



# **NAIP 2008 Summary Briefing Suredex Corporation**

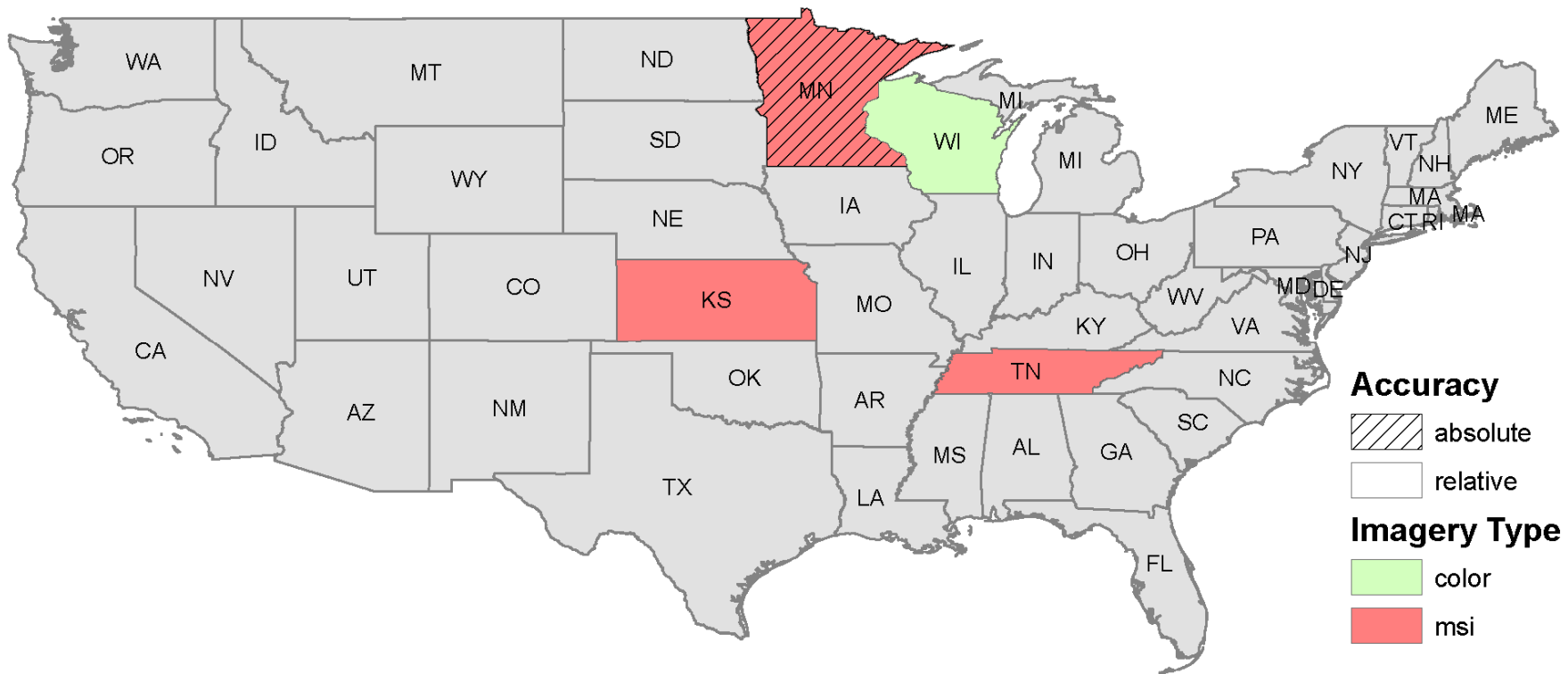
**19 November, 2008**

Ron Hoffmann, President

Craig Molander, Senior Vice President of Business Development

Tim Bohn, Project Manager

# Surdex 2008 Project Areas – 4 States



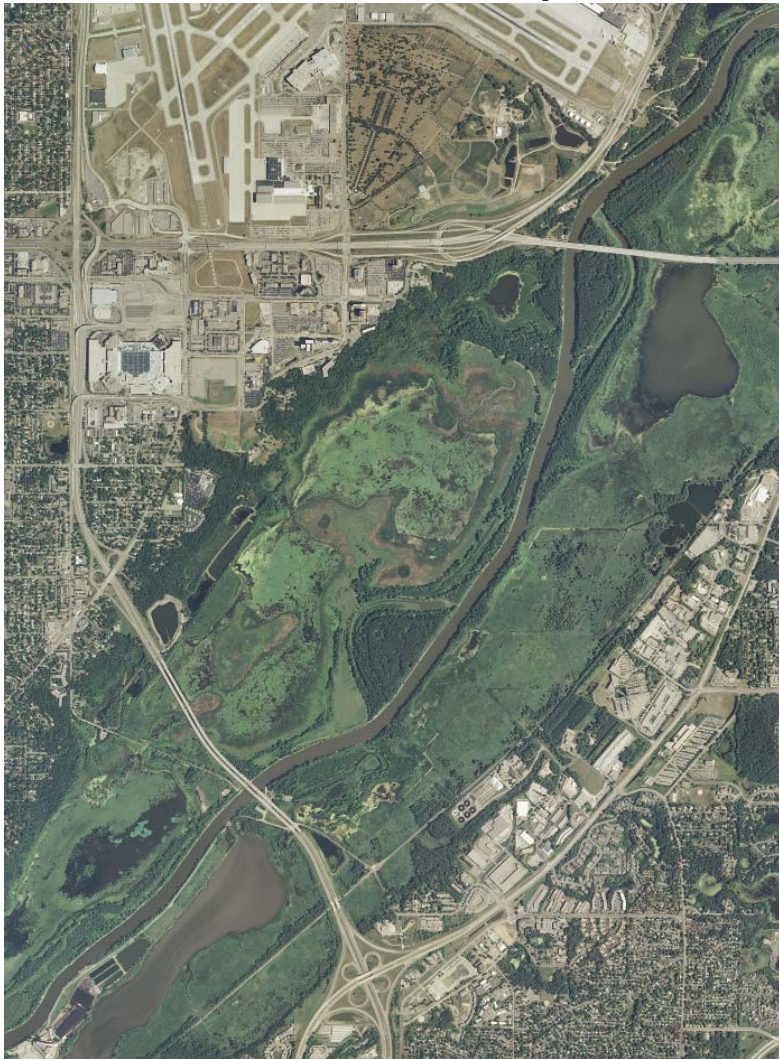
# Surdex Project Area Details

State	DOQQs	Sq Mi	Counties	Type	Accuracy	Windows
KS	5,902	86,212	105	MSI	Relative	#1: 6/15 – 8/7 #2: 7/1 – 9/1
MN	6,765	87,328	87	MSI	Absolute	6/1 – 8/31 (NE: 5/6 start)
TN	3,001	45,379	95	MSI	Relative	#1: 4/1 – 9/15 #2: 6/1 – 9/15
WI	4,503	59,899	72	Color	Relative	6/1 – 8/31
	<b>20,171</b>	<b>278,818</b>	<b>359</b>			

# Project Execution

- All-digital acquisition (Z/I Imaging DMC)
  - 60% forwardlap/30% sidelap (stereo)
  - Flown at ~31,000' MSL – net ~3.0' GSD
  - ABGPS & IMU acquisition
  - ~28,000 exposures
  - Used 3 Surdex Cessna 441 (Conquest) aircraft
- 40 control points used in MN (absolute accuracy)
- Prototype seamline file for KS

# Color & CIR (2008 NAIP, Minnesota)



# Acquisition Summary

- MN & WI planned/flowed as a single project
  - Common seasonal window (1 Jun – 31 Aug)
  - Northeast MN counties allowed ~5 May
  - Early-middle summer rain/flooding/standing water in MN and WI were problematic
  - Had to avoid some WI counties – waiting for flooding to recede
- Appalachians in TN planned SW-NE

## Acquisition Performance

- KS & TN enjoyed fairly normal seasons
- Single 2-week extension in MN/WI:
  - Hampered by rain/flooding
  - Confined to <100 re-flight exposures
- All other states accomplished within contractual schedules (1-2 weeks early)

# Acquisition Statistics

## ■ Overall:

- Total days: 154
- Acquisition days: 66 (43%)

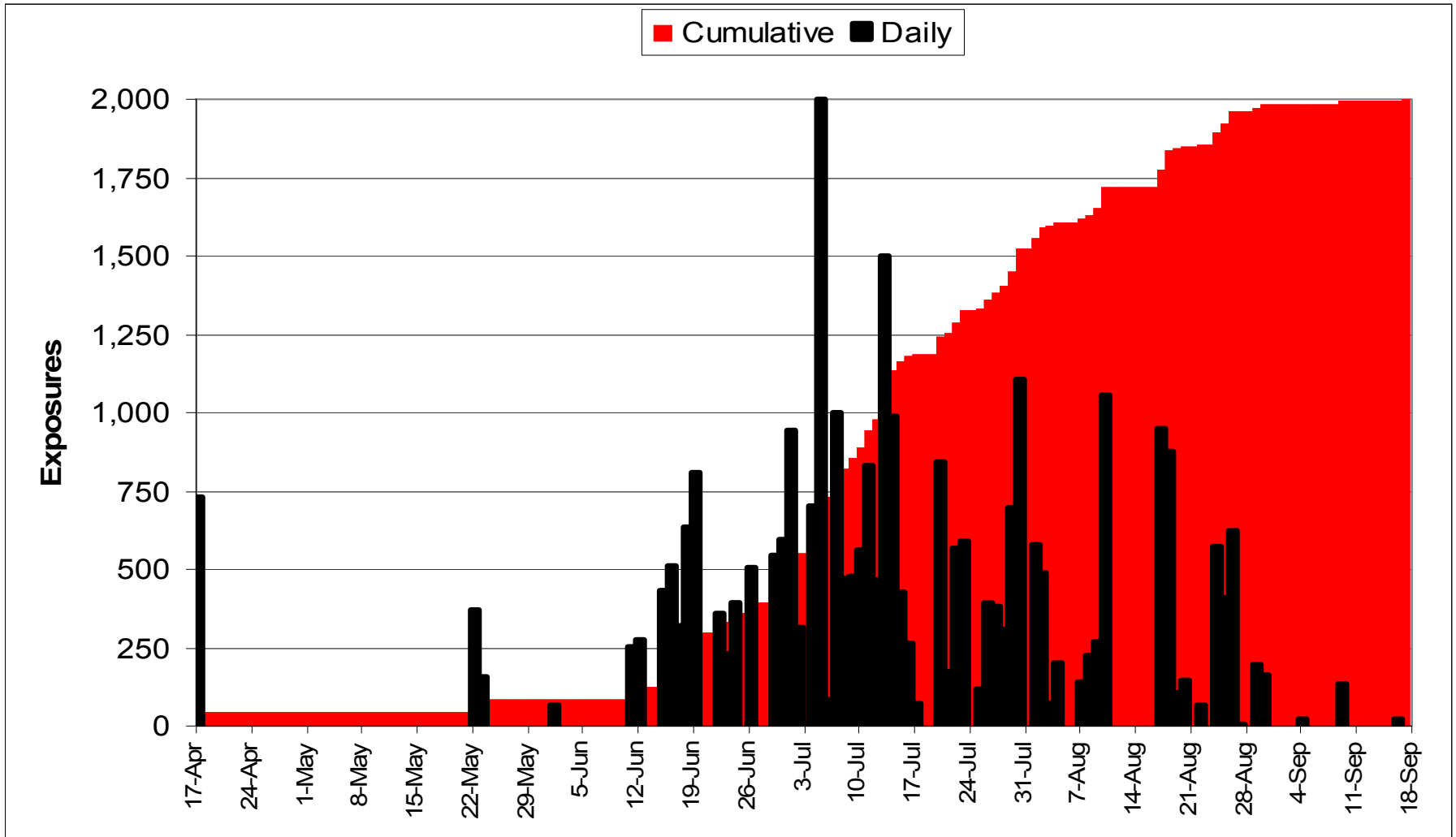
## ■ ~9 sq mi/exp neat coverage on average

## ■ Daily exposure statistics

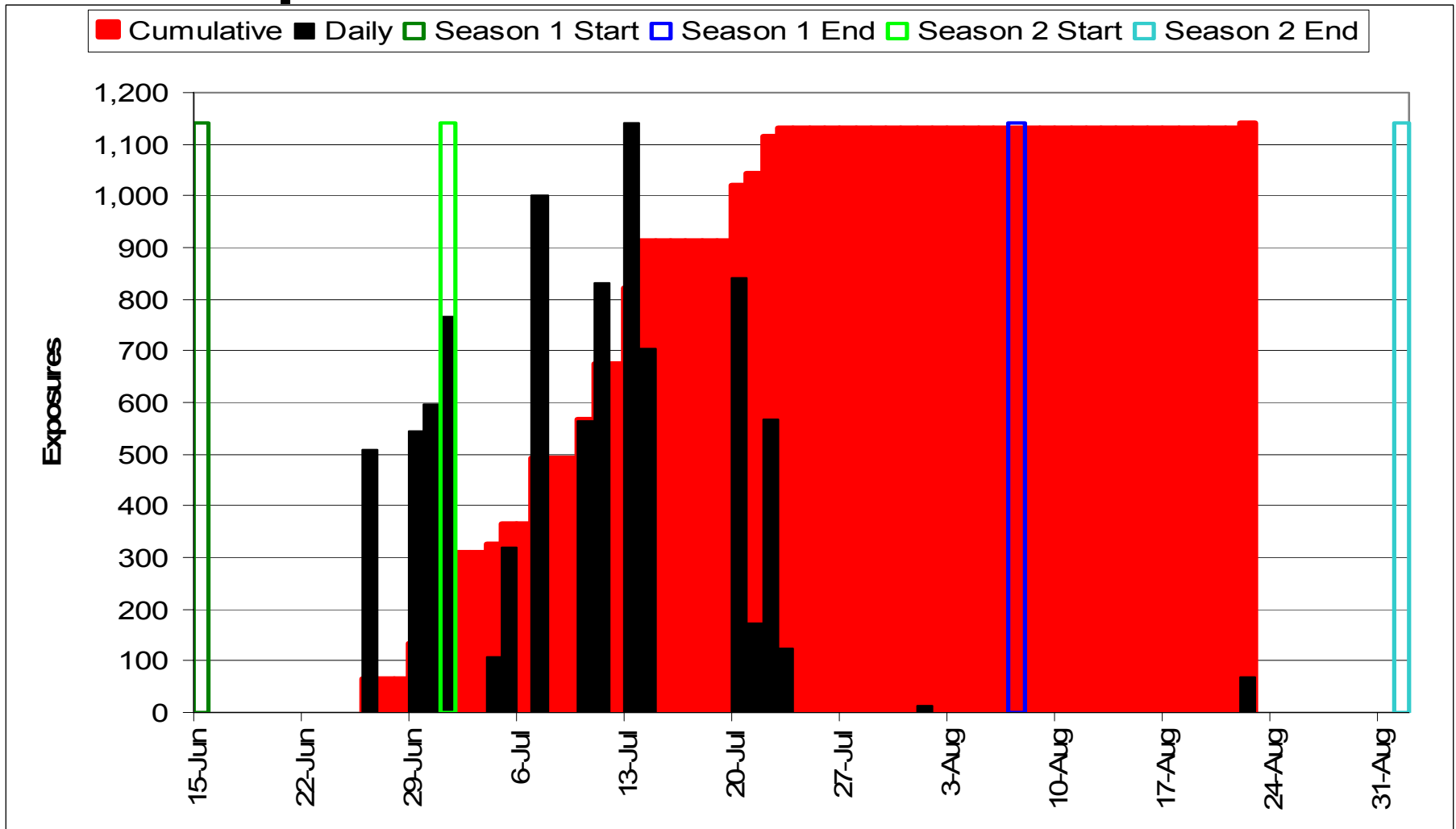
- Minimum: 8
- Maximum: 1,999 (~18,000 sq mi)
- Average: 468 (~4,200 sq mi)



# Overall Acquisition

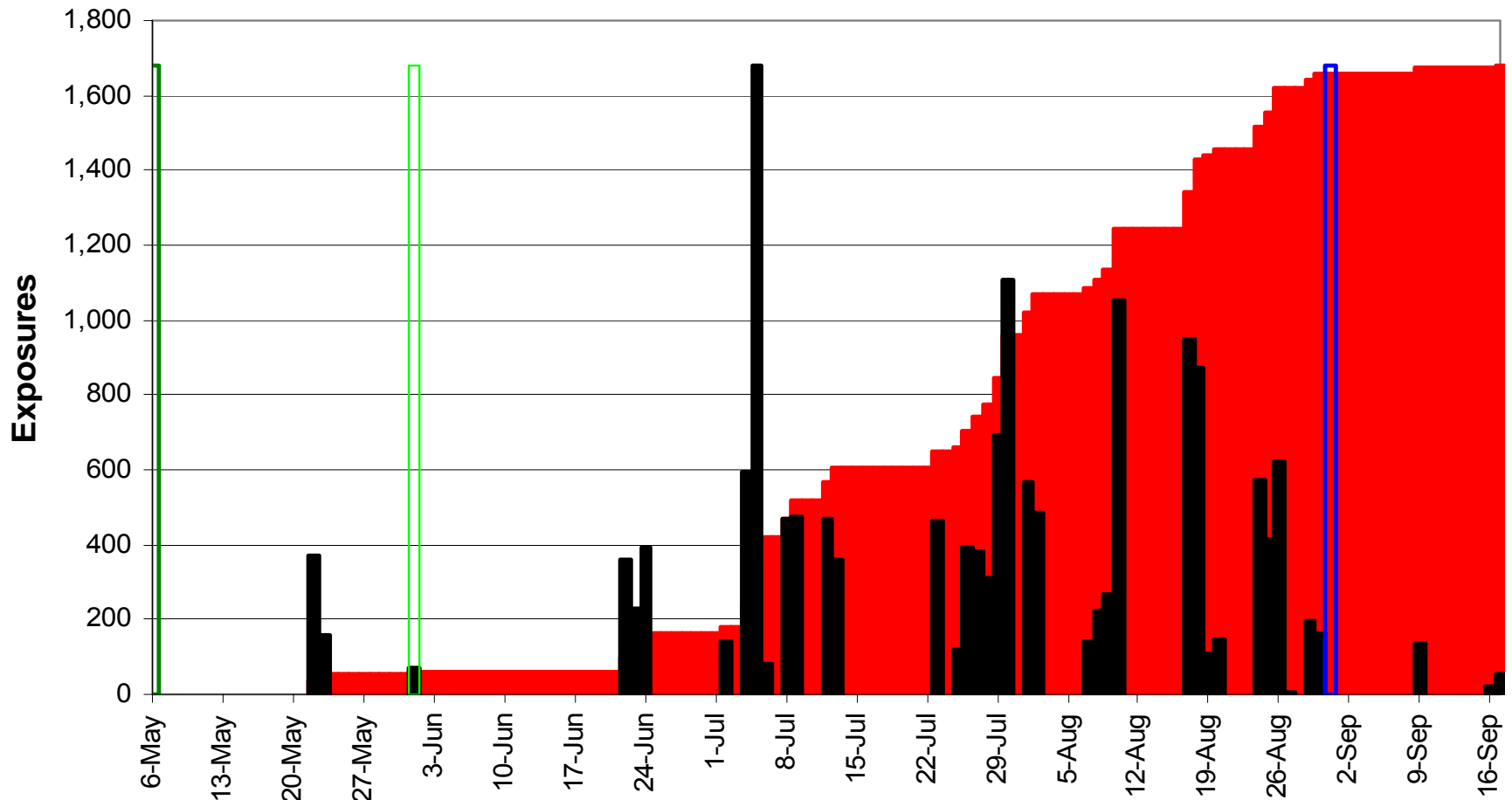


# KS Acquisition

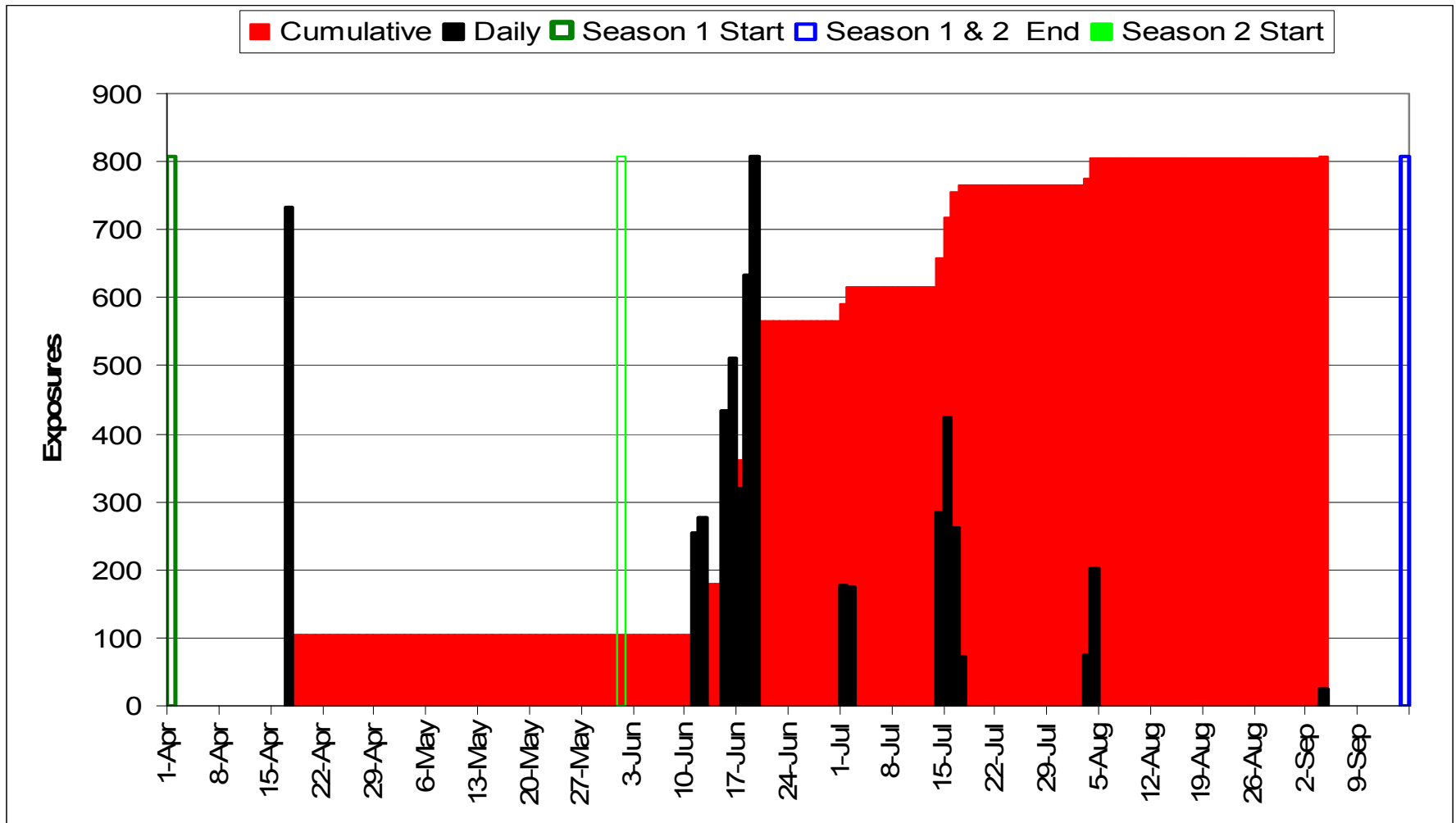


# MN-WI Acquisition

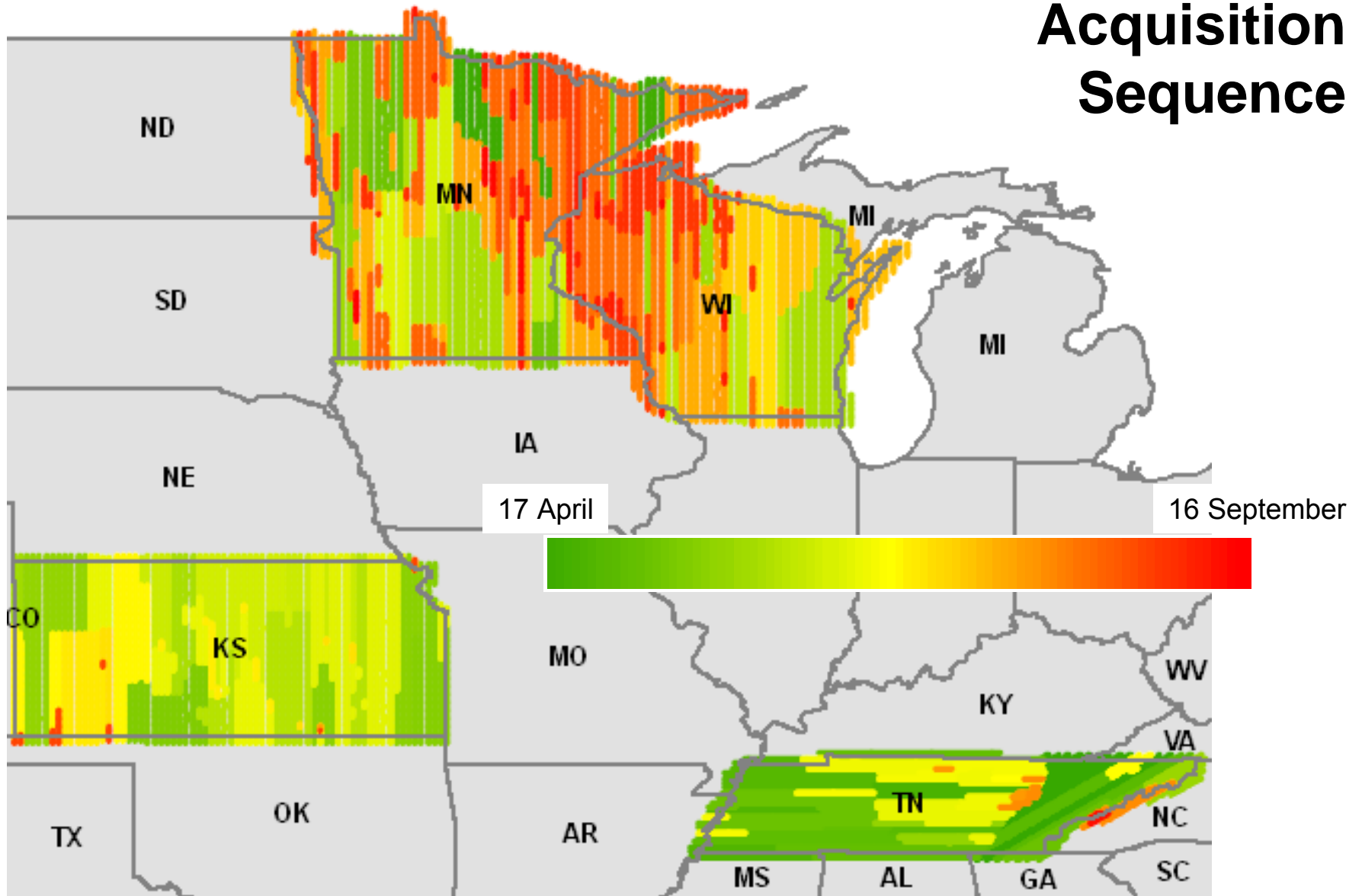
■ Cumulative 
 ■ Daily 
 □ NE MN Start 
 □ Season Start 
 □ Season End



# TN Acquisition



# Acquisition Sequence



# Delivery Performance

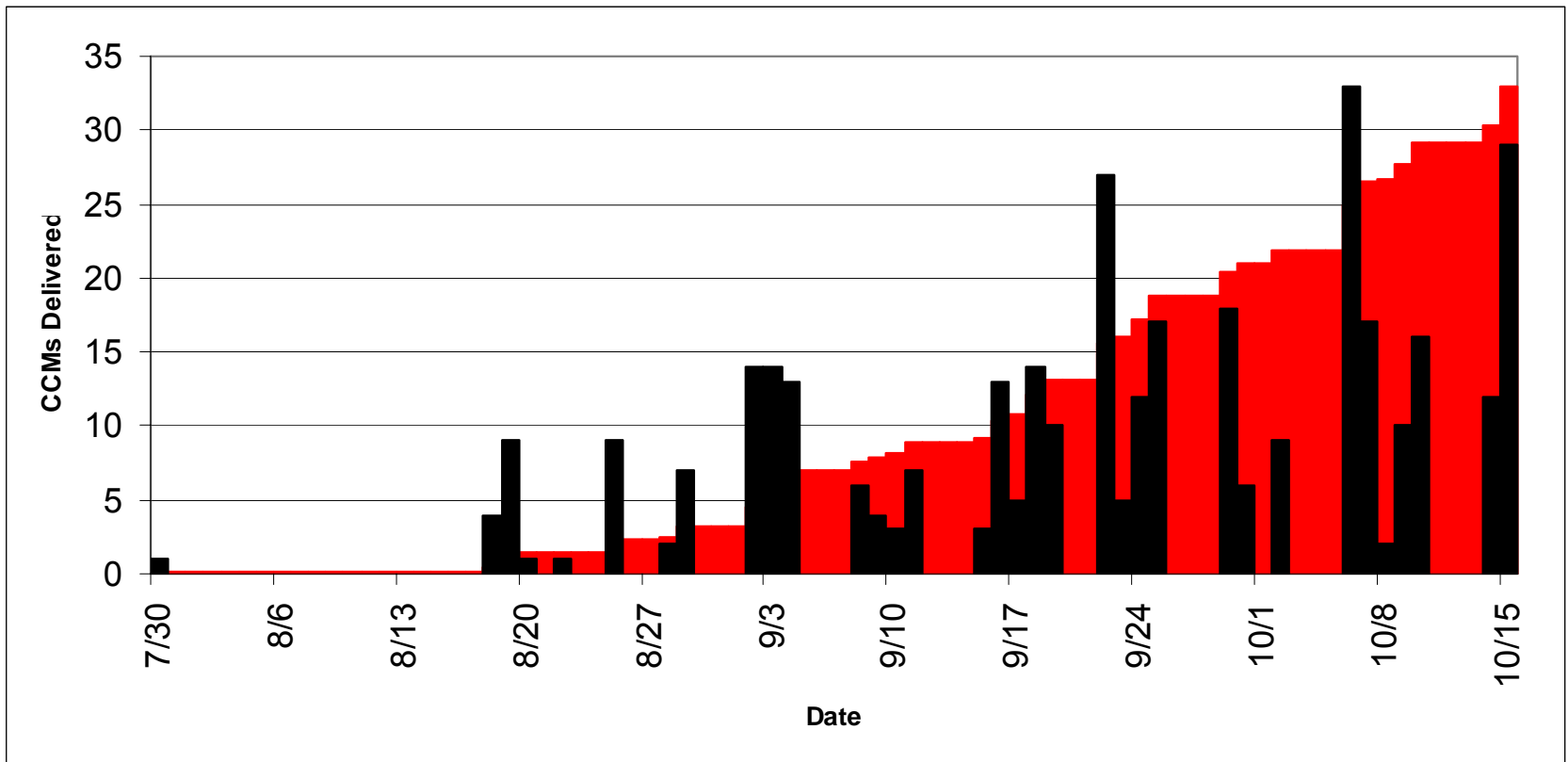
- Initial CCMs delivered within contractual timeline, except...
- (1) Surdex script handling JPEG2000 compression of 4-band imagery was in error
  - Specified 15:1 not set – defaulted to 20:1
  - Self-discovered and reported
  - All 4-band CCMs being re-compressed (KS, MN, TN)

## Delivery Performance (cont'd)

- (2) A few oversized counties in MN still being worked – counties broken into up to 6 parts
  - Laborious, time-consuming task of breaking into parts
  - Hard to predict actual size of CCM (JPEG2000)
  - Delays delivery

# CCM Delivery Profile – All States

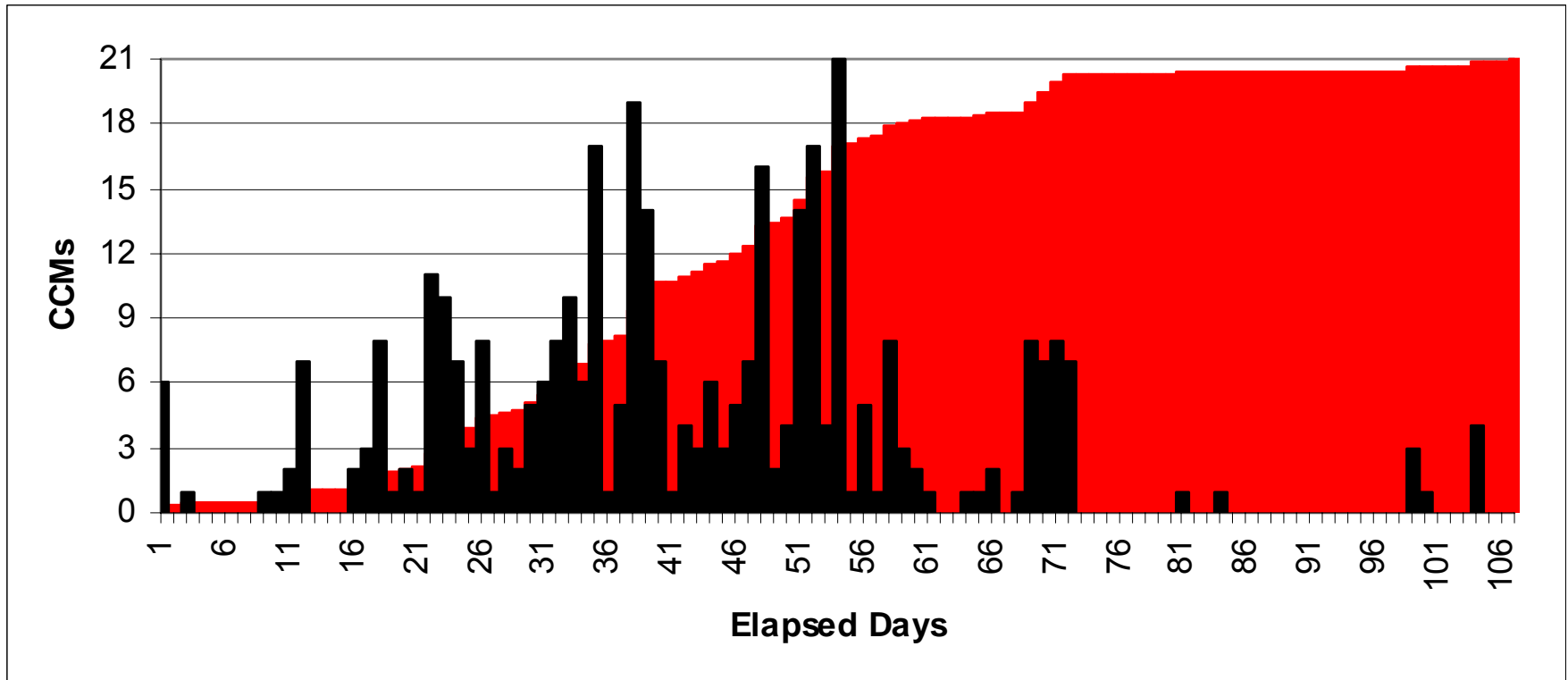
**NOTE: Does not include MN oversize counties**





# Elapsed Days of CCMs (Last Exposure in County Until Delivery Date)

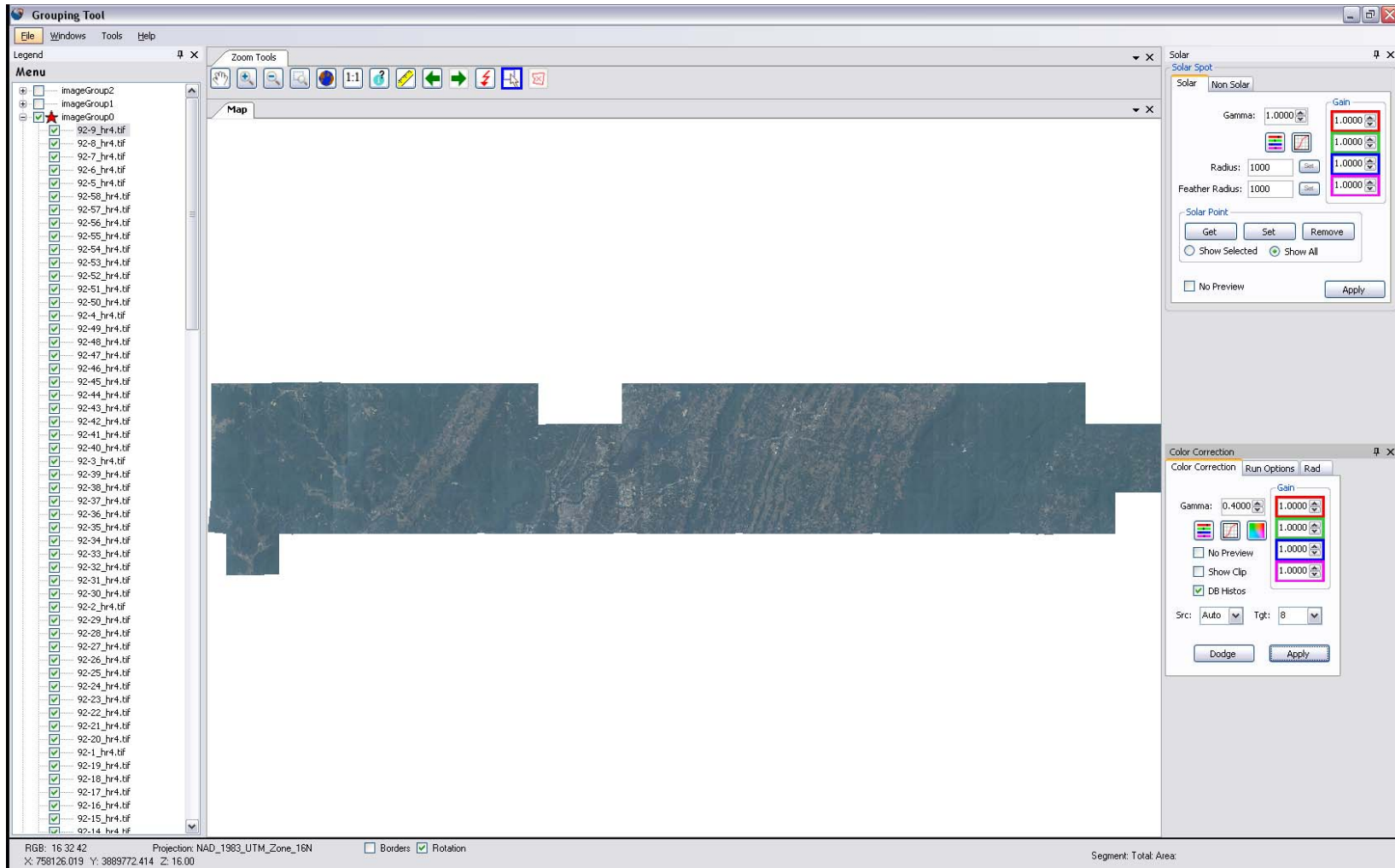
Within 45 Days: 31%  
 Within 60 Days: 59%  
 Within 75 Days: 87%



# Processing Improvements

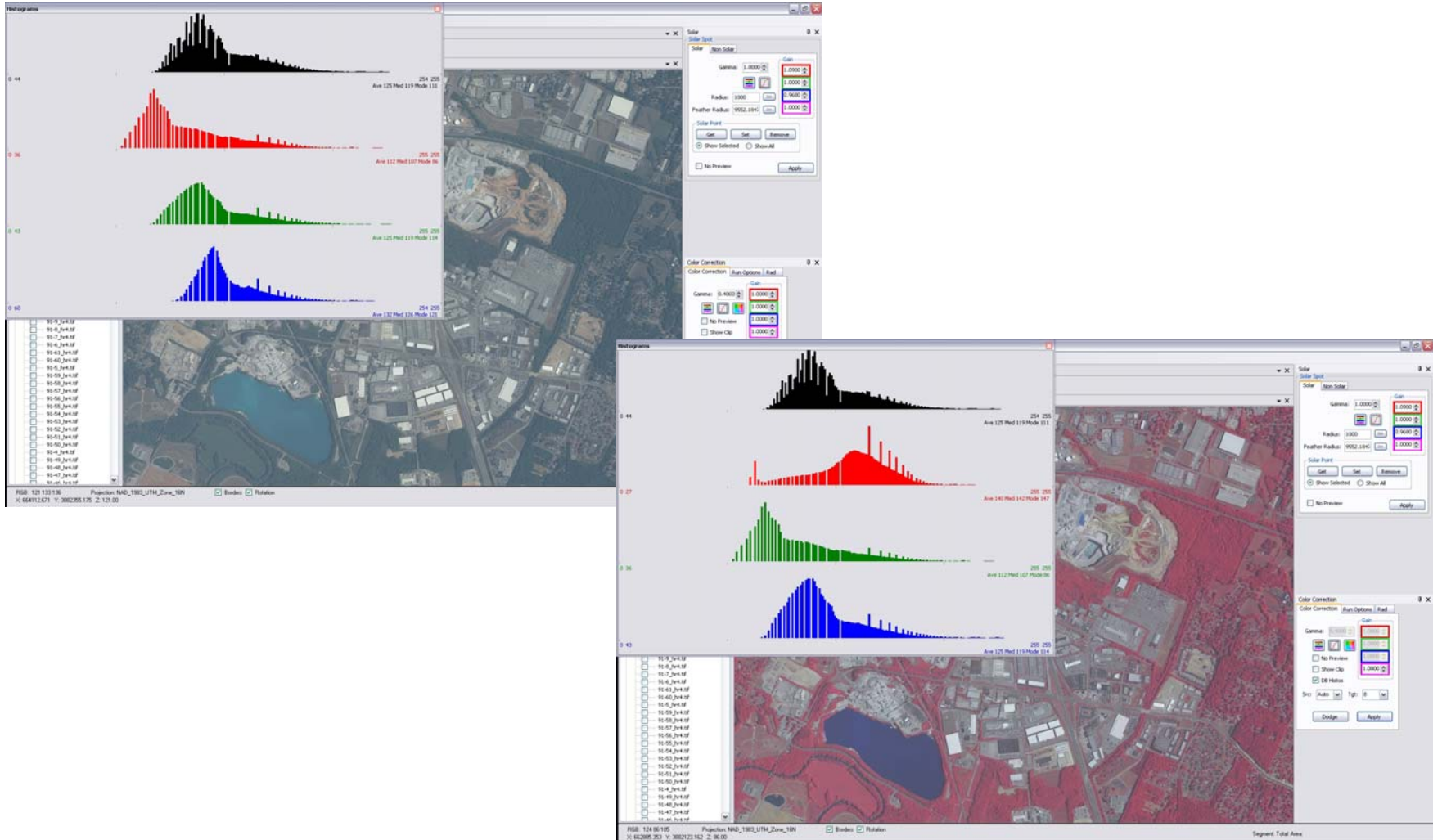
- Grouping Tool
  - Characterize each mission to achieve common colorimetry
  - Drives batch processing scripts for all exposures
  - Achieves image balance and metrics during image processing
  - Image metrics integrated into software
  - Supports 1,000s of images at a time
- Solar Correction
  - Centered on ground position where solar illumination and camera view angle are coincident (“hot spot”)
  - Dark area subtraction
  - Gain measurement
  - Mid-tone color alignment

# Grouping Tool: (>1,000 images, ~1TB – TN)



The screenshot displays the 'Grouping Tool' software interface. On the left, a 'Legend' panel lists a hierarchy of image groups: 'imageGroup2', 'imageGroup1', and 'imageGroup0'. Under 'imageGroup0', a long list of individual image files is shown, each with a small thumbnail icon and a checkmark, ranging from '92-14\_hr4.tif' at the bottom to '92-9\_hr4.tif' at the top. The central 'Map' area shows a satellite-style image of a terrain, with a large, semi-transparent dark rectangular area overlaid on the lower portion. To the right, there are two floating panels: 'Solar Spot' and 'Color Correction'. The 'Solar Spot' panel includes settings for 'Gamma' (1.0000), 'Radius' (1000), and 'Feather Radius' (1000), along with a 'Gain' color calibration tool. The 'Color Correction' panel includes settings for 'Gamma' (0.4000), 'Src' (Auto), and 'Tgt' (8), also featuring a 'Gain' color calibration tool. At the bottom of the window, a status bar provides technical details: 'RGB: 16 32 42', 'Projection: NAD\_1983\_UTM\_Zone\_16N', 'X: 758126.019 Y: 3889772.414 Z: 16.00', and 'Segment: Total Area'. The interface also includes a menu bar (File, Windows, Tools, Help) and a toolbar with various zoom and navigation tools.

# Color & CIR Views During Image Processing

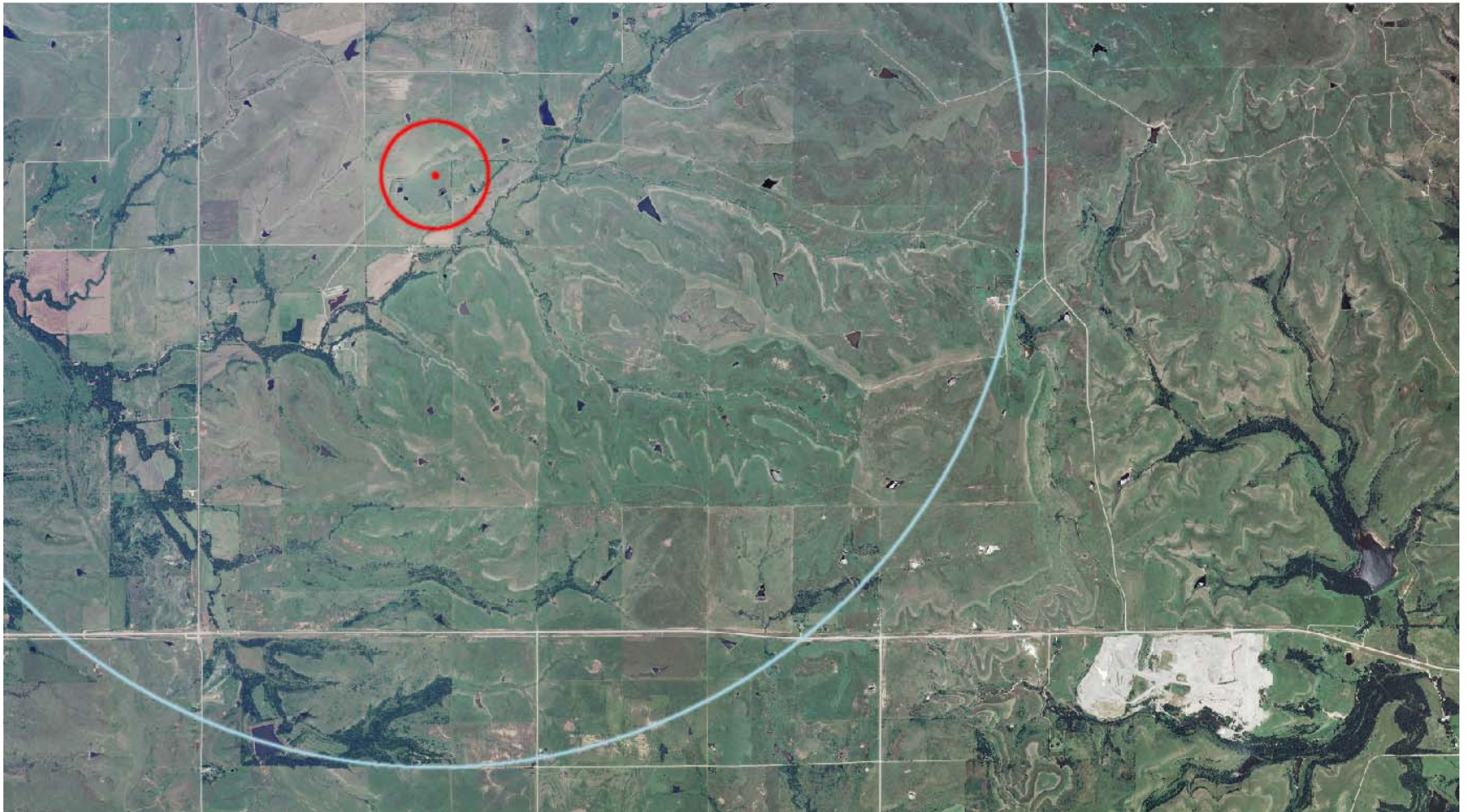


The image displays four sequential stages of image processing for an aerial photograph:

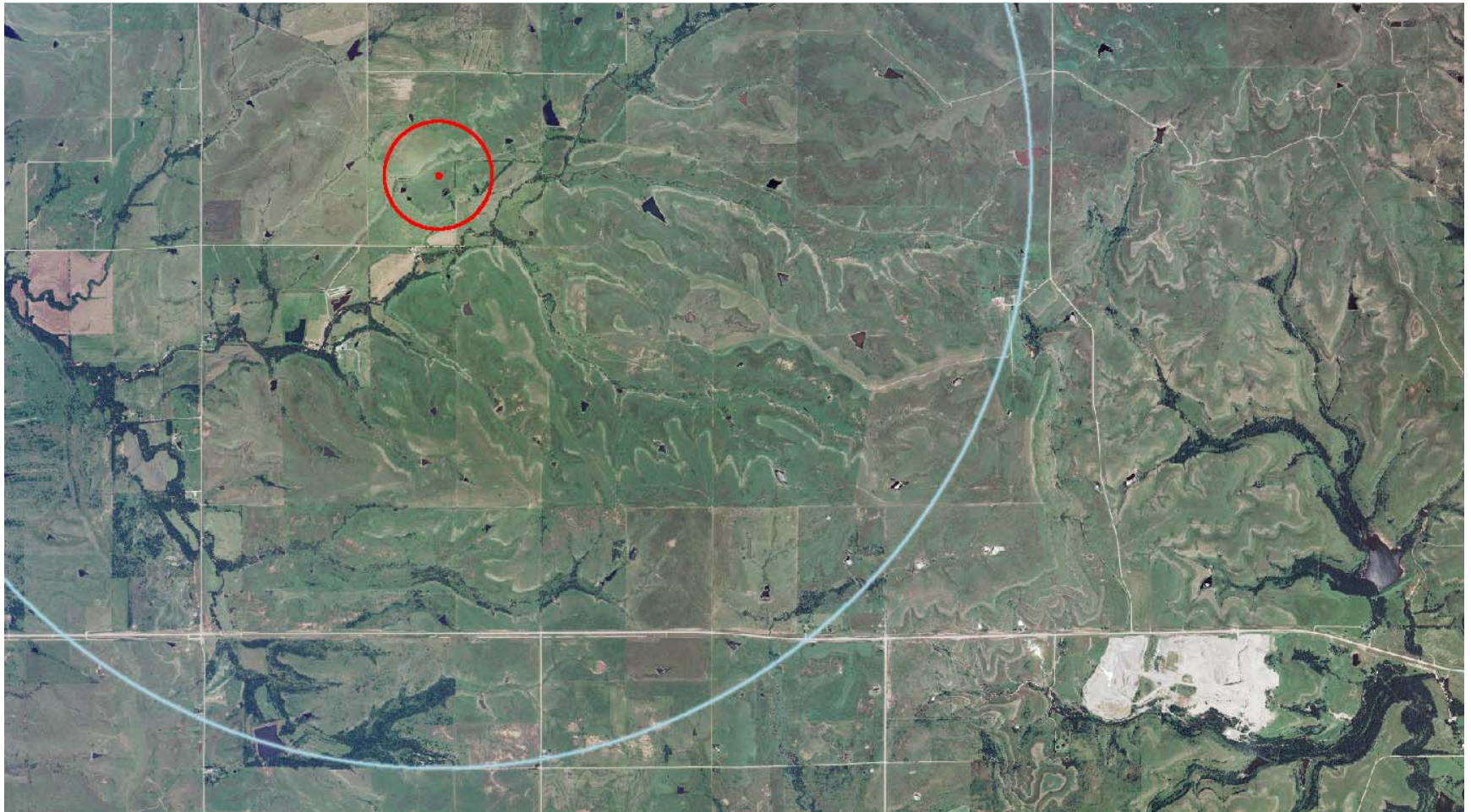
- Top Left:** The initial raw image. The histogram shows three distinct peaks: black (top), red (middle), and blue (bottom). The 'Solar' panel shows Gamma: 1.0000, Gain: 1.0000, Radius: 1000, and Feather Radius: 9992.1942.
- Bottom Left:** The image is processed with a color palette. The histogram shows the same three peaks, but the red peak is significantly higher and wider. The 'Solar' panel is identical to the first stage.
- Top Right:** The image is processed with a color palette. The histogram shows the same three peaks, but the red peak is significantly higher and wider. The 'Solar' panel is identical to the first stage.
- Bottom Right:** The final Color Infrared (CIR) view. The image is predominantly red, with a blue lake and black shadows. The histogram shows the same three peaks, but the red peak is significantly higher and wider. The 'Solar' panel is identical to the first stage.

Each screenshot includes a histogram window on the left showing three channels (black, red, blue) and a 'Solar' adjustment panel on the right. The main image window shows the aerial photograph being processed. The bottom status bar of each window displays coordinates and projection information.

# Before Solar Correction



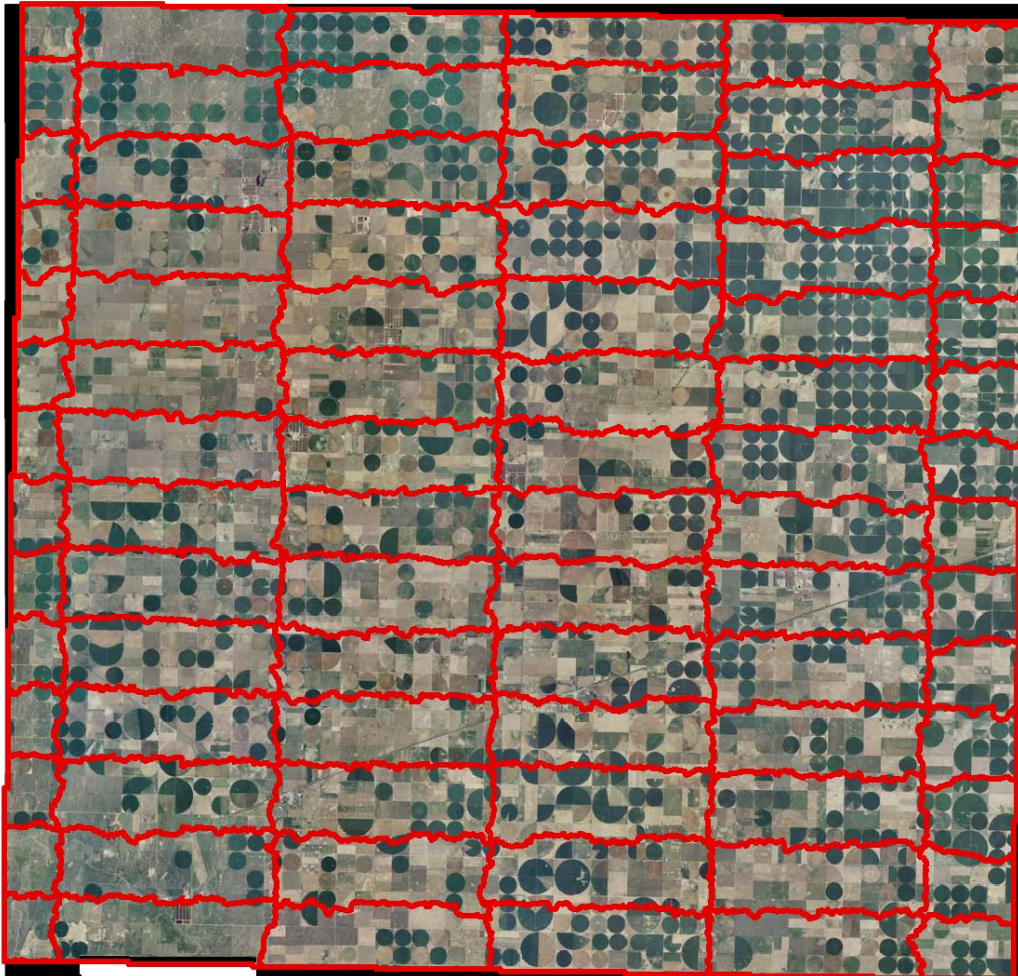
# After Solar Correction



## **New Requirements in 2008**

- **Seamline file generation (KS)**
  - Developed by Surdex R&D
  - Caused some re-work in KS...introduced black lines/areas
- **Absolute accuracy (MN)**
  - 40 photo-identifiable control points surveyed by Surdex
  - ~3 weeks of survey time at project start
  - MNDOT testing to date: ~2m CE95 (NSSDA)

# Seamline File – Haskell County, KS



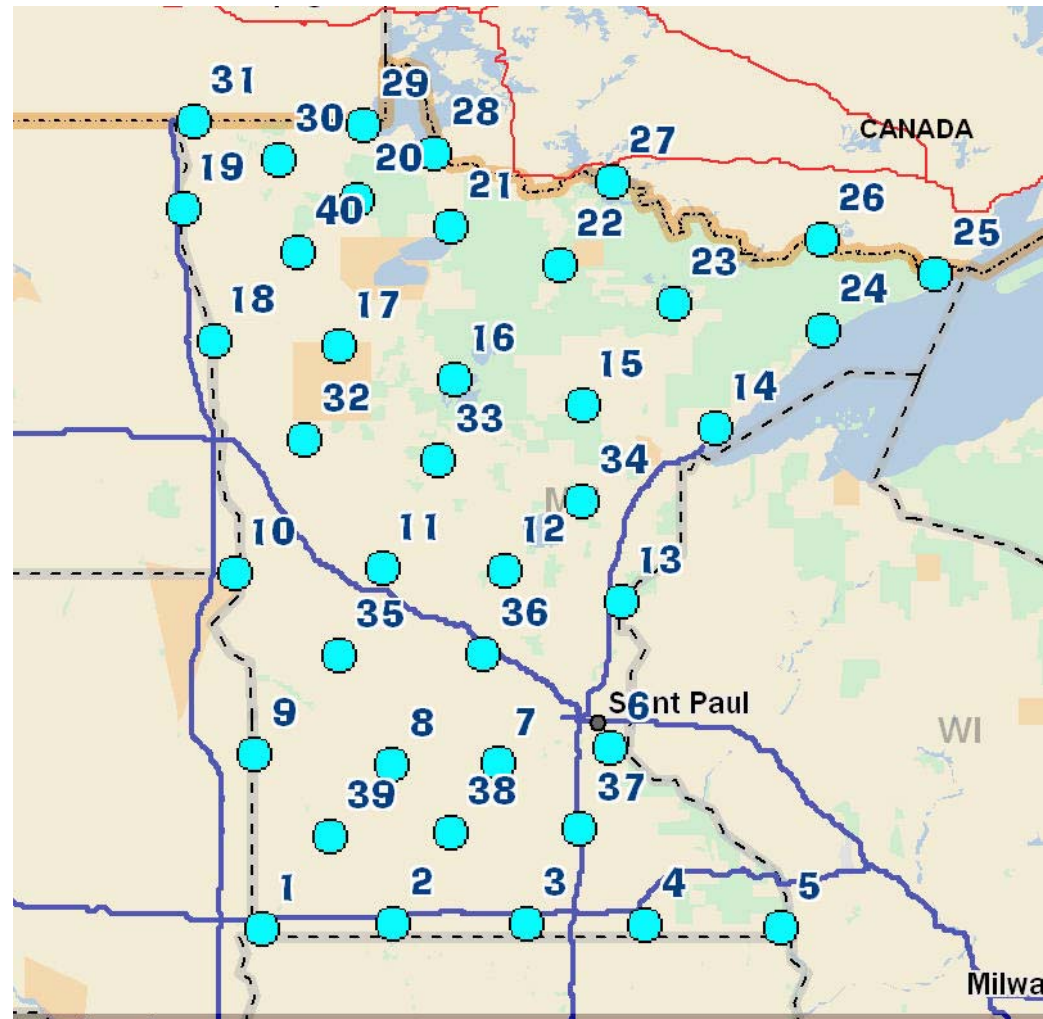
48 DOQQs  
88 Images





# Ground Control – MN

40 points  
Evenly distributed  
Photo-identifiable  
Surdex survey  
~3 weeks



## Suggestions/Comments

- More research into JPEG2000 compression for 4-band CCMs
  - When will FSA get ArcMap upgrade to avoid display limit?
  - How better to predict breakdown of counties to stay within DVD size limit?
- Absolute accuracy control
  - What are plans to share points with contractor (reduce cost)?