



Ecological Applications of Landsat Data—USDA Forest Service Science and Operational Needs (with partners)

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Landsat 8 Launch & Landsat Science Team Meeting
10-14 February, near Vandenberg Air Force Base, CA

Primary Collaborators

Zhiqiang Yang, Justin Braaten, David Mildrexler,
Kevin Briggs, Peder Nelson, Eric Pfaff [*Oregon State
University*]

Sean Healey, Gretchen Moisen, Todd Schroeder,
Andy Gray, Hans-Erik Andersen, Ken Brewer, Brian
Schwind [*USDA Forest Service*]

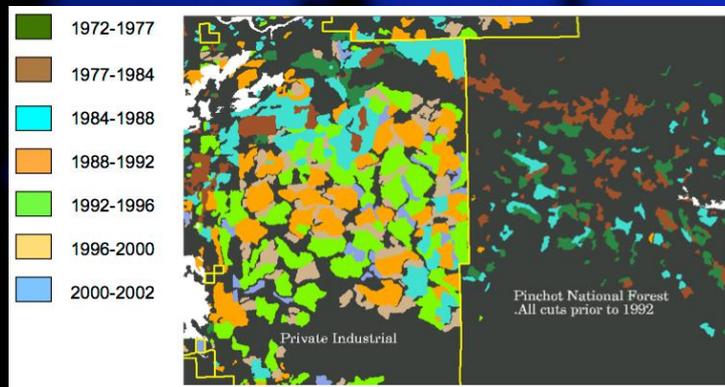
Steve Stehman [*Syracuse University of New York*]

Dirk Pflugmacher [*Humboldt University of Berlin,
Germany*]

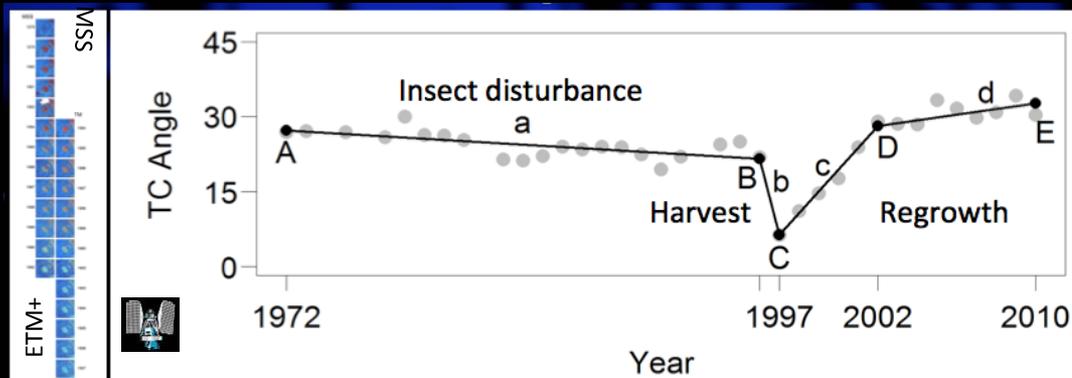
...and others in this room

Objectives

1. Temporal integration across all Landsat sensors for change detection applications



- MSS-TM-ETM+ integration has always been valuable for forest monitoring (with Healey)
- Recent inclusion into annual time-series analyses to predict forest structure (with Pflugmacher, Yang, Kennedy)



- Next: → OLI, automate process for large areas (i.e., western US) to examine climate effects on vegetation (with Braaten, Yang)

Motivation

- Integration across *all* Landsat sensors is critical for US Forest Service and related agency science & applications
 - Long time periods of observation are important for understanding ecosystem resilience to historic management and policy decisions & to guide future decisions under the influence of climate change



Objectives

2. Further a nascent Landsat-based inter-agency monitoring system for the US: Landscape Change Monitoring System (LCMS)

- Statistical modeling framework that *integrates map output from multiple time series algorithms* and other relevant data
- Includes sampling & estimation context to *adjust map-based change rates for disturbance omission errors* (a la Olofsson et al.) using plot-level reference time series interpretations
- Roll adjusted estimates back to the map

Motivation

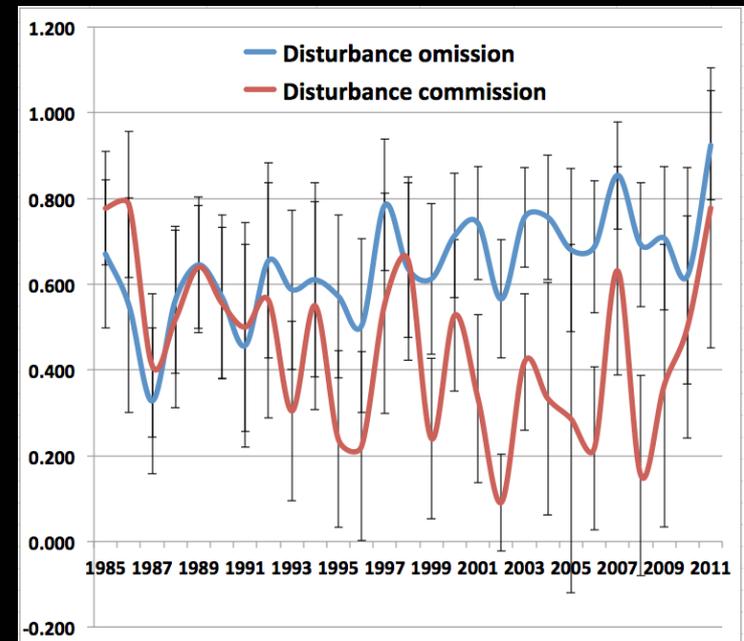
- Change maps from Landsat data are critical for quantification of forest dynamics in the context of management, policy, and international treaties
- But, change maps derived from any automated algorithm using can be/are loaded with error

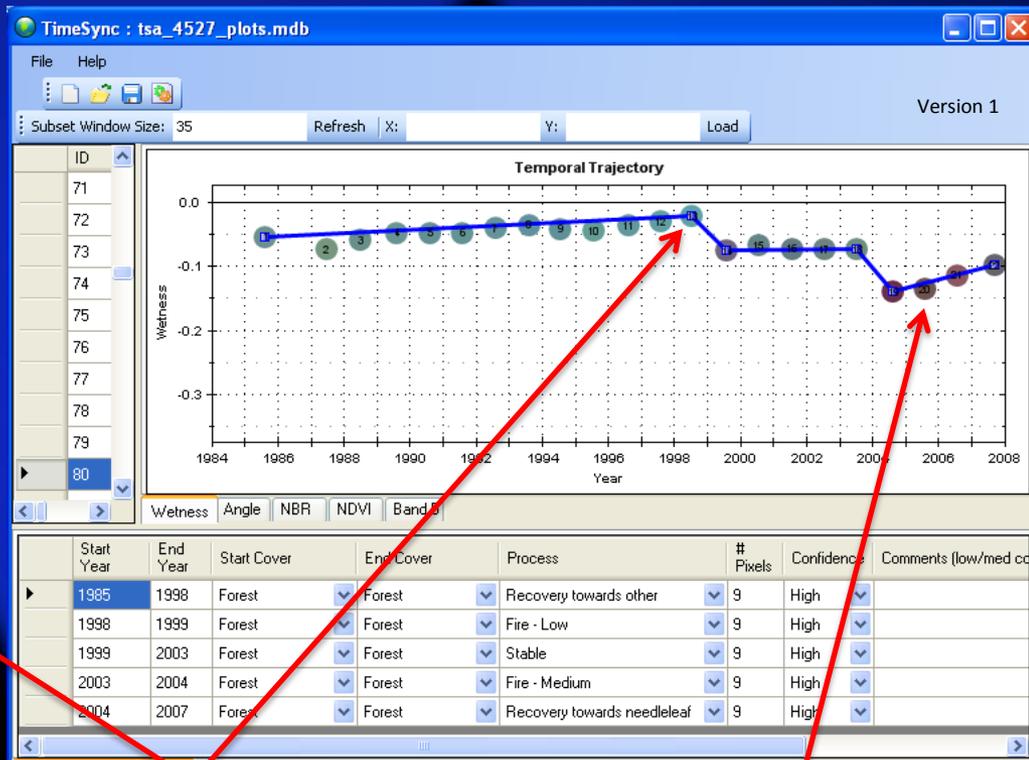
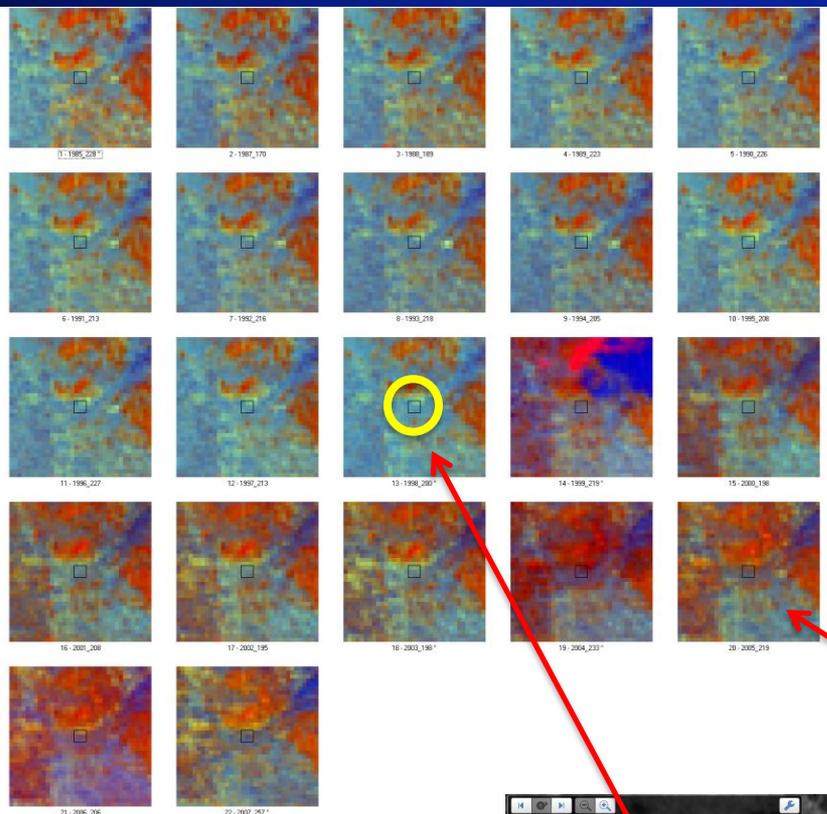
Map	Reference			Commission
	Disturbed	Undisturbed	Agreement	
Disturbed	355	317	0.528	0.472
Undisturbed	571	30887	0.982	0.018
Agreement	0.383	0.990	0.972	
Omission	0.617	0.010		

Across years

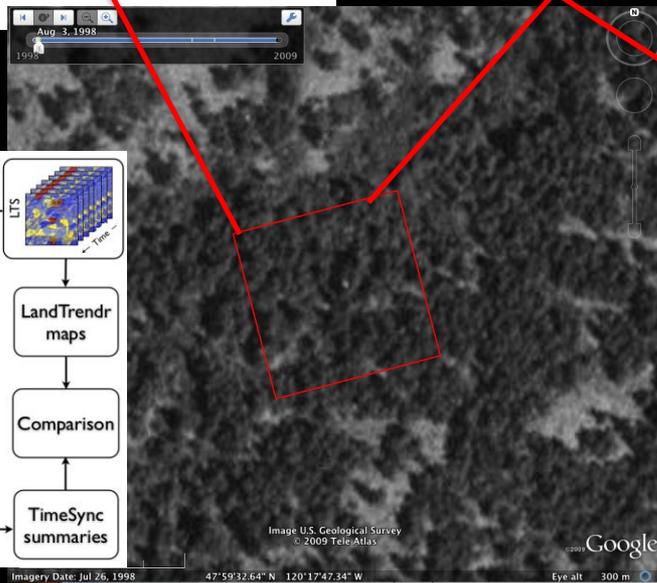
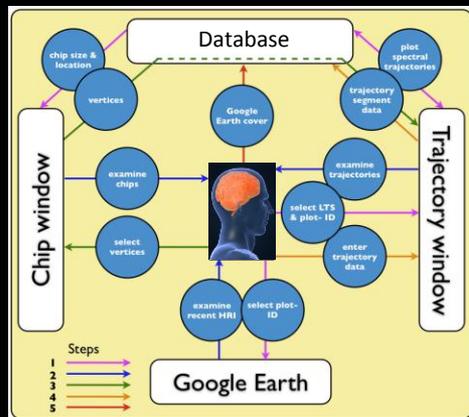
- Needed is a statistical adjustment from plots...

By year





TimeSync



TimeSync Workflow for Plot-based Observations

