

# Internet-based Heat Evaluation and Assessment Tool (I-HEAT)

## Project Team

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# Internet-based Heat Evaluation and Assessment Tool (I-HEAT) Project

## Overall Objective

Provide health professionals with an advanced geospatial web-based system for preparing and responding to emergency heat events, developing mitigation strategies, and educating the public.

The system will couple demographic and environmental data obtained from Landsat satellite imagery with browser-based software to model and map heat-related morbidity and mortality risks at the neighborhood level.

## Specific Aims

- 1) Develop and test a prototype system for accessing and incorporating NASA Web-Enabled Landsat Data (WELD) with existing demographic, socio-economic, and health data, and
- 2) Test the system using a case study (Detroit, Michigan).

# The I-HEAT model concept builds on work performed by Marie O'Neill and colleagues

Mean cumulative heat vulnerability maps at census block group level.

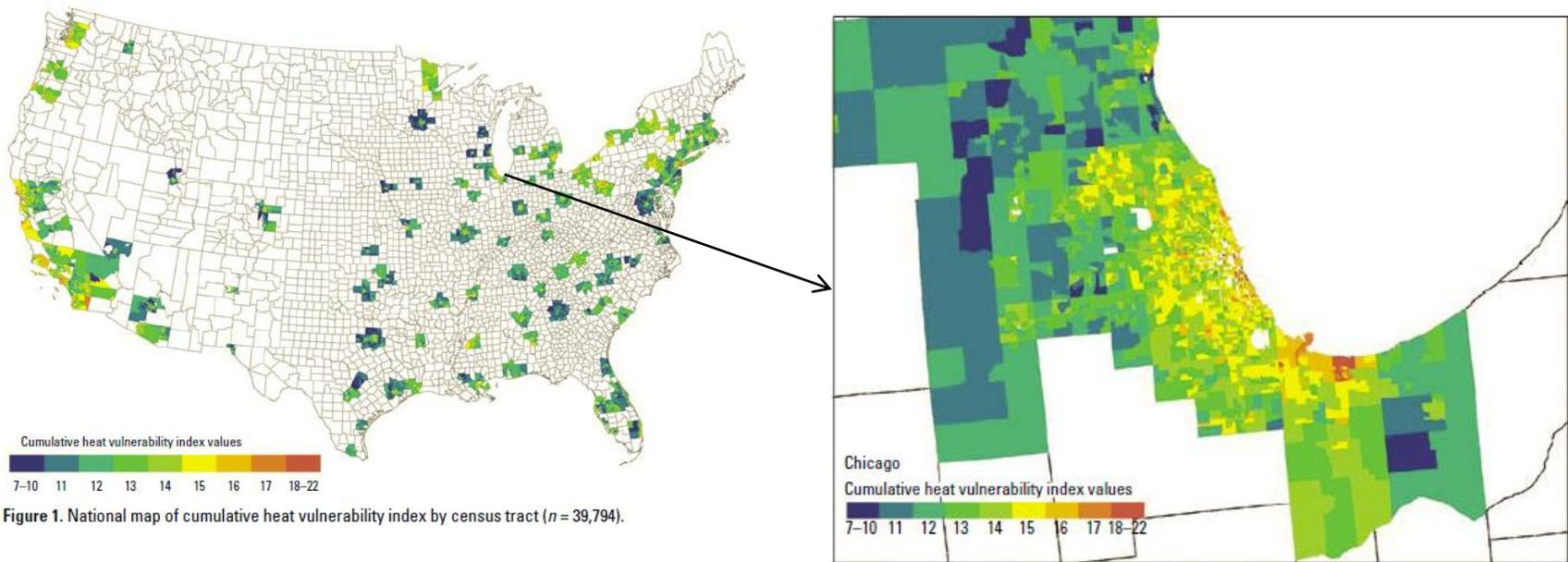


Figure 1. National map of cumulative heat vulnerability index by census tract ( $n = 39,794$ ).

From: Reid, O'Neill, et al., "Mapping community determinants of heat vulnerability", Environmental Health Perspectives, 2009, 117:1730-1736.

# Project Status

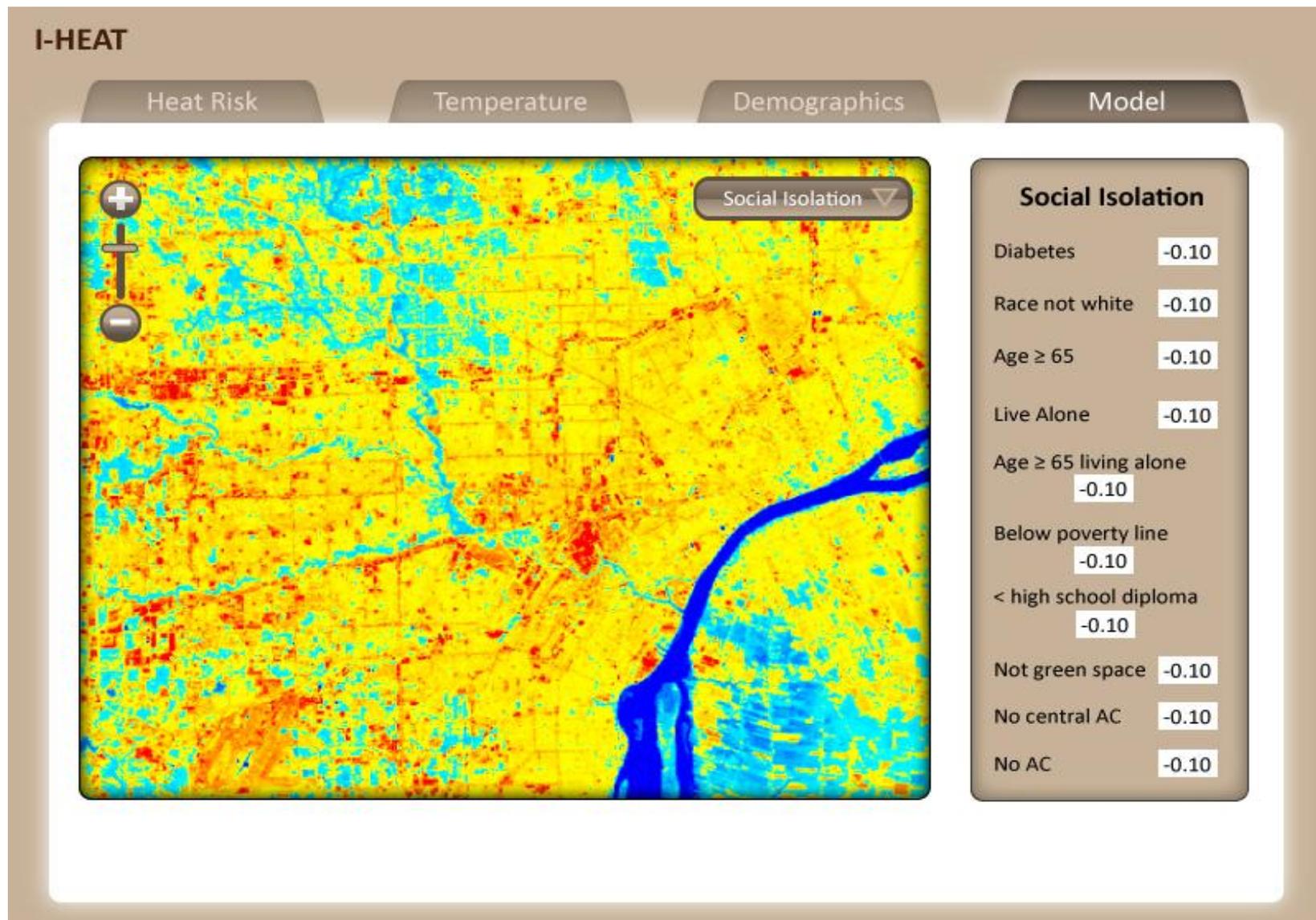
## Initiated I-HEAT system development

- Demographic data collection complete
- WELD image selection/evaluation in progress
- Software development in progress

## Identifying end-users

- Michigan Department of Community Health

# I-HEAT user interface showing heat risk map of Detroit, MI



# Demographic and Health Data

## Demographic

Percent population below the poverty line	Census (Track level)
Percent population with less than a high school diploma	Census (Track level)
Percent population of a race other than white	Census (Track level)
Percent population living alone	Census (Track level)
Percent population $\geq 65$	Census (Track level)
Percent population $\geq 65$ living alone	Census (Track level)
Percent population $\geq 65$ single	Census (Track level)

## Diabetes prevalence

Percent population ever diagnosed with diabetes	Behavioral Risk Factor Surveillance System (County level)
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## Air conditioning

Percent households without central AC	American Housing Survey (County level)
Percent households without any AC	American Housing Survey (County level)

## WELD Imagery Data

### Land Cover

Vegetation greenness (NDVI)

Landsat (WELD, 30m)

Land surface temperature

Landsat (WELD, 60m)

# WELD (Web-Enabled Landsat Data) Overview

Funded by NASA and USGS (2005-2012)

PI: David Roy, South Dakota State University

WELD: WEB - ENABLED LANDSAT DATA

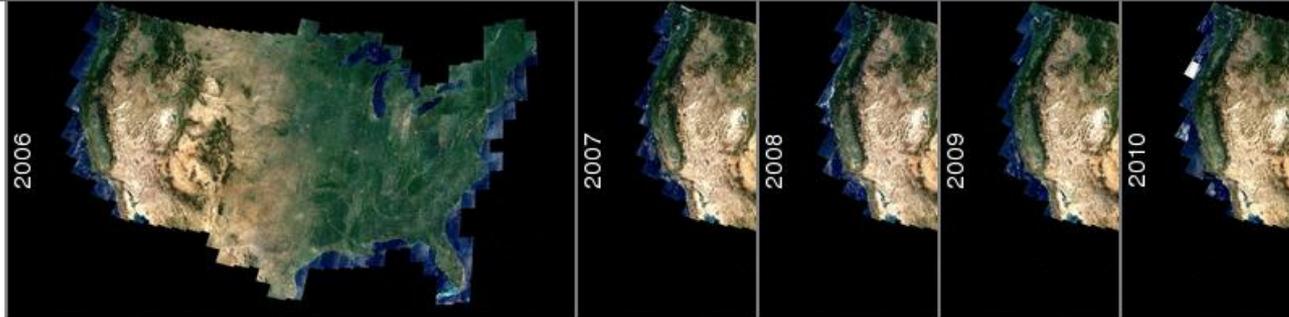


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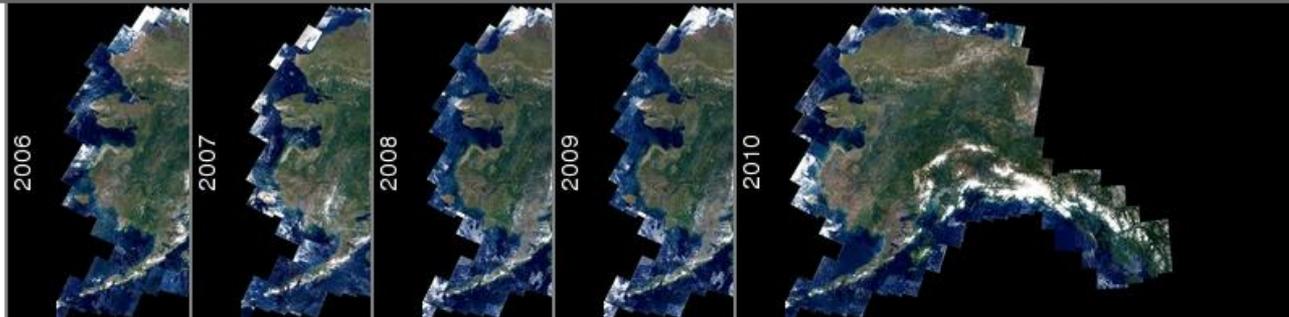
Available Years:

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CONUS



Alaska



## WELD Overview

- Systematically generated 30 m composited Landsat ETM+ (SLC-off) mosaics of the conterminous U.S. and Alaska (2005-2012).
- Processed to reflectance and temperature values.
- Successive products are defined in the same coordinate system and align precisely, making them simple to use for multi-temporal applications.
- Available as Weekly, Monthly, and Seasonal composites
- They provide the first instance of continental-scale Landsat data.

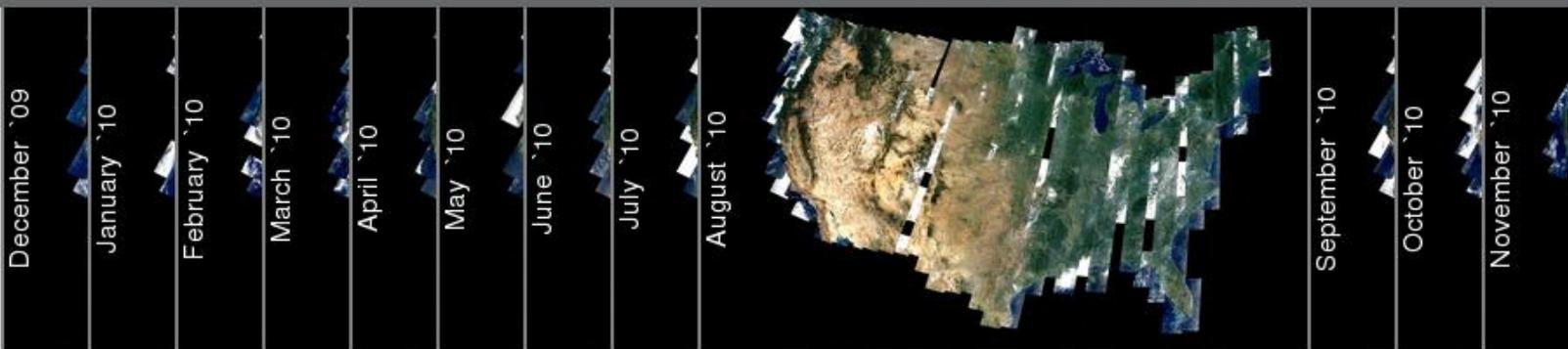
# WELD Overview

Products are currently available for 2006 through 2010 (2005, 2011, and 2012 will be available later)

## Annual & Seasonal



## Monthly

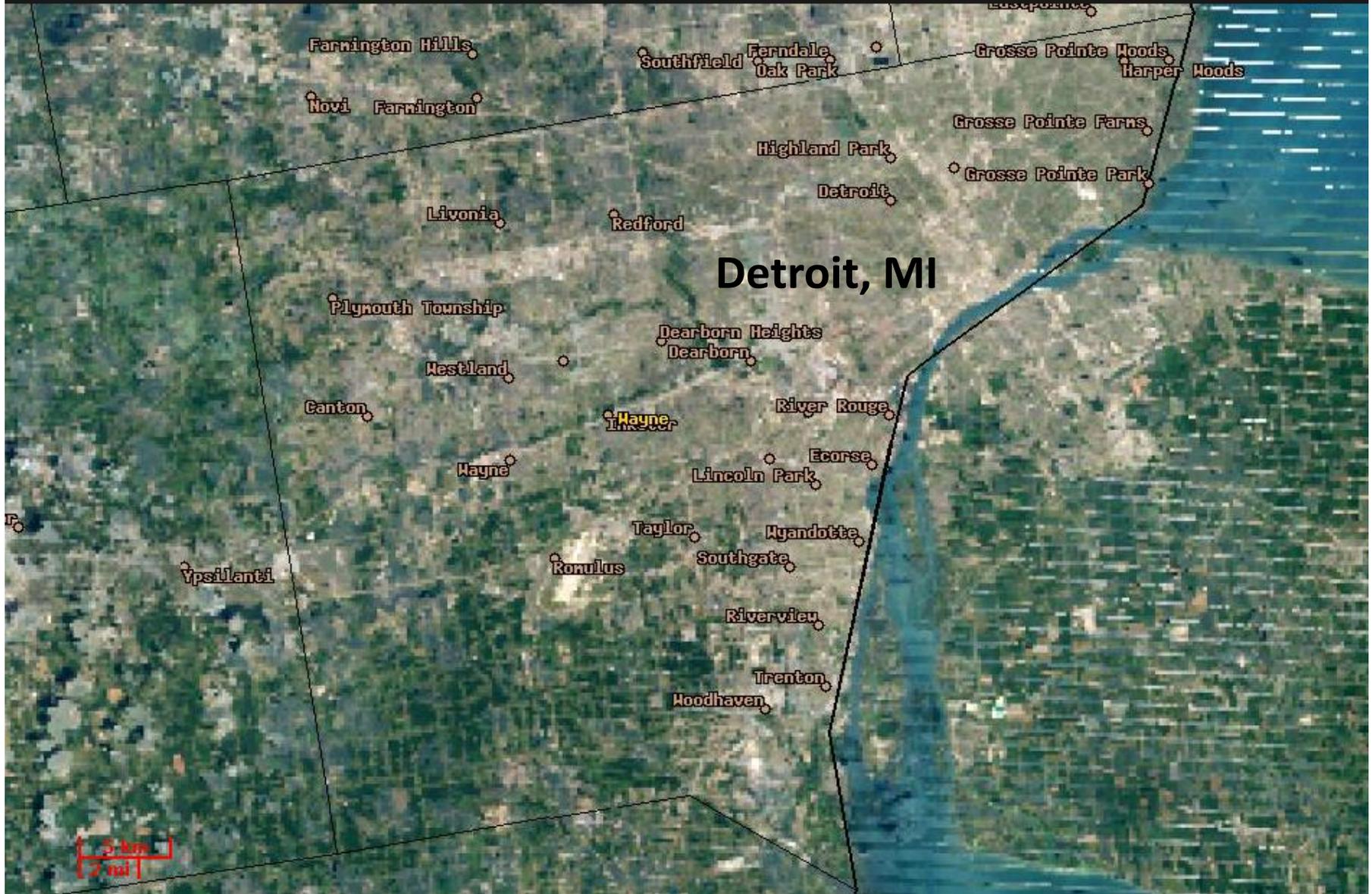


## Weekly



# Original Target Date: Summer 2010

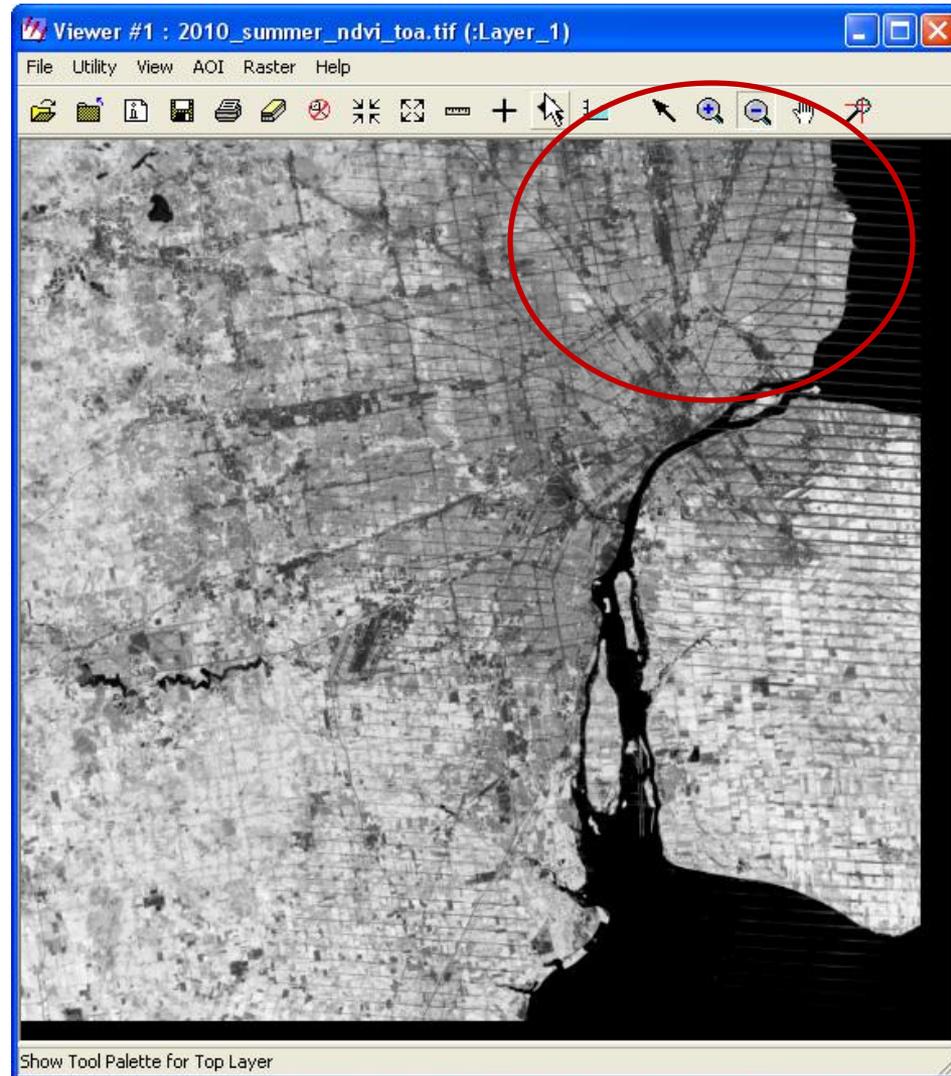
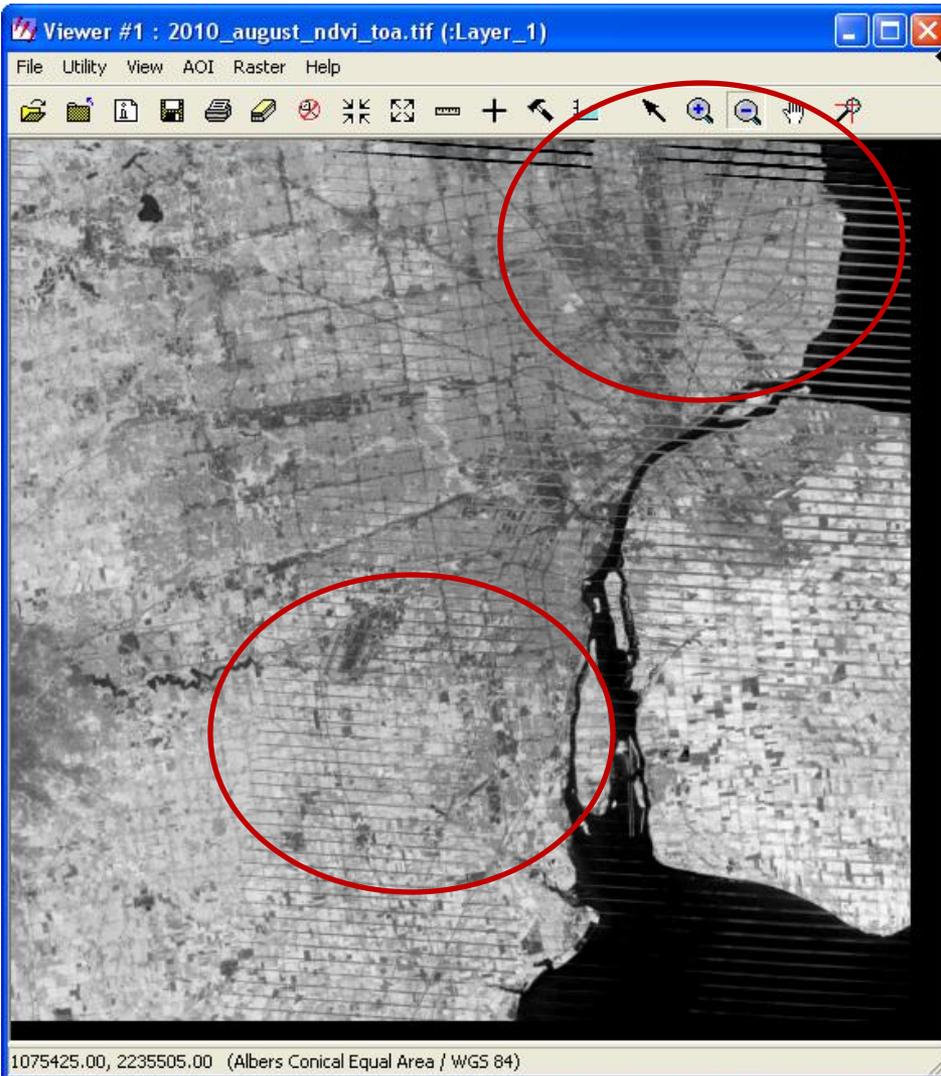
CONUS: Summer 2010 [ Jun 2010 - Aug 2010 ]



# WELD Evaluation: evidence of SLC-off gaps

2010 August-composite: NDVI

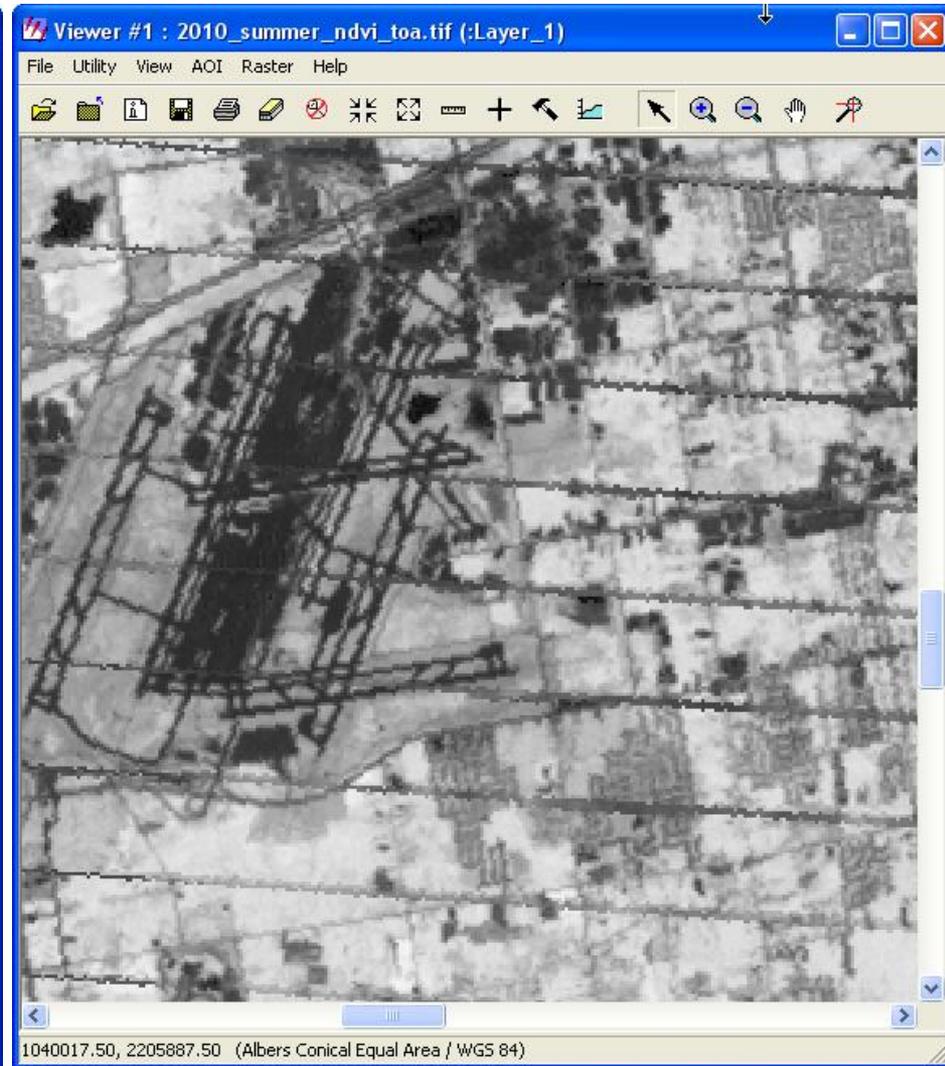
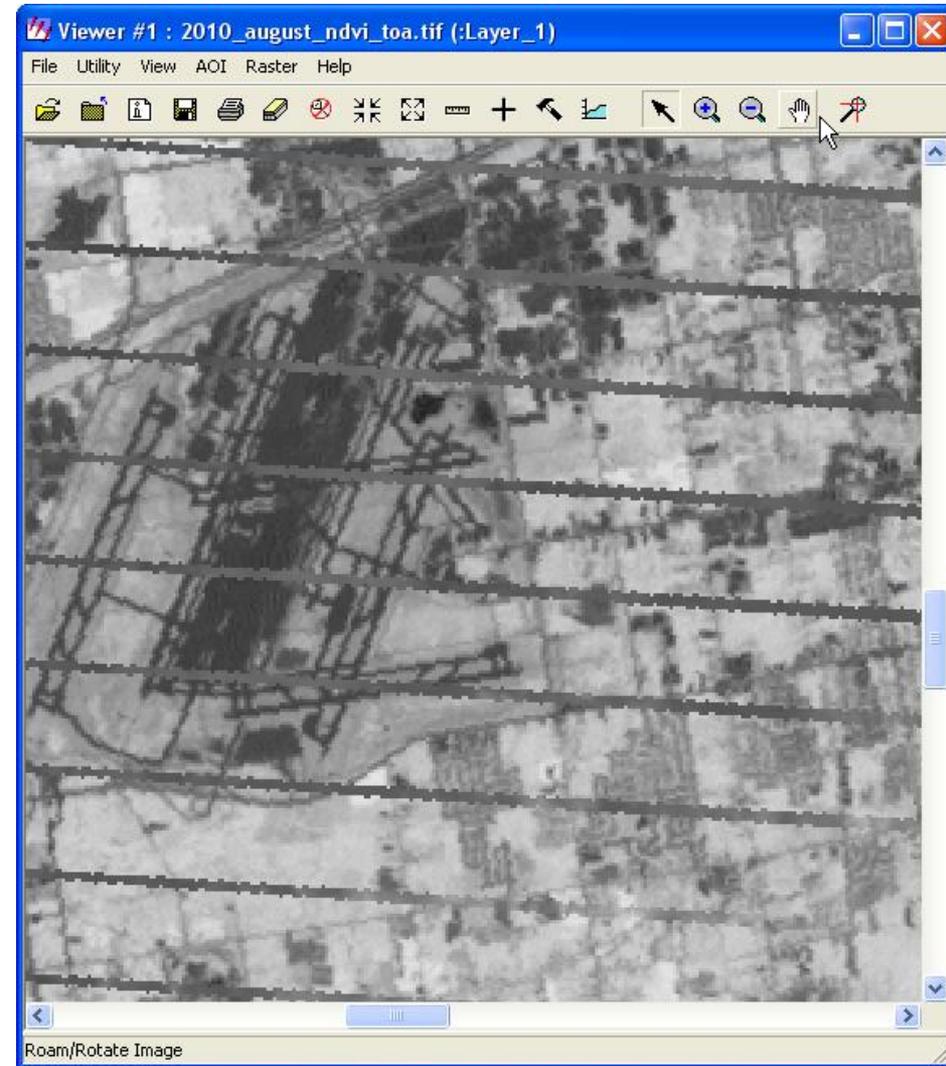
2010 Summer-composite: NDVI



# WELD Evaluation: evidence of SLC-off gaps

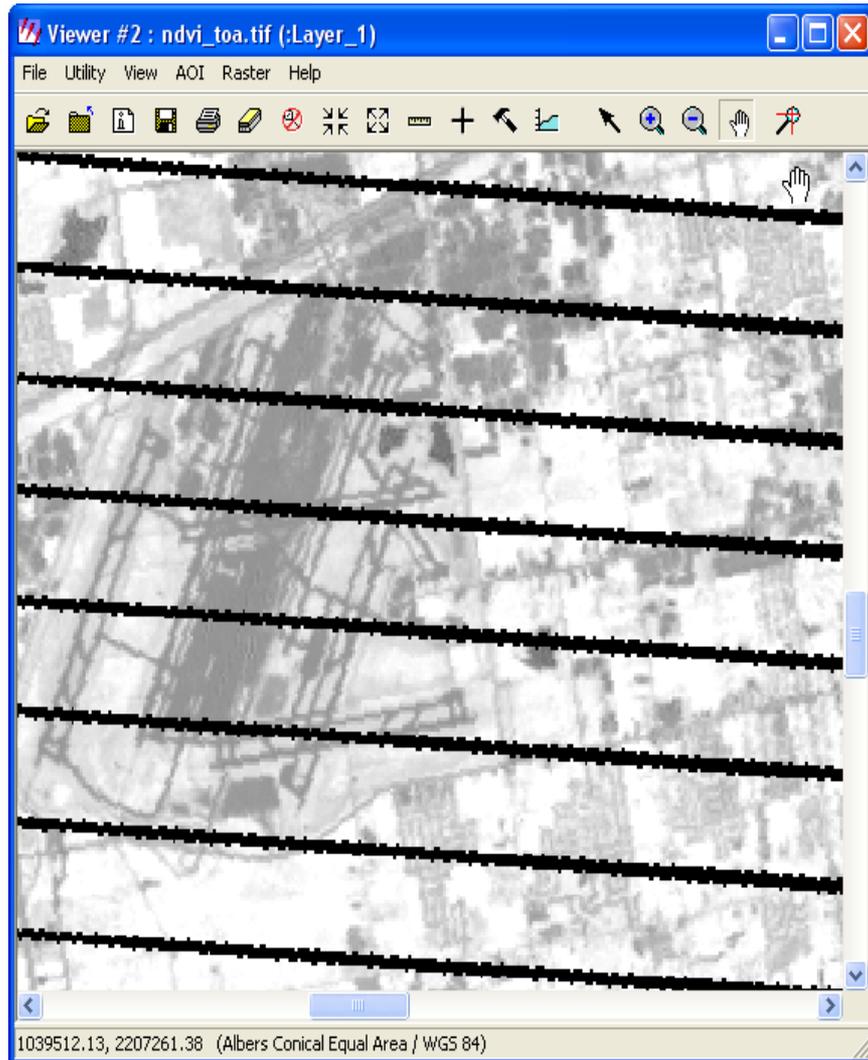
2010 August-composite: NDVI

2010 Summer-composite: NDVI



# WELD Evaluation: David Roy suggested we should use the “weekly” image product for our application

2010 Week 37: NDVI



“Weekly” images are not gap-filled

Next step: proceed with software development using Landsat 7 SLC-on or Landsat 5 imagery