# USING TIME-SERIES APPROACHES TO IMPROVE LANDSAT'S CHARACTERIZATION OF LANDSCAPE DYNAMICS

Project update, October 2013, by Kennedy.

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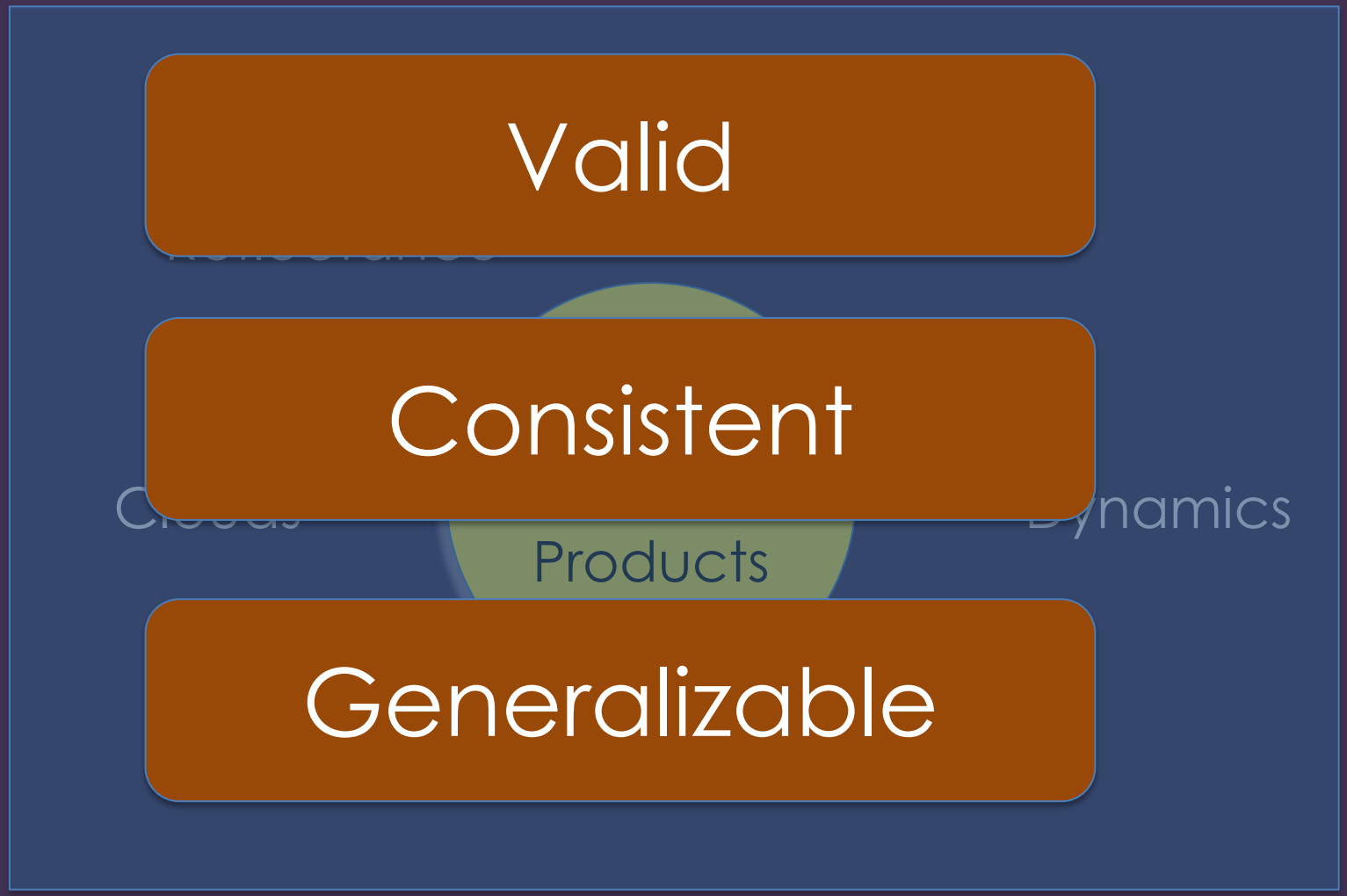
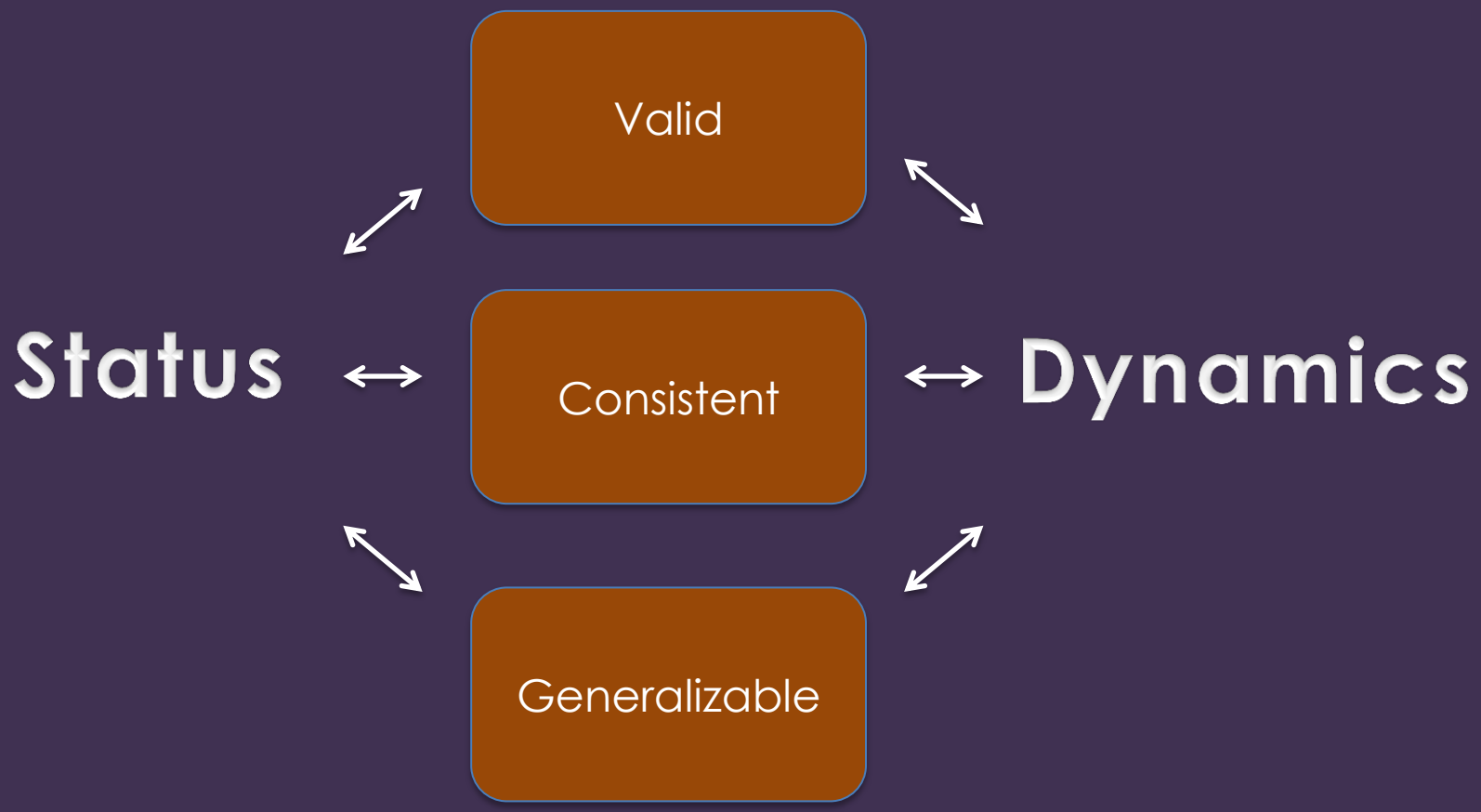
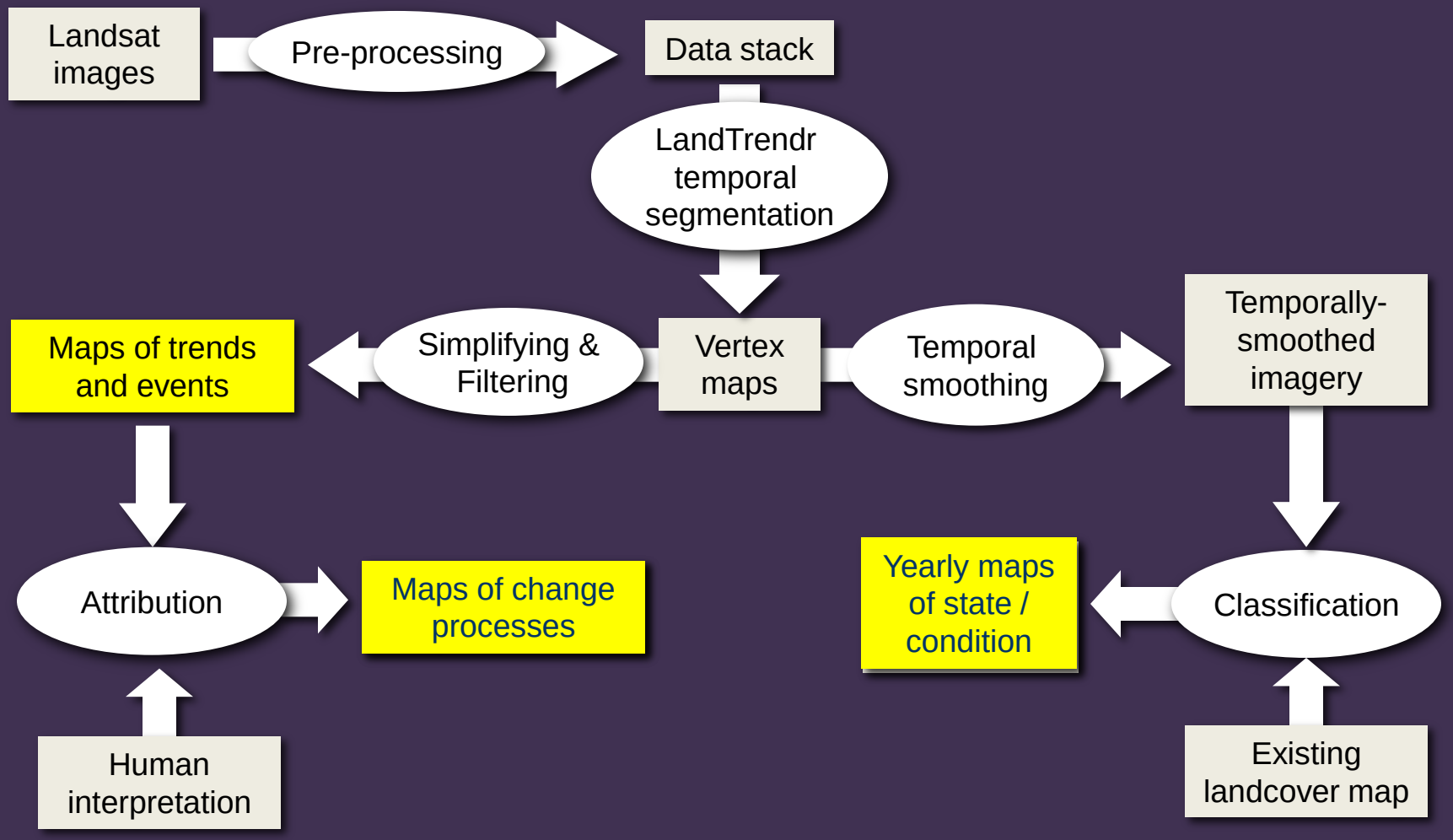
# Motivation




Valid
Status
Consistent
Dynamics
Generalizable

# Overall workflow



# Preprocessing

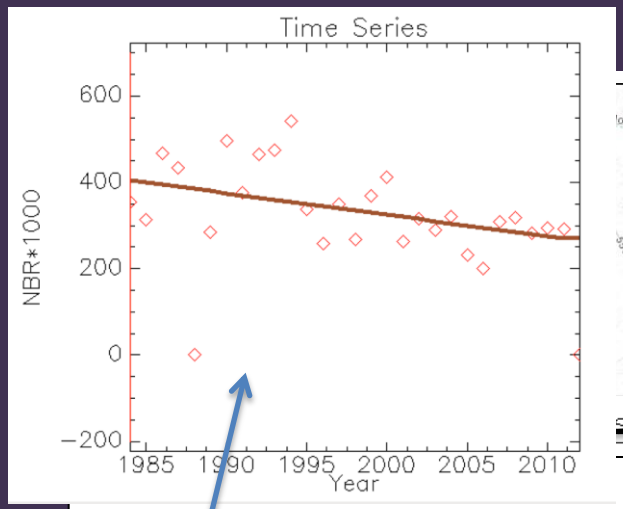
Relative
LEDAPS
Normalization

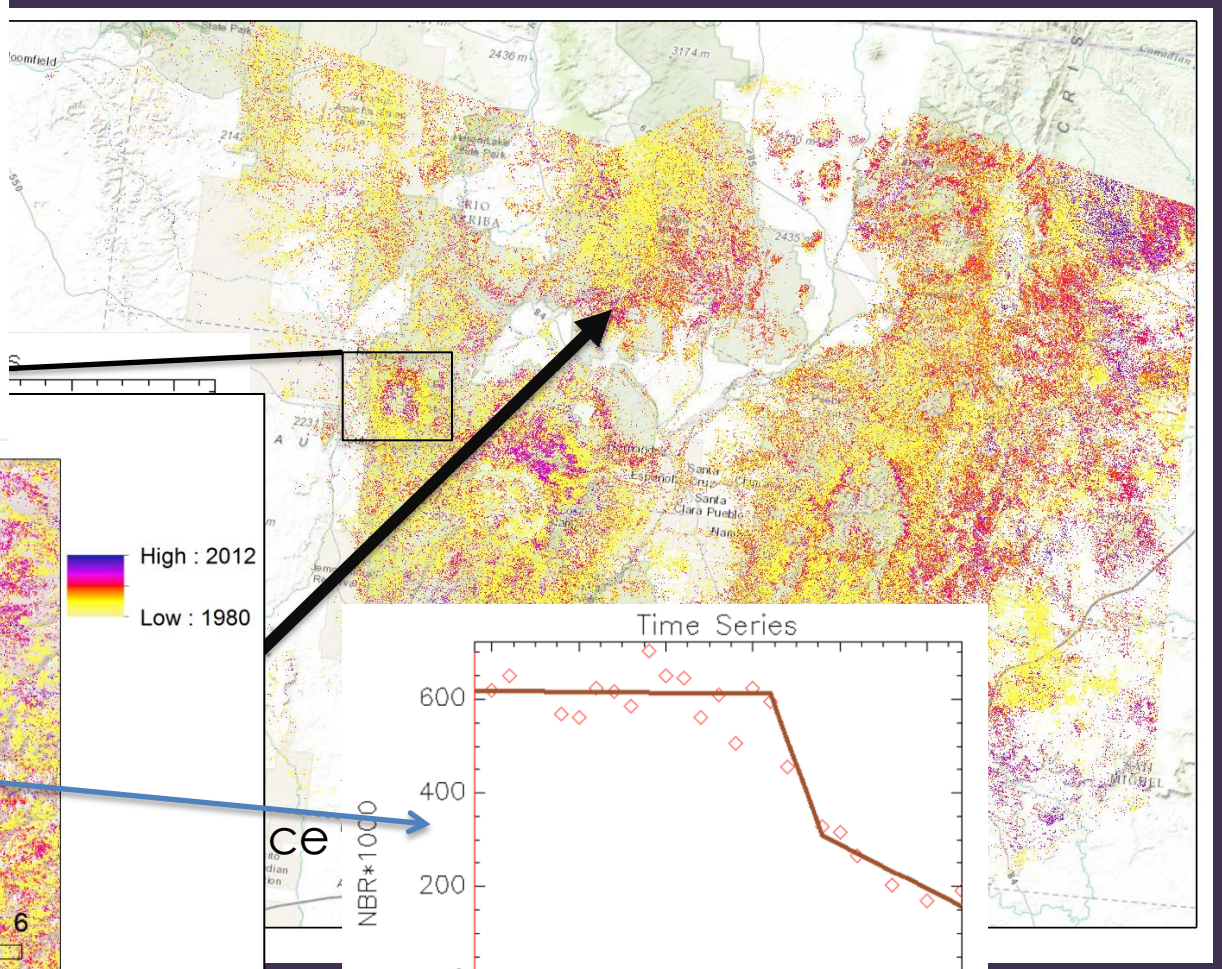
Consistent

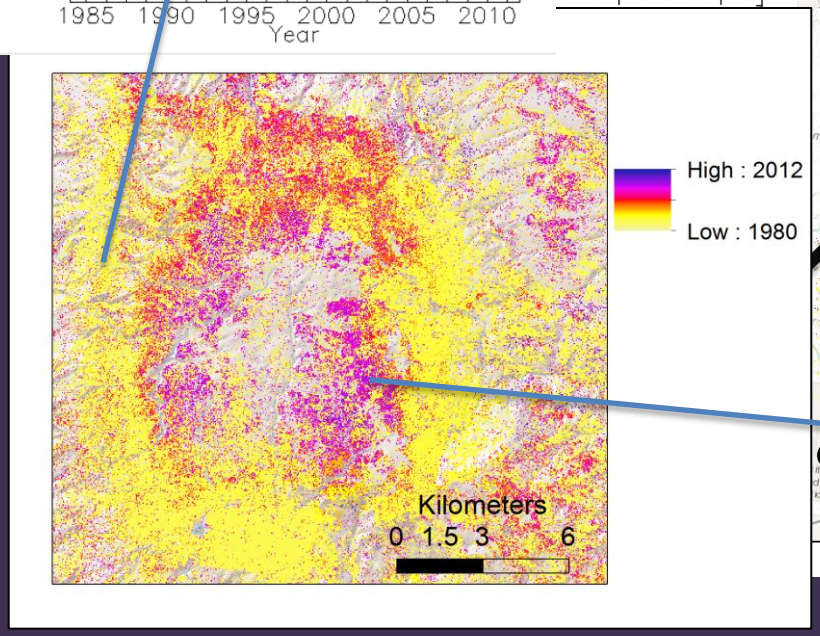
Generalizable

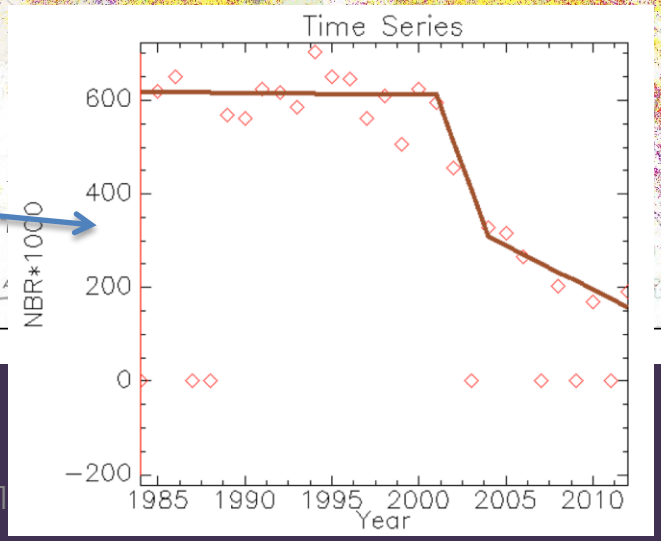
Fmask + QA

# Ledaps + Fmask: Good!





Generalizing

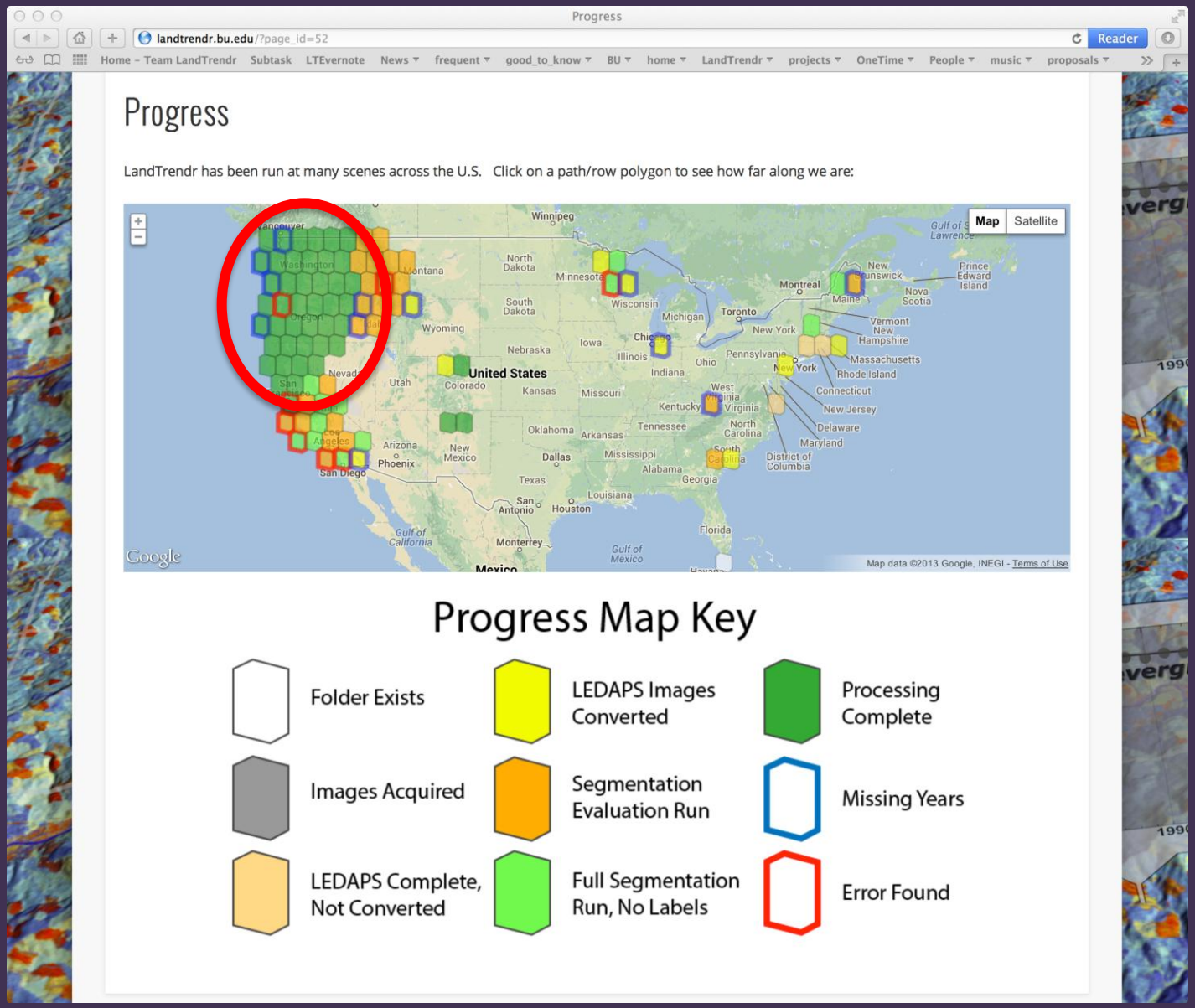
LandTrendr$_{IDL}$

SilviaTerra

Use MapReduce framework and new Python/GDAL coding

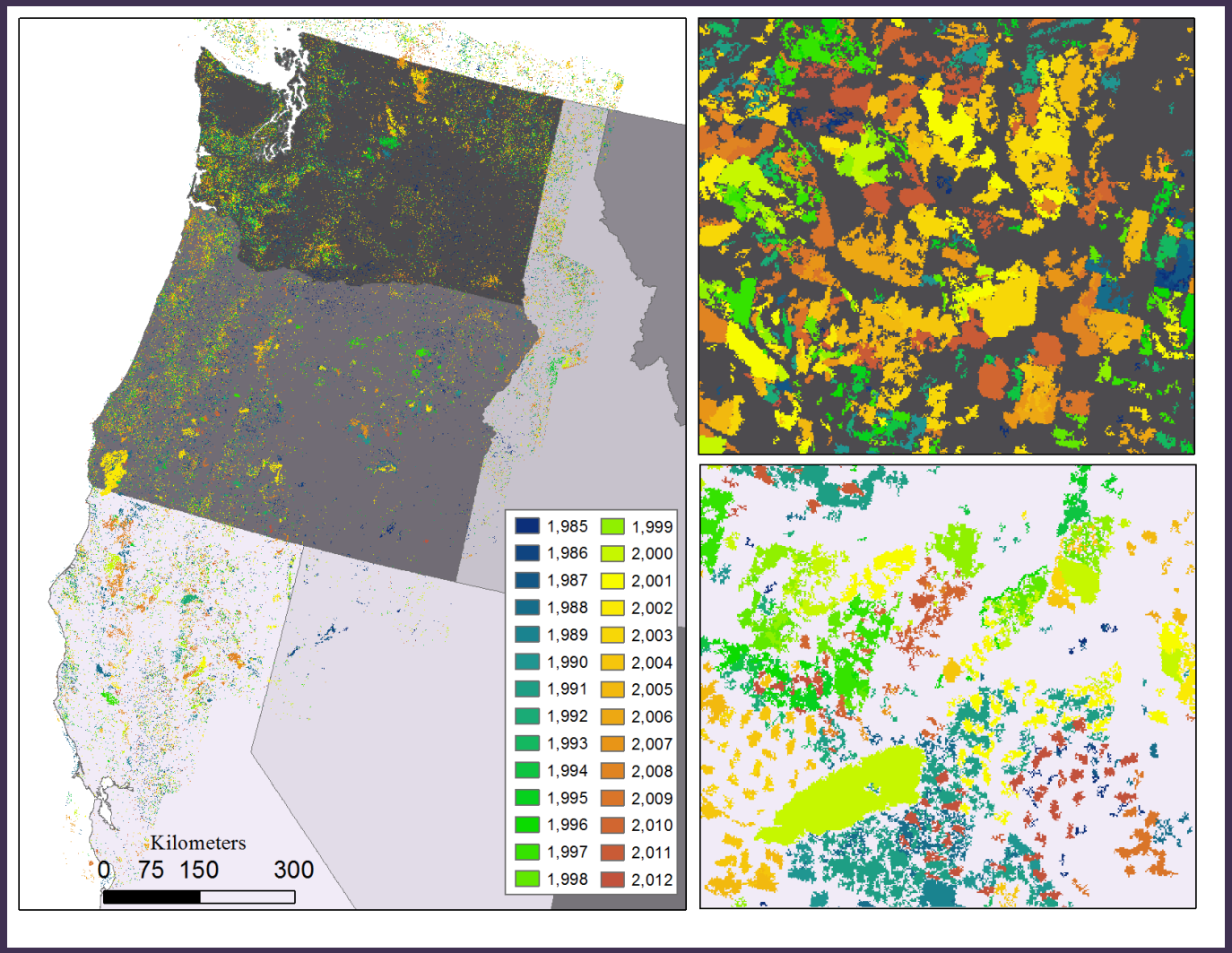
General framework will be useful for any pixel-based time series approach

LandTrendr 2.0


Progress
landtrendr.bu.edu/?page_id=52
Reader
Home – Team LandTrendr
Subtask
LTEvernote
News
frequent
good_to_know
BU
home
LandTrendr
projects
OneTime
People
music
proposals
Progress
LandTrendr has been run at many scenes across the U.S. Click on a path/row polygon to see how far along we are:
Map
Satellite
Google
Map data ©2013 Google, INEGI - Terms of Use
Progress Map Key
Folder Exists
LEDAPS Images Converted
Processing Complete
Images Acquired
Segmentation Evaluation Run
Missing Years
LEDAPS Complete, Not Converted
Full Segmentation Run, No Labels
Error Found

# Mapping Change

# Year of disturbance: Abrupt

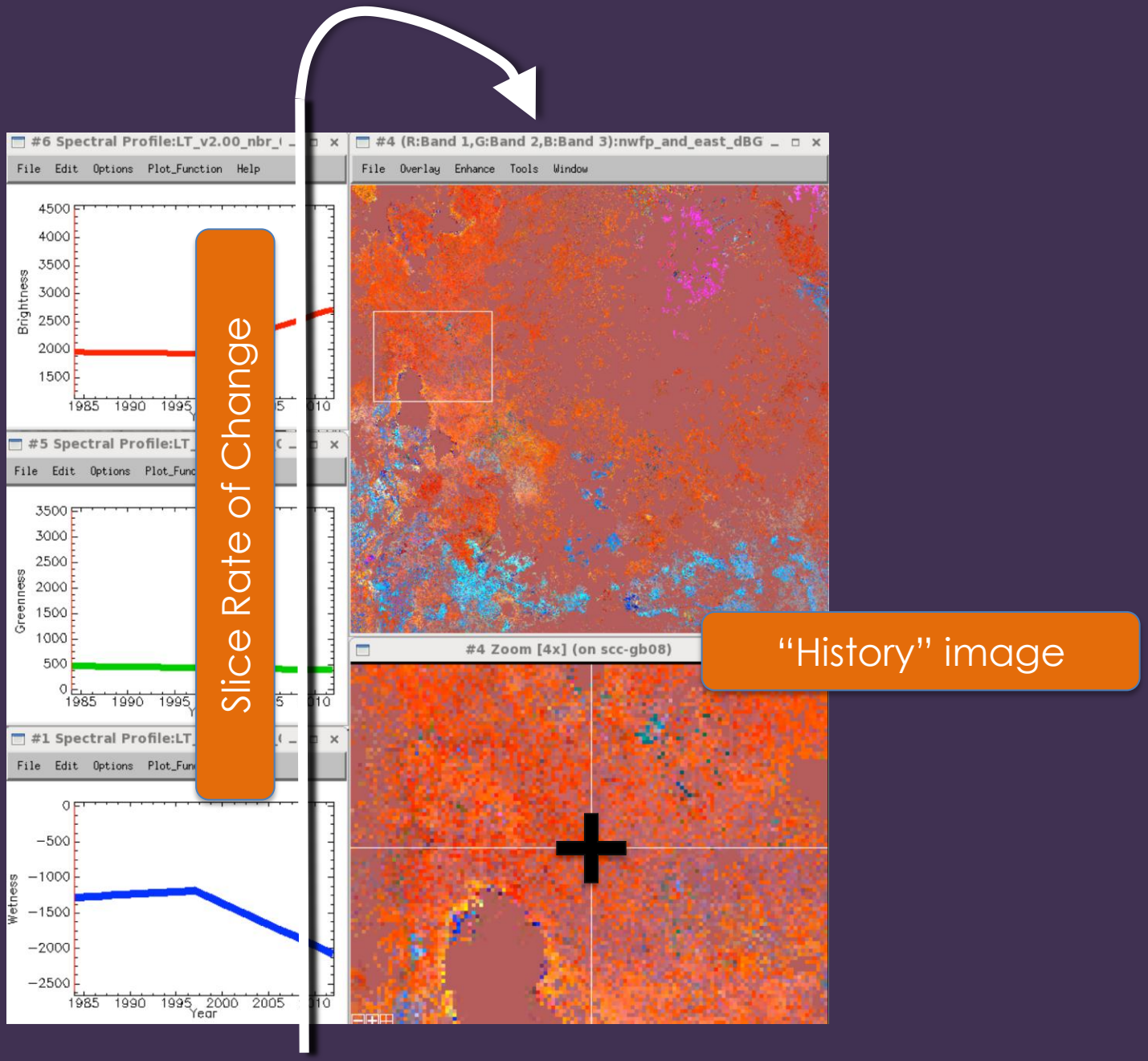


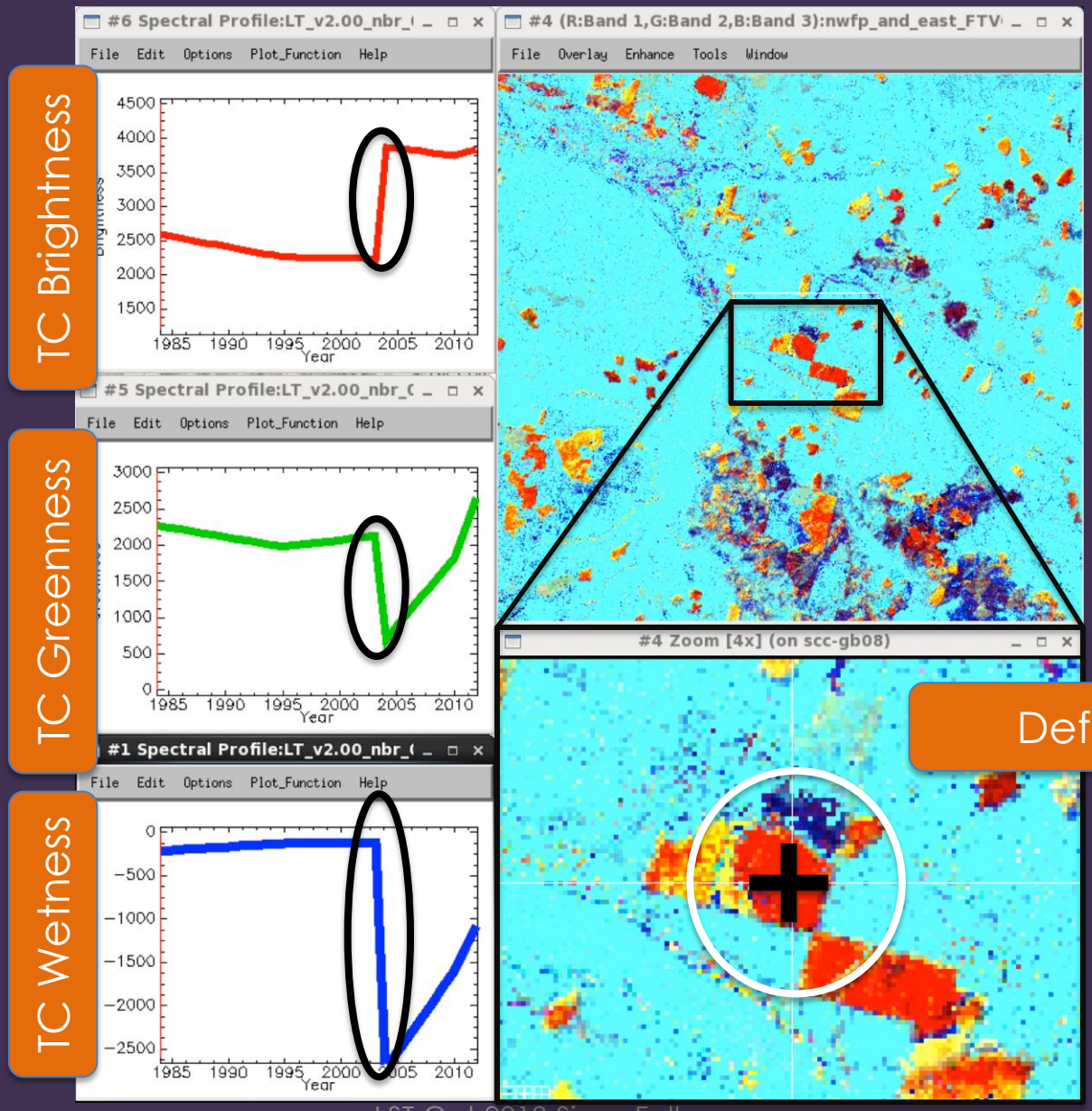
# Attribution

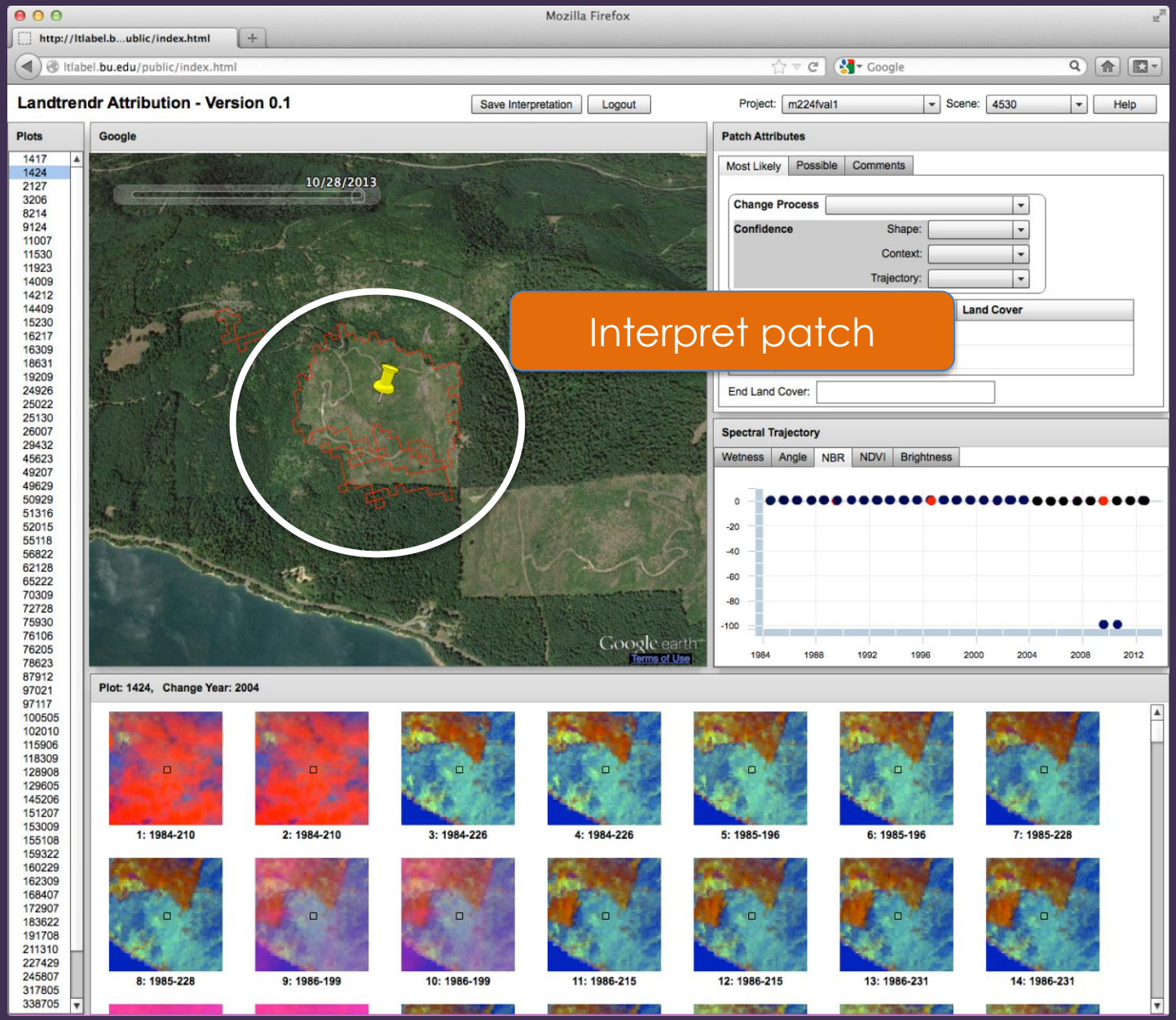
Patch-based

Interpreted

Contextual

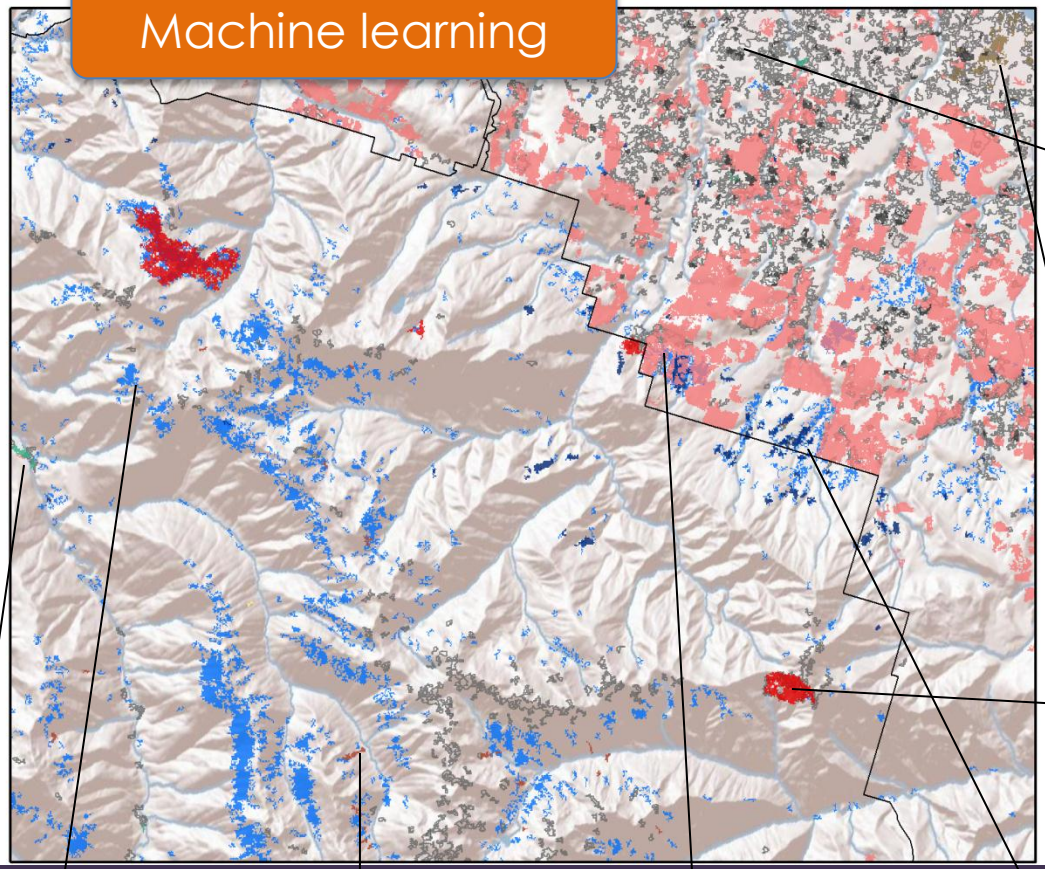

#6 Spectral Profile:LT_v2.00_nbr_(
File Edit Options Plot_Function Help
Brightness
#5 Spectral Profile:LT_
File Edit Options Plot_Func
Greenness
#1 Spectral Profile:LT_
File Edit Options Plot_Fun
Wetness
Year
#4 (R:Band 1,G:Band 2,B:Band 3):nwfp_and_east_dBG
File Overlay Enhance Tools Window
#4 Zoom [4x] (on scc-gb08)
Slice Rate of Change
"History" image


TC Brightness
TC Greenness
TC Wetness
#6 Spectral Profile:LT_v2.00_nbr_(
#5 Spectral Profile:LT_v2.00_nbr_(
#1 Spectral Profile:LT_v2.00_nbr_(
File Edit Options Plot_Function Help
Year
#4 (R:Band 1,G:Band 2,B:Band 3):nwfp_and_east_FTV
File Overlay Enhance Tools Window
#4 Zoom [4x] (on scc-gb08)
Define patch

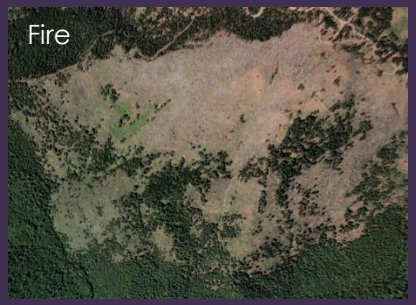

Mozilla Firefox
http://ltlabel.b...ublic/index.html
ltlabel.bu.edu/public/index.html
Landtrendr Attribution - Version 0.1
Save Interpretation
Logout
Project: m224fval1
Scene: 4530
Help
Plots
Google
10/28/2013
Patch Attributes
Most Likely
Possible
Comments
Change Process
Confidence
Shape:
Context:
Trajectory:
Land Cover
End Land Cover:
Interpret patch
Spectral Trajectory
Wetness
Angle
NBR
NDVI
Brightness
Plot: 1424, Change Year: 2004
1: 1984-210
2: 1984-210
3: 1984-226
4: 1984-226
5: 1985-196
6: 1985-196
7: 1985-228
8: 1985-228
9: 1986-199
10: 1986-199
11: 1986-215
12: 1986-215
13: 1986-231
14: 1986-231

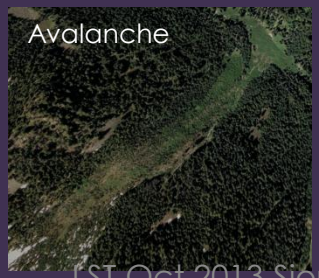
# Machine learning

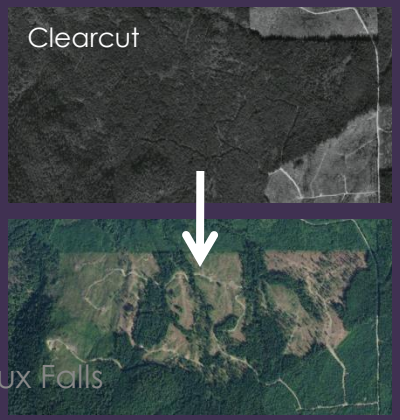
- Agricultural
- Avalanche
- Clearcut
- Development
- Fire
- Landslide
- Riparian
- Wind
- Insect
- No visible change



Development

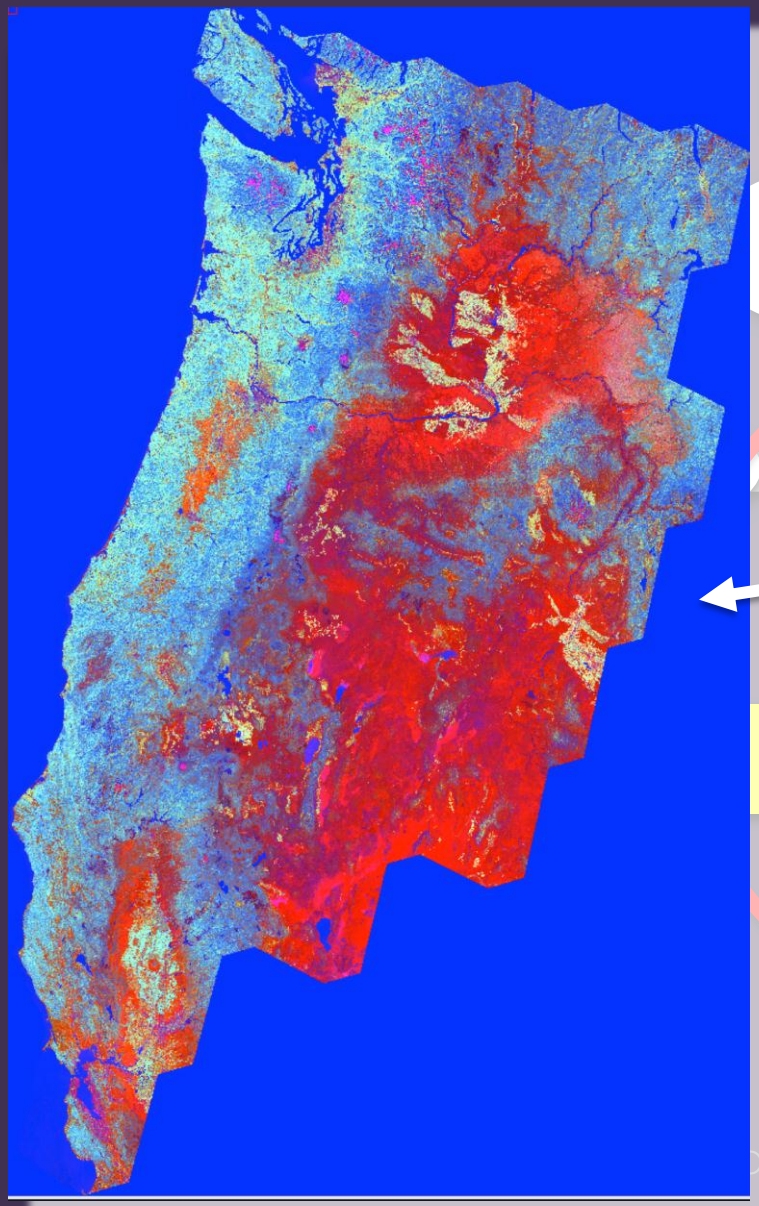


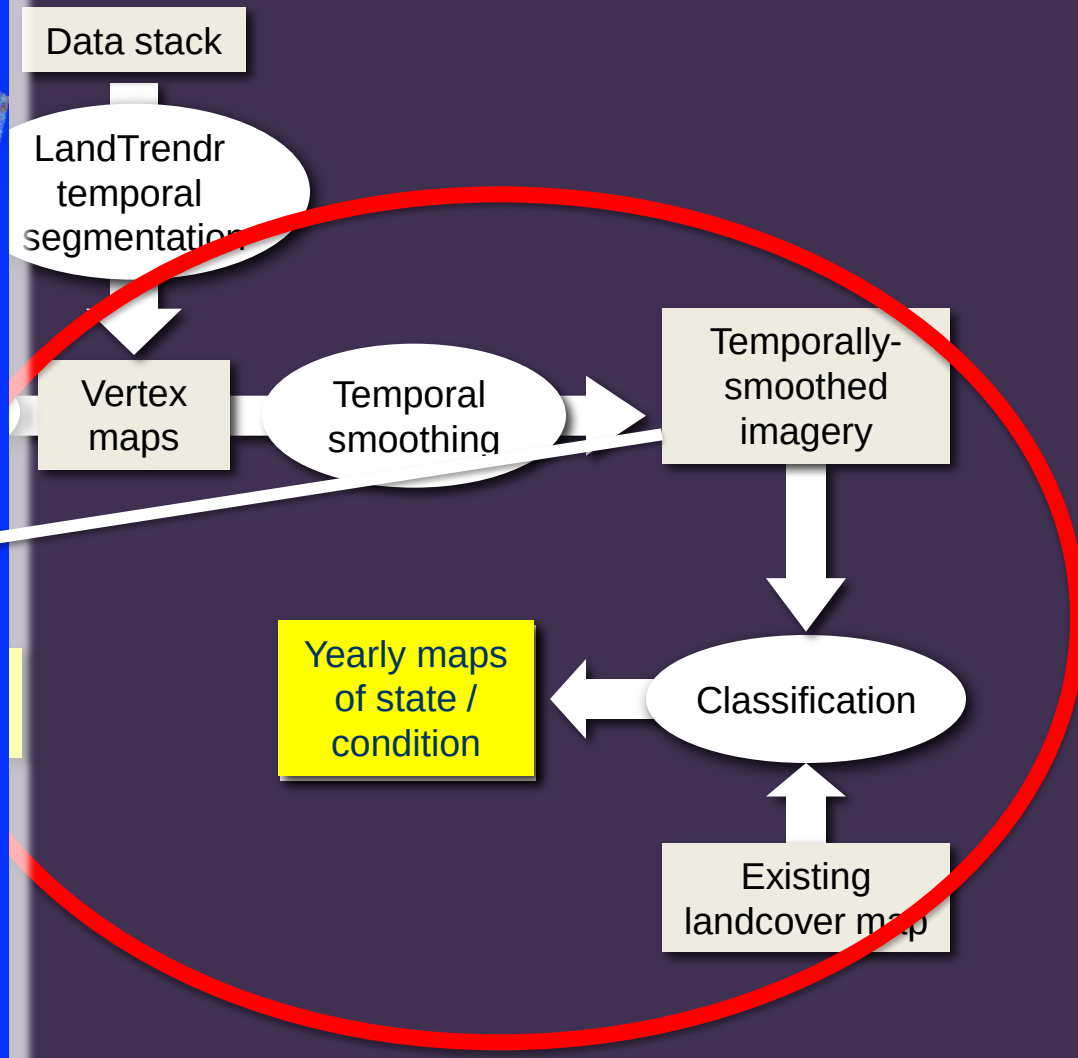


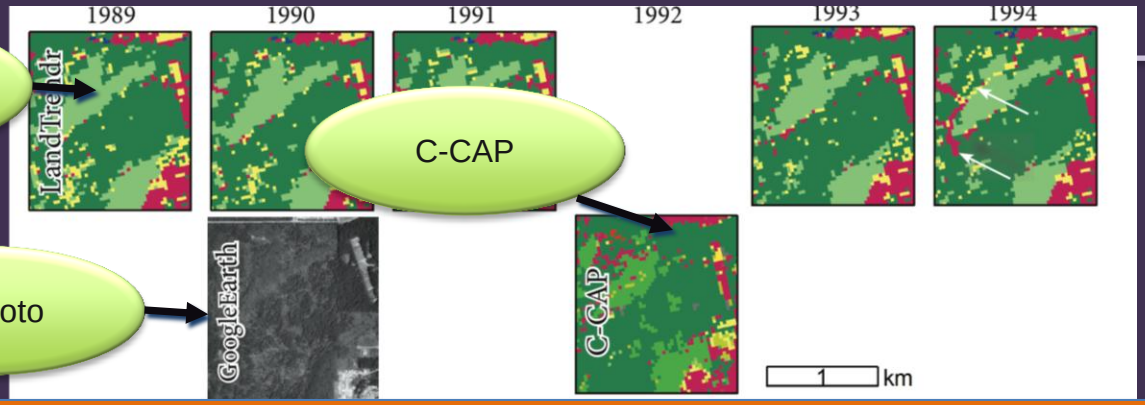
# Land cover mapping

# Overall workflow





# Yearly land cover mapping




LandTrendr

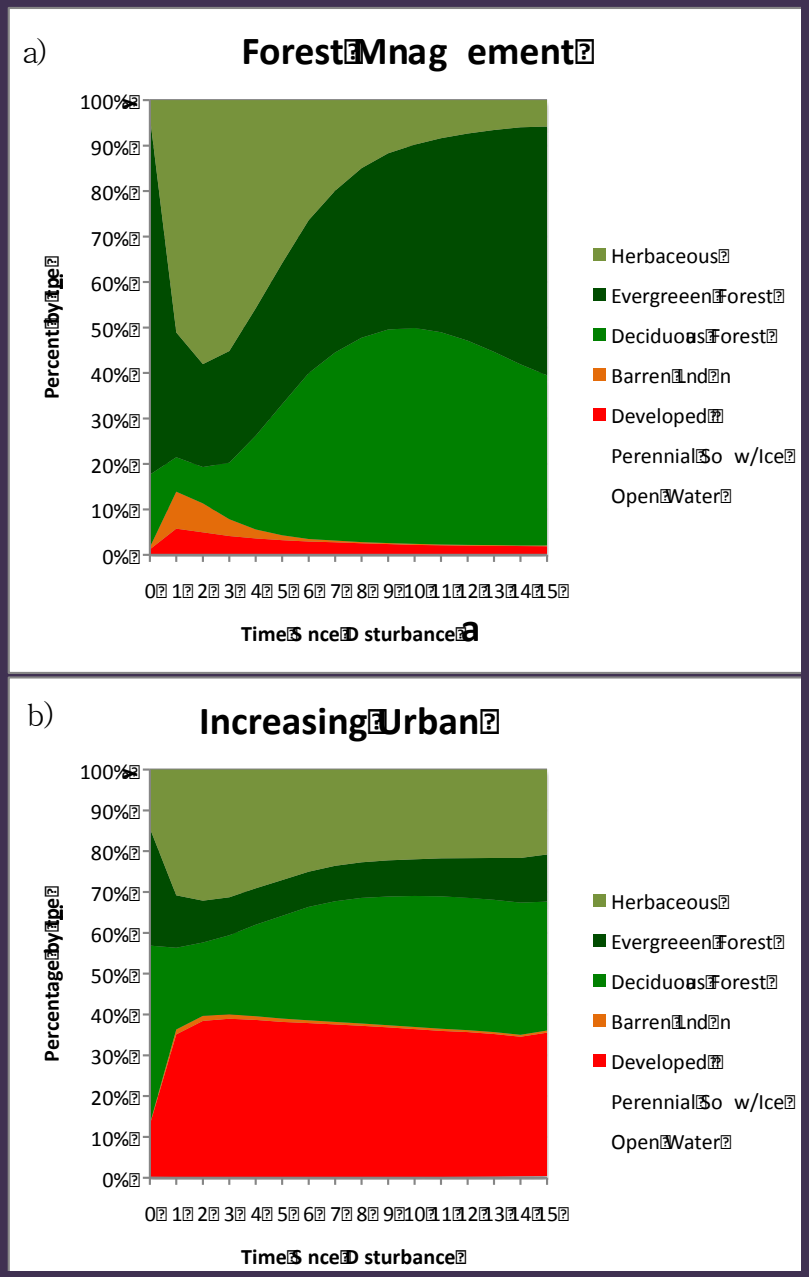
C-CAP

Airphoto

White
sh
develo

The only thing changing is the spectral value over time

Status




Dynamics

# Motivation

Surface Reflectance

Status

Landsat Standard Products

Clouds

Dynamics

Geometry

Use

Spectral information

Ancillary information

# Cover

Classes / Legend / Continuous Variables

Spatial grain

Temporal grain

Spatial extent

Temporal extent

# Grain vs. Extent

Resolving power

Domain of applicability

We will be forced to articulate these for the temporal domain!

# LCMS*

Multiple algorithms

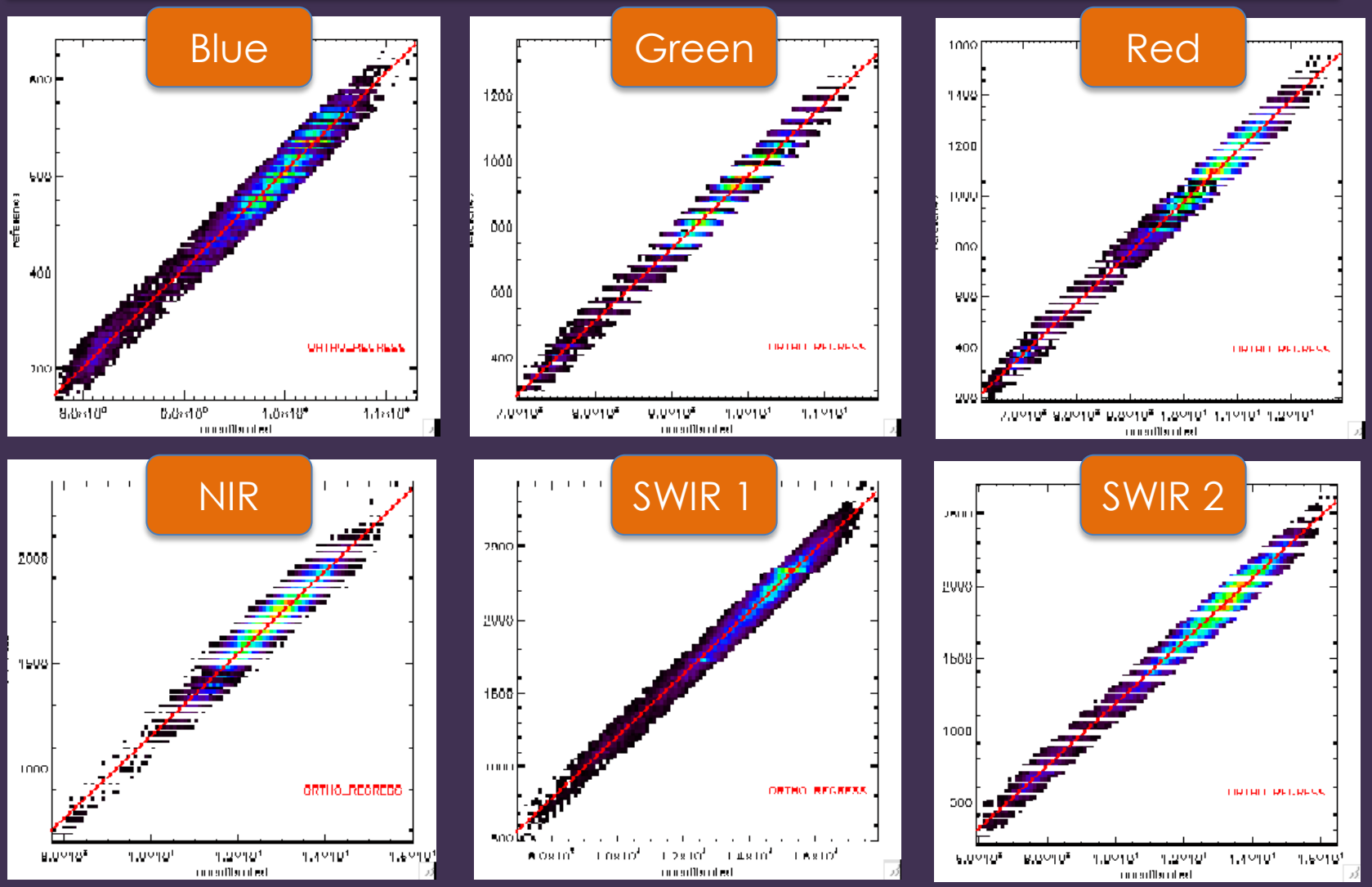
Tune-able voting

* Landscape Change Monitoring System – USGS and USFS

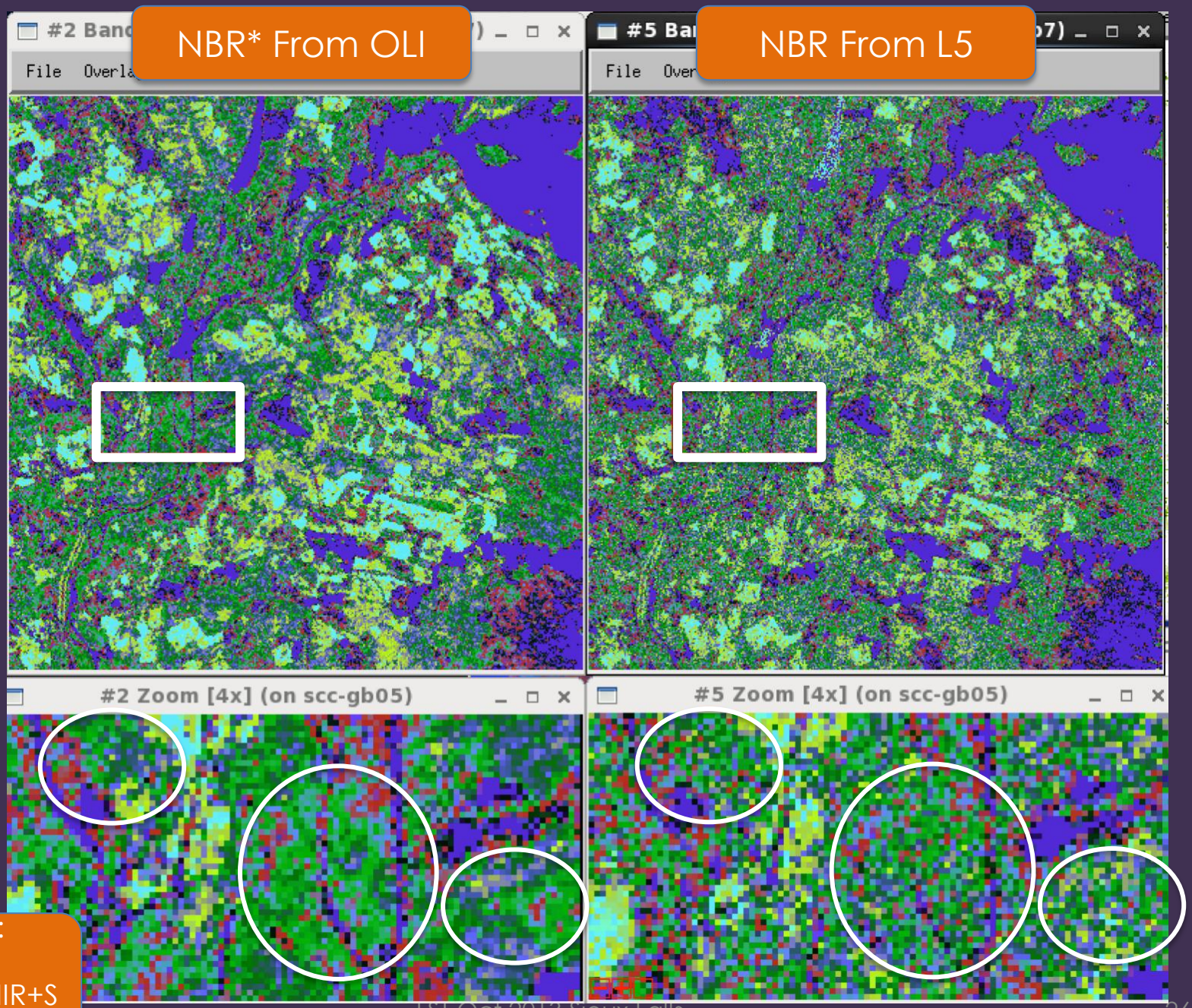
# Landsat 8

# Single image normalization: L5 vs. OLI

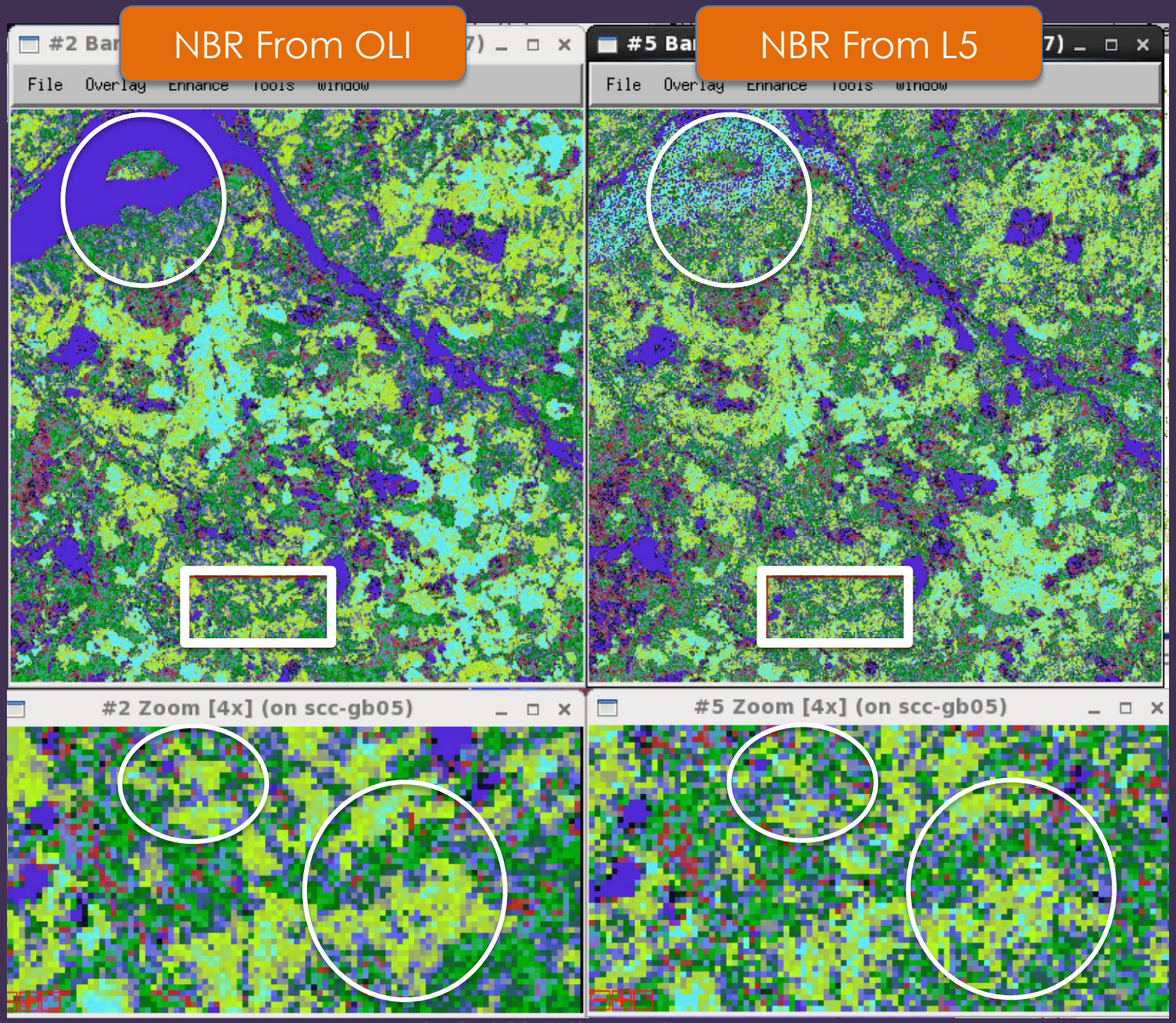
← L5 →

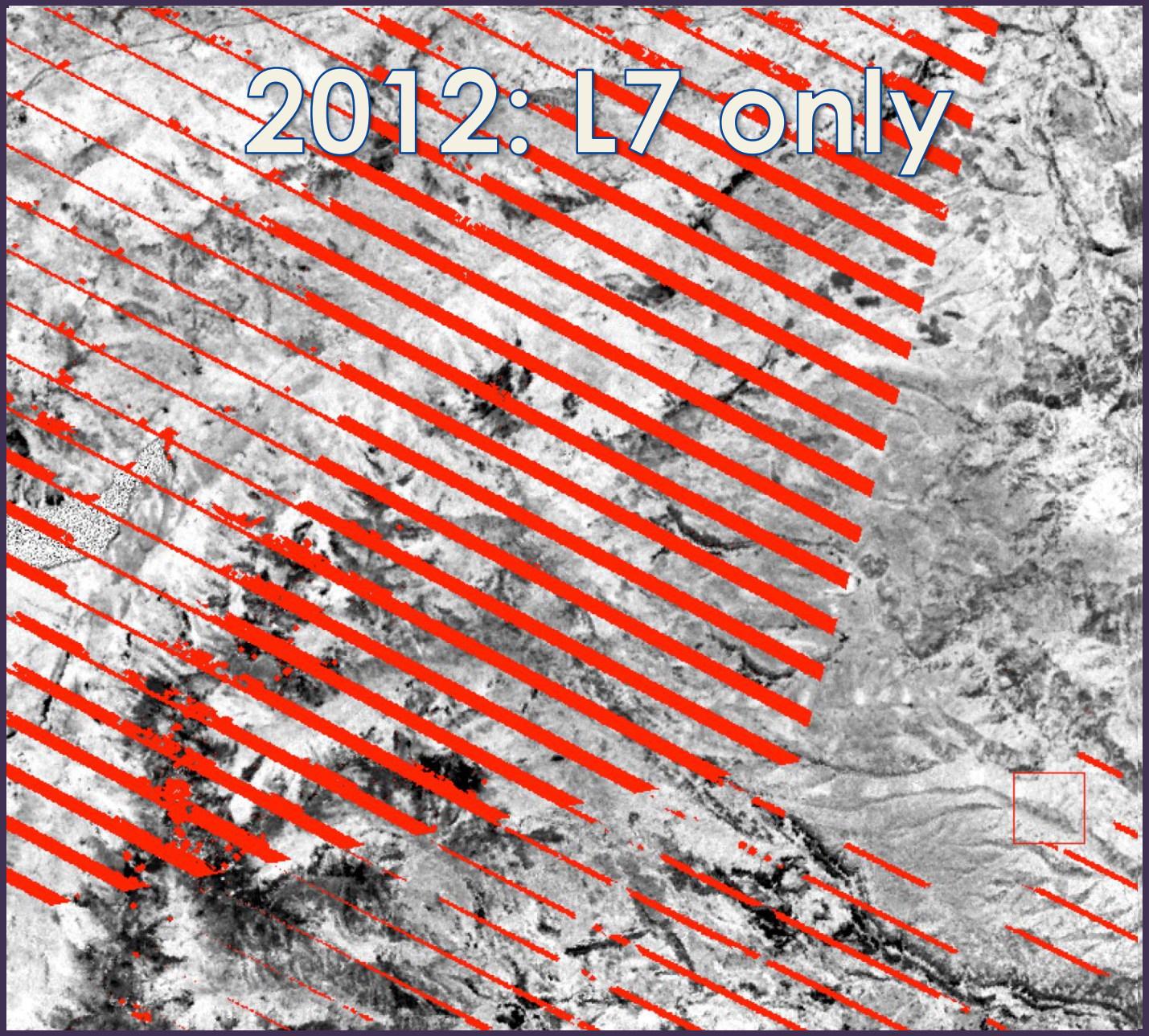


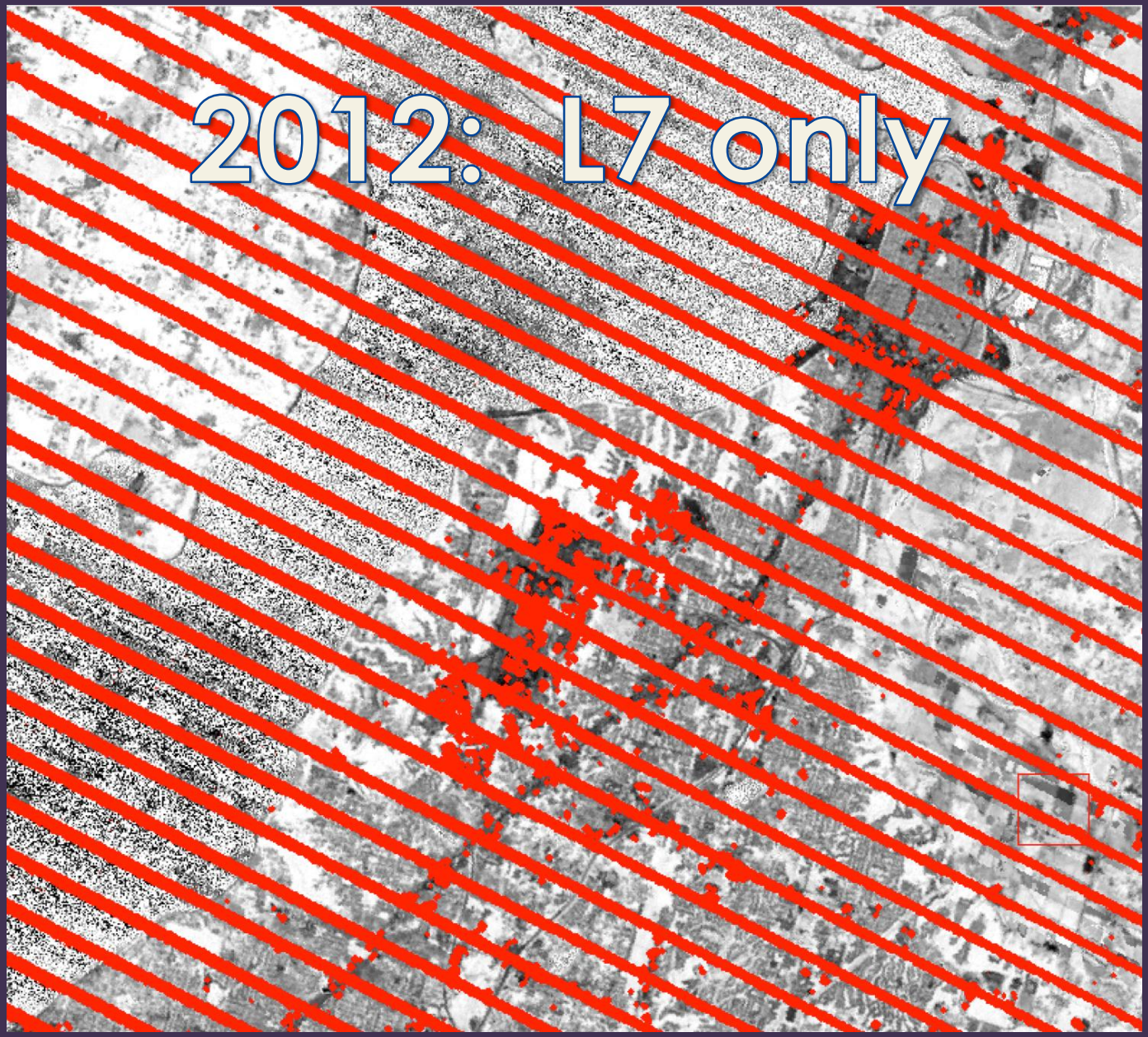

← OLI →




* NBR: (NIR-SWIR2)/(NIR+SWIR2)


NBR From OLI
NBR From L5
File Overlay Enhance Tools Window
File Overlay Enhance Tools Window
#2 Zoom [4x] (on scc-gb05)
#5 Zoom [4x] (on scc-gb05)


2012: L7 only


2012: L7 only

Status ← Consistent → Dynamics

# Summary

## Landsat 8 Rocks