What is AmericaView

- University-led, state-based consortium
- Dedicated to advancing remote sensing:
  - Data availability and distribution
  - Education
  - Outreach
  - Research and technology transfer
- Funded under the USGS National Land Remote Sensing Education Outreach and Research Activity (NLRSEORA)
Evaluation of Surface Reflectance Product

- Models to predict percent mortality from bark beetle
- Developed with 2013 OLI SR data
- Predict 2009 Landsat 5 TM SR data
- Compared pre-7/1/2016 L8SR and post-7/1/2016 LaSRC
Evaluation of Surface Reflectance Product (cont.)

• 2013 base year comparison
  – Median error decreased 41% (from 3.04% to 1.79%)

• 2009 predictions based on 2013 model
  – Median error decreased 58% (from 6.57% to 2.52%)
Forest Structure Time Series
Representative Reflectance Spectra Showing Some of the Optical Complexity of Water Bodies in Minnesota.

Colored Dissolved Organic Matter (CDOM)
Examples of Invariant Objects and Landsat 8 OLI Band Relationships Between Base and Target Images

Normalized Imagery Using Radiometric Rectification

- Green $R^2 = 0.999$
- Red $R^2 = 0.999$
- NIR $R^2 = 0.999$

- Urban
- Conifer
- Water
Landsat 8 OLI Imagery Used for Minnesota CDOM Map

Provisional Surface Reflectance v 2.2

Radiometric Rectification

9/20/15  11/7/15  9/29/15  11/9/15
a\text{440} \text{ in situ vs. } a\text{440} \text{ using Landsat 8 data from multiple dates normalized to surface reflectance using radiometric rectification}

**Green/red model**

- $r^2 = 0.79$
- RMSE = 0.582
- N = 63

**Green/red + ln(red/NIR)**

- $r^2 = 0.86$
- RMSE = 0.482
- N = 63
Two-variable model (green/red + ln(red/NIR)),

$$a_{440} = -5.478 \frac{OLI3}{OLI4} - 0.633 \ln \left( \frac{OLI4}{OLI5} \right) + 8.135$$
Maximum NDVI image mosaics from a multi-temporal stack of OLI imagery converted to surface reflectance (solar angle adjusted)

A multi-temporal (summer-long) collection of OLI imagery for 15 different Path/Rows were processed to identify the pixel with the maximum NDVI return

The 2013 mosaic consists of 72 individual OLI images
The 2014 mosaic consists of 85 individual OLI images
The 2015 mosaic consists of 89 individual OLI images
Landsat OLI Multi-Temporal Normalized Difference Fire Index Image Mosaics

Maximum NDFI image mosaics from a multi-temporal stack of OLI imagery converted to surface reflectance (solar angle adjusted)

A multi-temporal (summer-long) collection of OLI imagery for 15 different Path/Rows were processed to identify the pixel with the maximum NDFI return

- The 2013 mosaic consists of 72 individual OLI images
- The 2014 mosaic consists of 85 individual OLI images
- The 2015 mosaic consists of 89 individual OLI images

= fire
The process to extract and generate maximum NDVI and NDFI mosaics for Utah was applied to Landsat 5 and 8 imagery spanning 1985-2015. This process allowed us to identify yearly wildfire events and generate fire frequency maps.
Algorithm 2: Removal of thin clouds in Landsat-8 OLI data with independent component analysis

- Pro: removal of thin clouds in visible, NIR, and short IR bands (e.g., Bands 1-7 of Landsat 8) using a single image. No QA band is required.
- Con: Band 9 (of Landsat-8) is required.

Landsat-8 images

A sub-image of Landsat 8 acquired on 1 April 2014 is shown as a color composite (Band 4 as red, Band 3 as green, and Band 2 as blue). The image is 1000 rows (30km) by 1000 columns (30km). Thin clouds as bright features are noticeable. The area is around Hobucken, North Carolina.

Before and after clouds removed