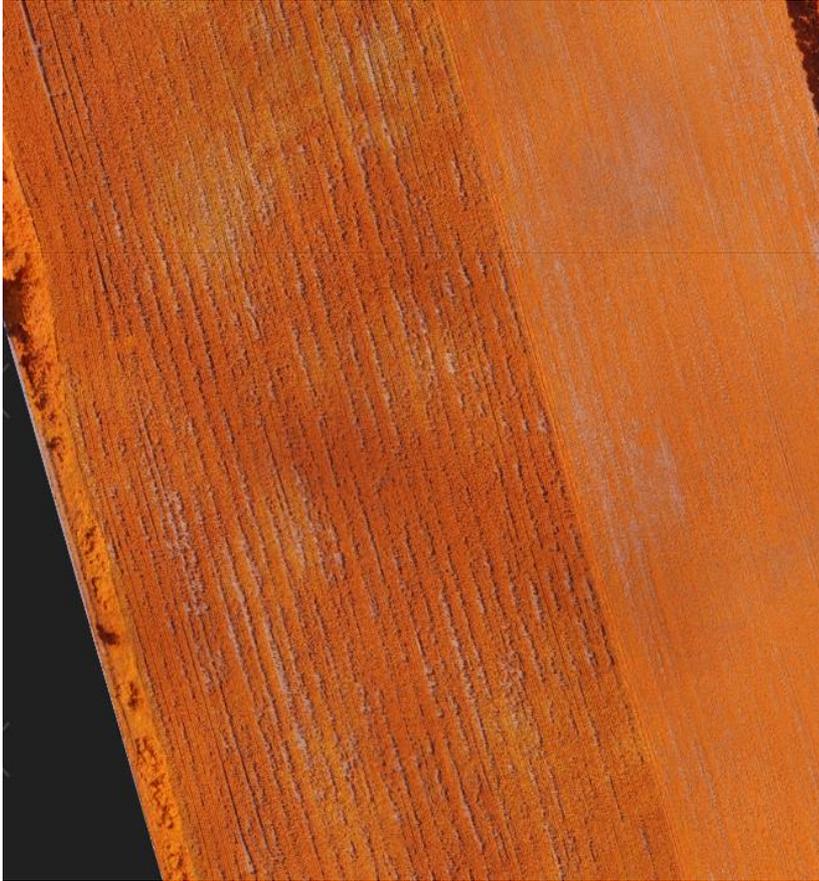
Location of Tile Runs



High Resolution Images

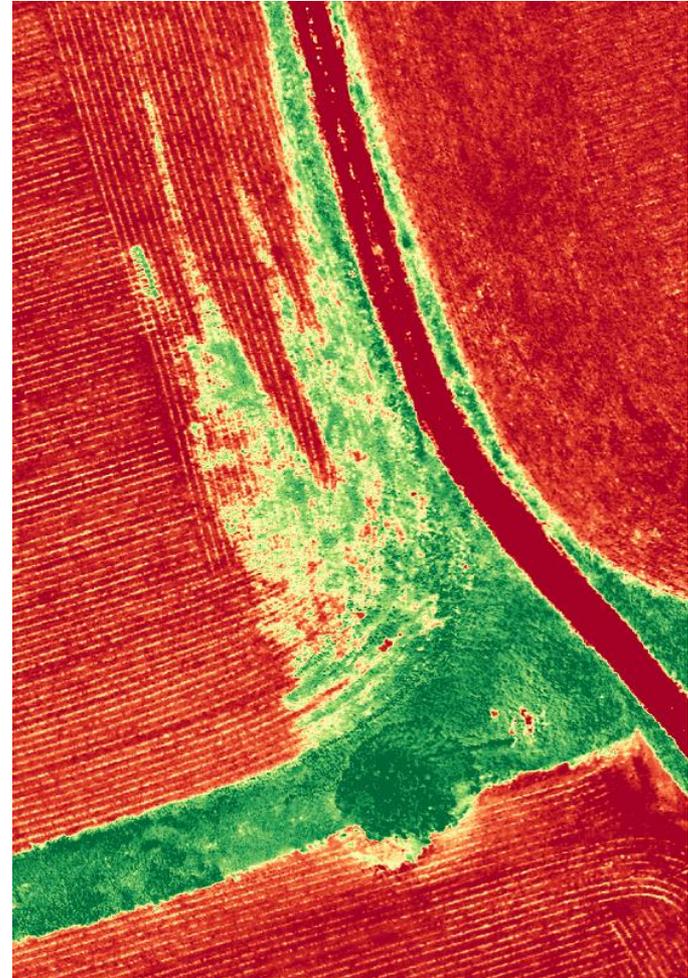


Crop Scouting



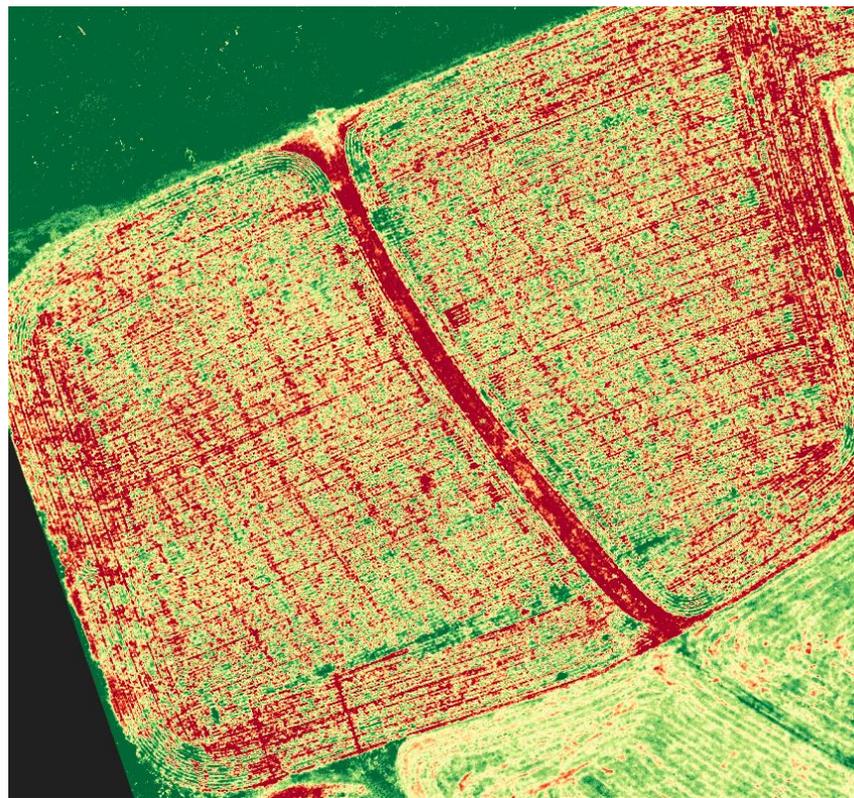
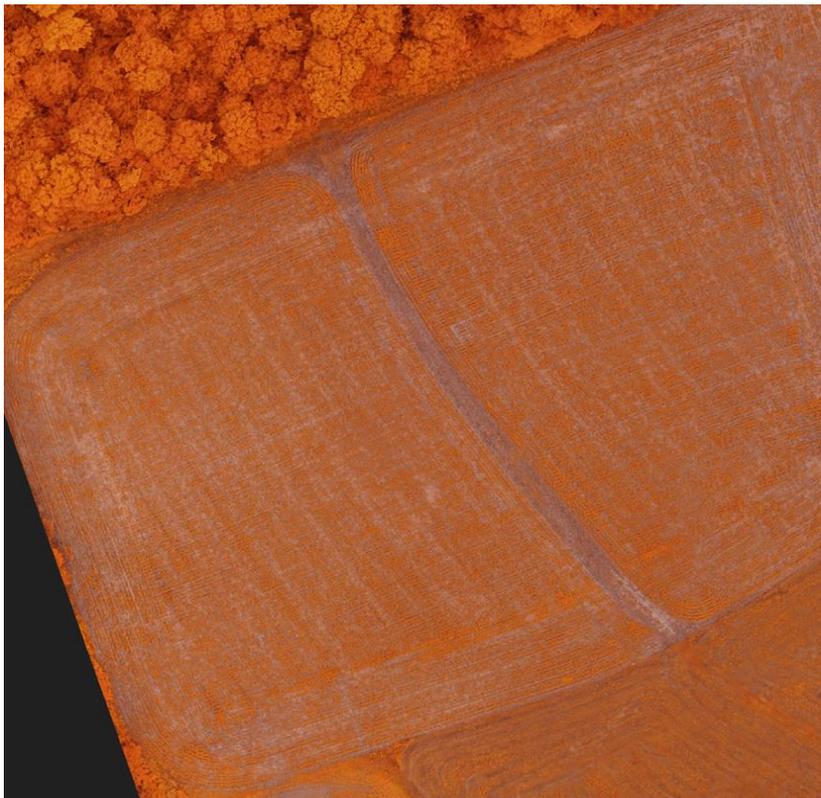
Corn/Beans – July 21, 2015

Best Management Practices



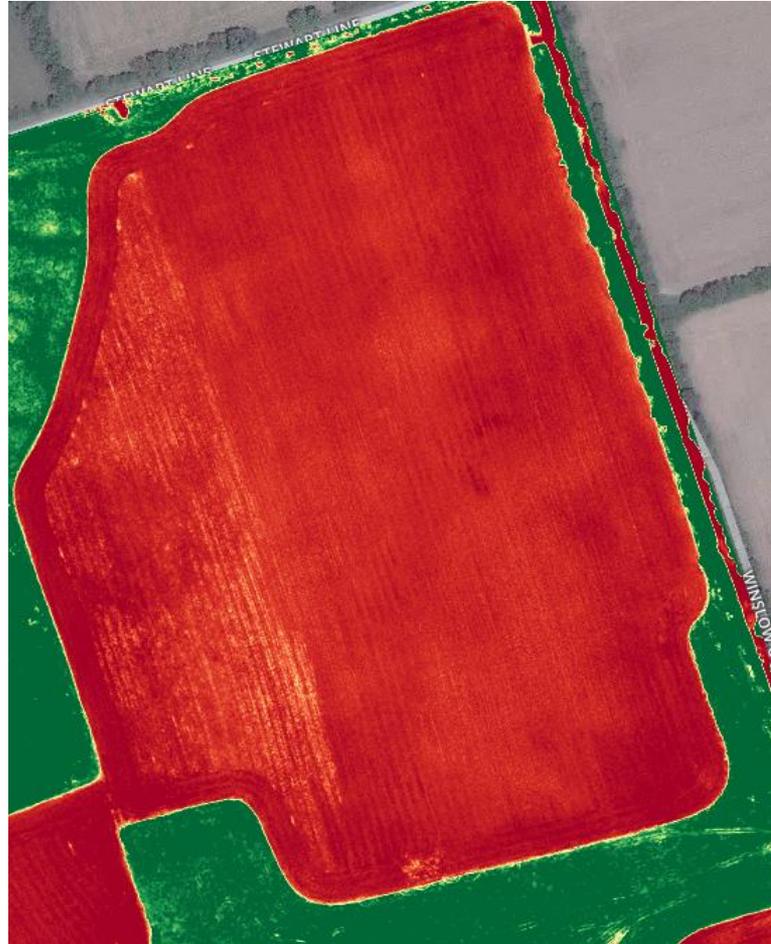
Sprayed May 25, 2015 - Image June 17, 2015

Equipment Issues



Planted May 19, 2015 – Image July 9, 2015

Herbicide Management



Bare Ground – June 4, 2015

Seed Variety Analysis

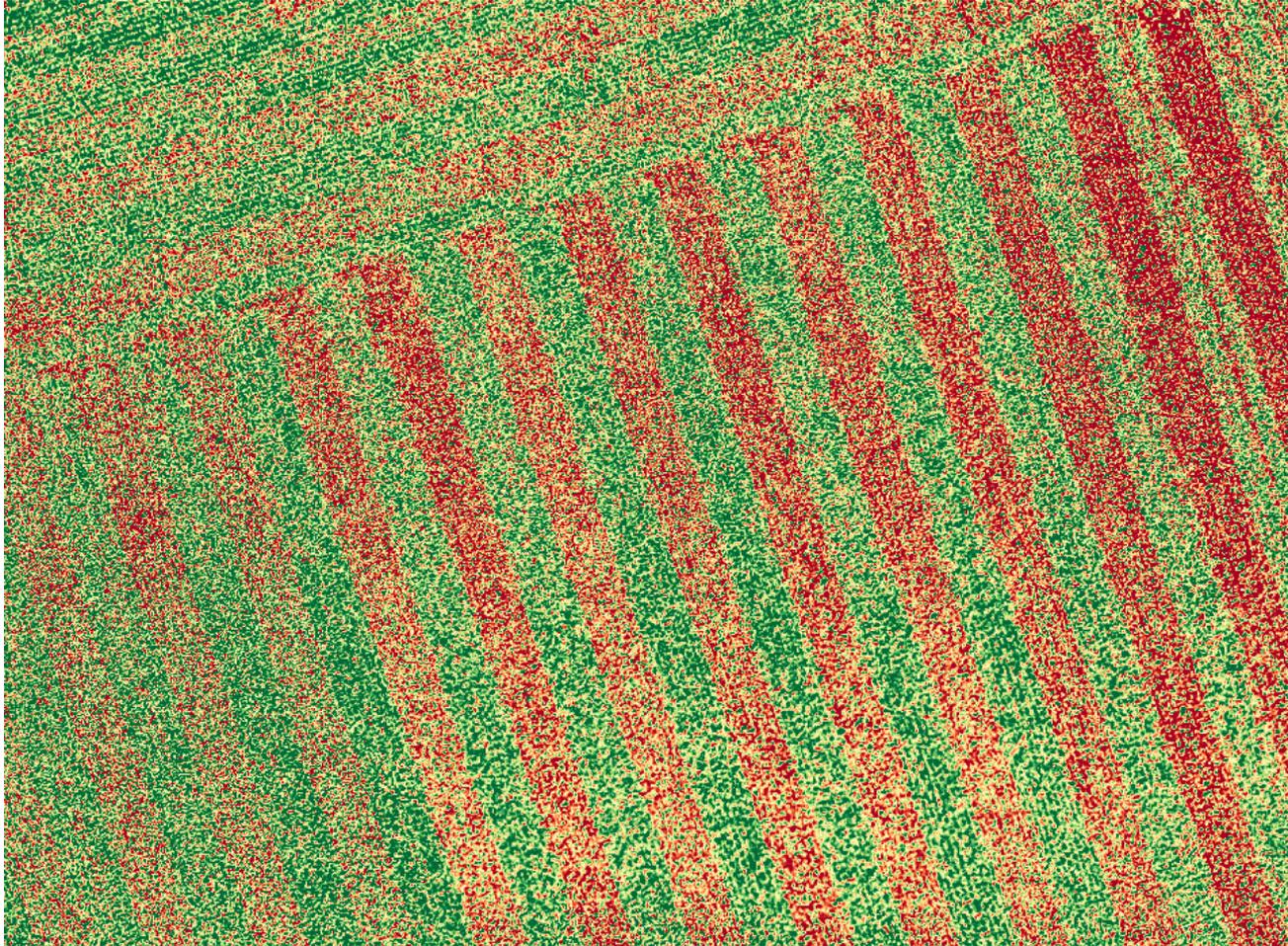
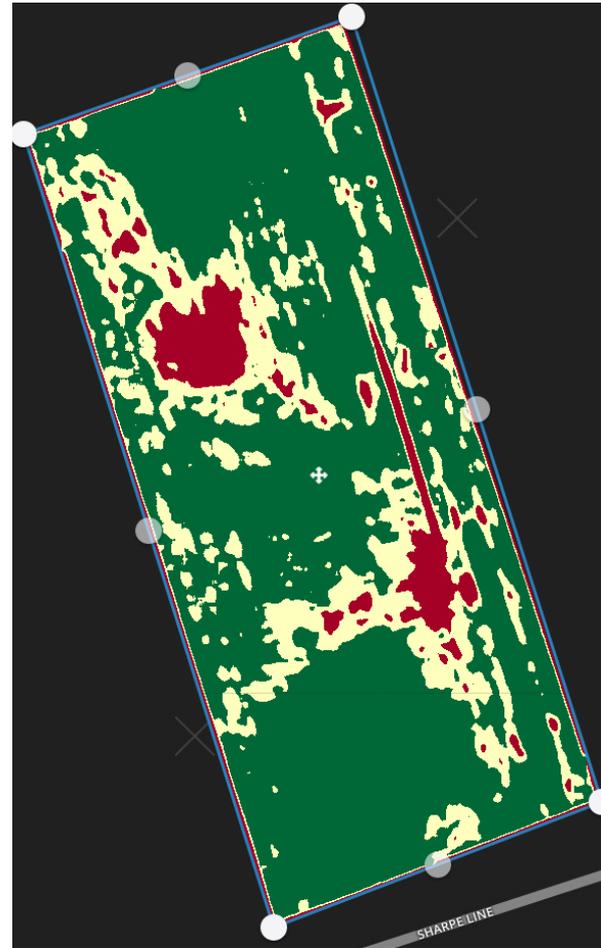
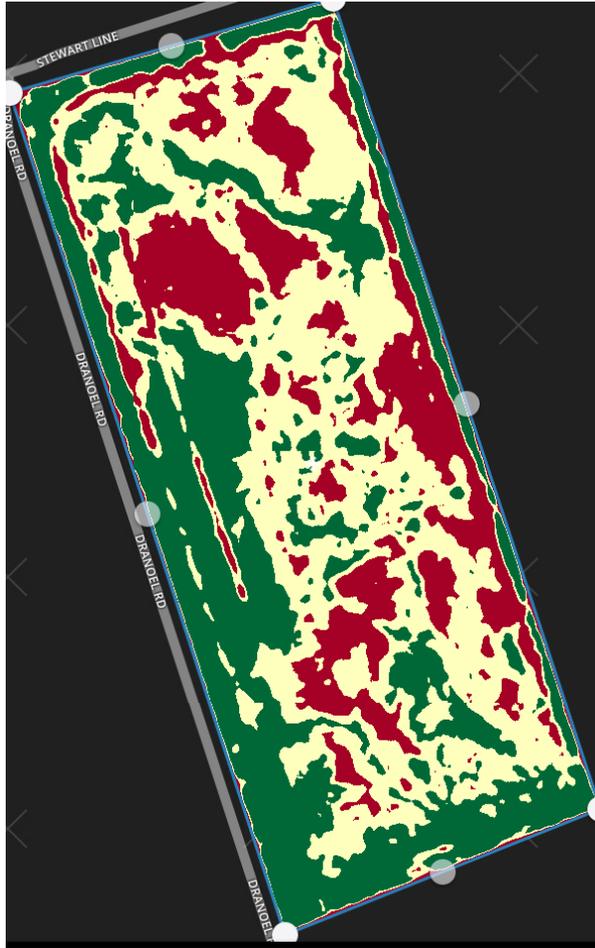


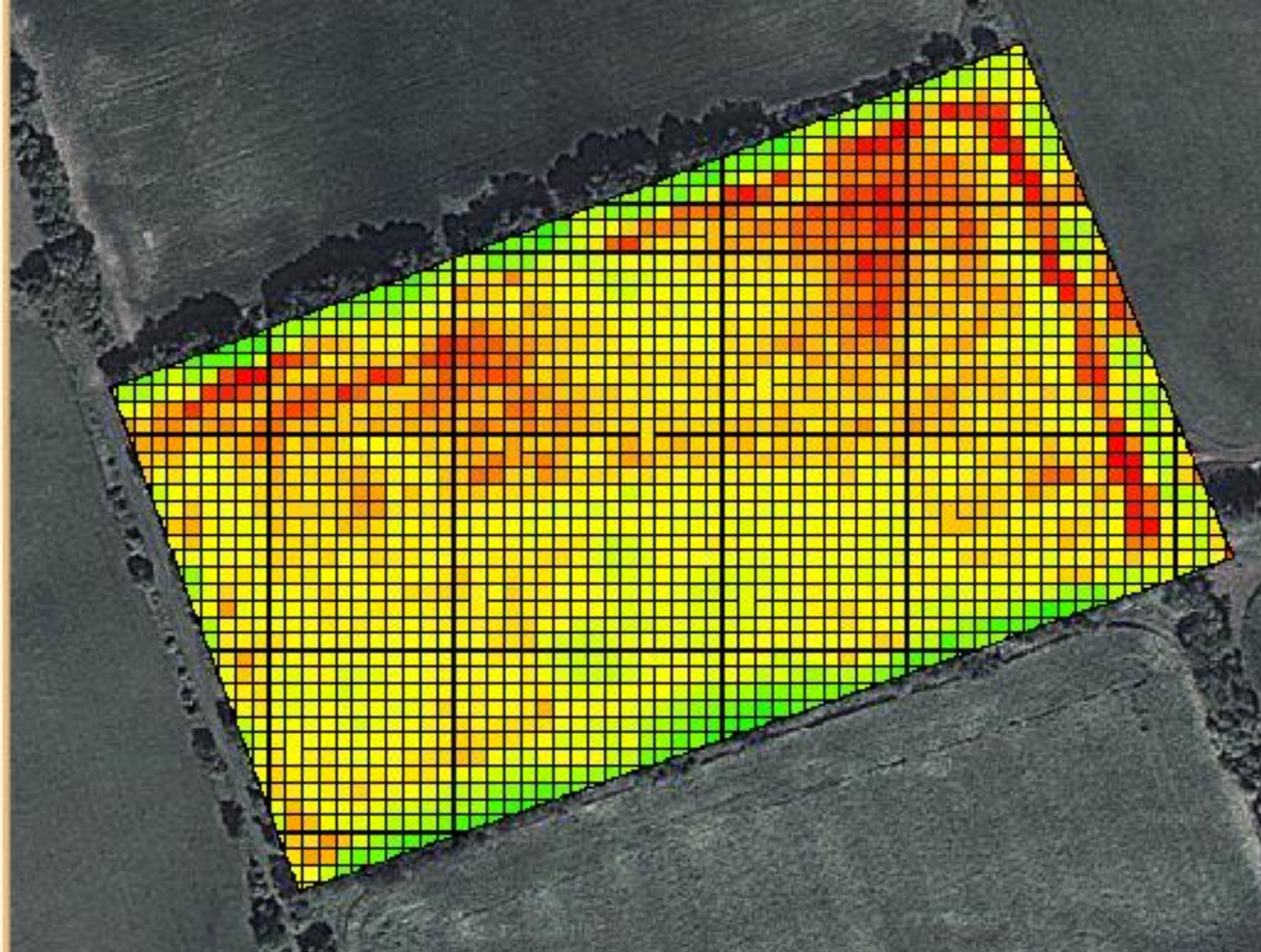
Image August 5, 2015

Precision Agriculture

- Creation of Management Zones
 - Variability measurements – broad scale
- Prescription Management
 - Nitrogen, fertility
- Data Exports
 - Integrate with current farm software
 - Layer with existing data
 - Soil analysis
 - Yield data
- Digital Elevation Models/Topography

Zone Maps





The Future

- New Tools and Software
 - Plant stand counts
 - Determining economic thresholds
 - Pro-active management opportunities
- Sensor Improvements
 - Multispectral bands
 - Obtaining absolute values
 - Cost/weight limitations and considerations
- Hardware Improvements
 - Beyond line of sight
 - Battery technologies
- Managing Expectations
 - Historical data required
 - Grower input required, calibrations
 - Boots on the ground still required

The Future

Prescriptible

Predictable



“Agriculture....will be the biggest market”

- The Economist, December 5th 2015, Airborne Innovation

“ In Japan agriculture, 2.4 million acres are sprayed annually by unmanned helicopters”

- Yamaha Precision Agriculture, 2015



Custom Hiring

- Acquisition Costs
 - Hardware
 - Multiple platforms for different applications
 - Sensors
 - Variety of sensors for different applications
- Variable Costs
 - Software
 - Multiple partners
 - Data
 - Insurance
- Personnel
 - Pilot & crew members
 - IT personnel to manage data
- Regulatory Environment

Questions?

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