

Monitoring Trends in Burn Severity (MTBS)

Building a National Fire Atlas

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Background

● MTBS

- ◆ Sponsored by Wildland Fire Leadership Council and National Interagency Fire Center
- ◆ Nationally consistent assessment of historical and current fires
- ◆ To help monitor national fire trends and effectiveness on National Fire Plan



Background

● MTBS

- ◆ Funded by DOI and USDAFS
- ◆ USGS/EROS Center and USFS Remote Sensing Application Center sharing the work load
- ◆ Duration: FY06-FY10
- ◆ Fires over 1000 ac in West, 500 ac in East
- ◆ Uses Landsat data and Differenced Normalized Burn Ratio (dNBR) to map burn severity
- ◆ Delivers burn severity maps and reports
- ◆ Will evaluate burn history: 1984 – 2003
- ◆ Conduct annual evaluations 2004 - 2010



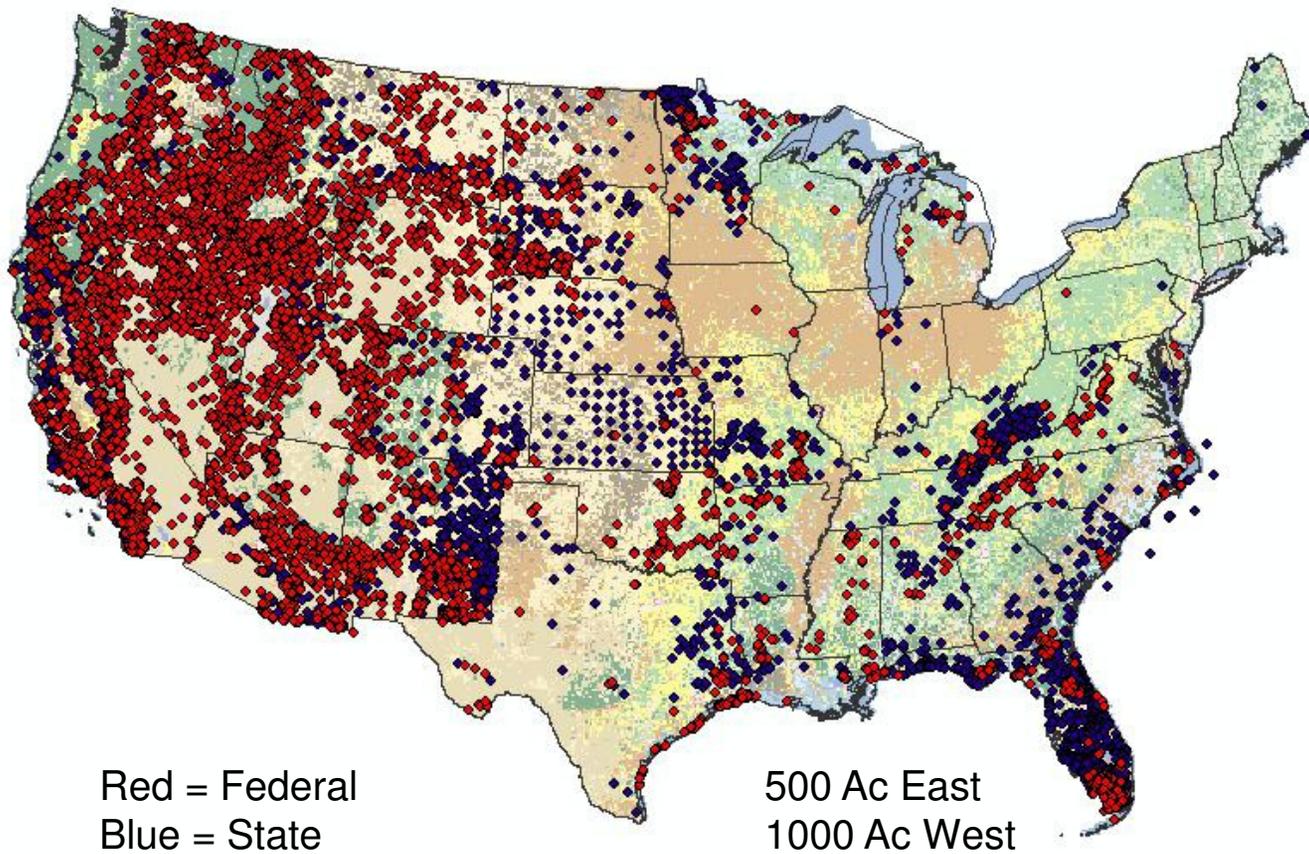
Methods

- **Compile Fire Occurrence Database records**

- ◆ Forest Service, BLM, NPS, BIA, FWS and most States
- ◆ Filter by size and date:
 - 750,000+ records down to 15,000+ (many duplicates)
- ◆ Assign unique MTBS Fire Identification code
 - Agency, Agency/Unit, FireID, Start Date
 - Examples (same fire):
 - ◆ FS-0407-113-20040728
 - ◆ UT-DIF-000025-20040728
- ◆ Generate shape file
 - Spatial Quality Check: 200+ outside US borders, Others? YES!
 - Assign each fire to a unique Landsat Path/Row
- ◆ Annual updates

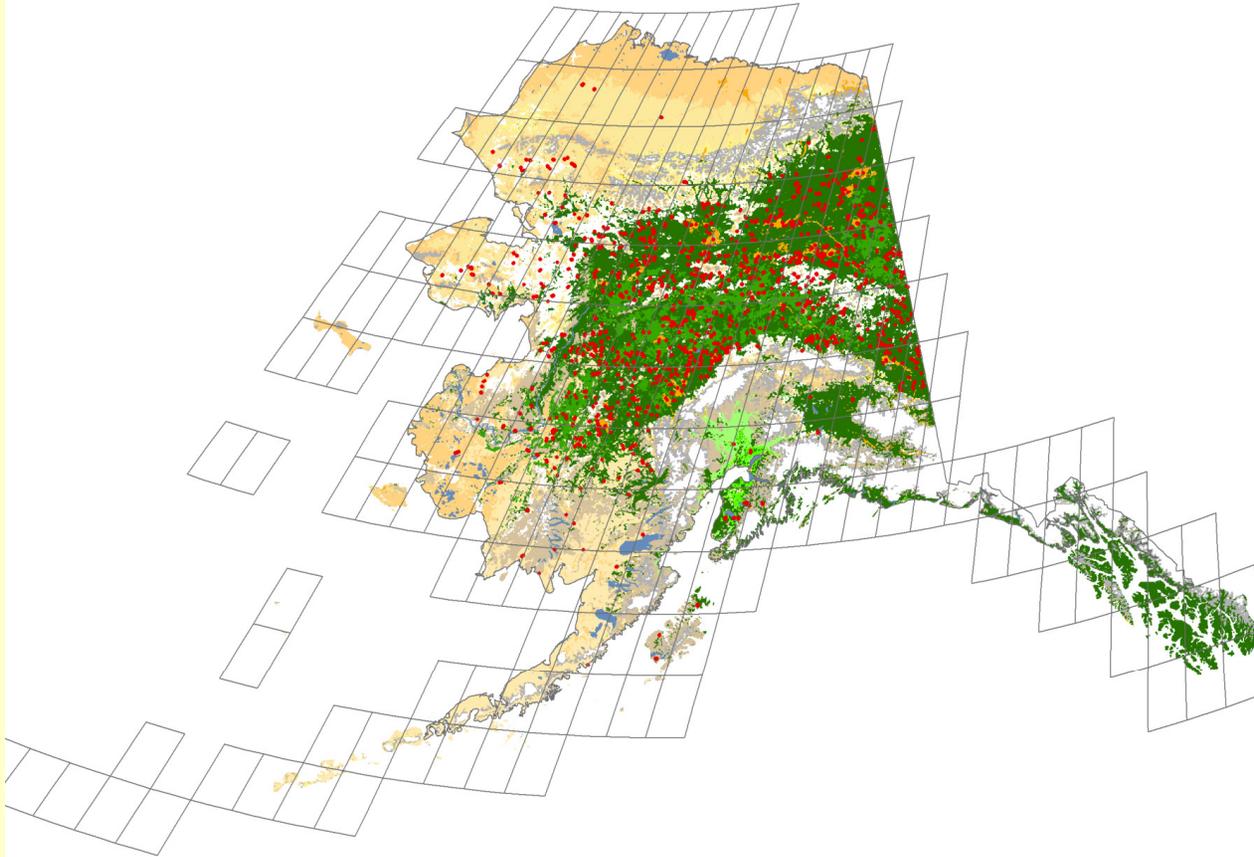
Fire Locations

Reported State and Federal Fires 1984 - 2004



Fire Locations

Reported State and Federal Fires: 1984 - 2004





Methods

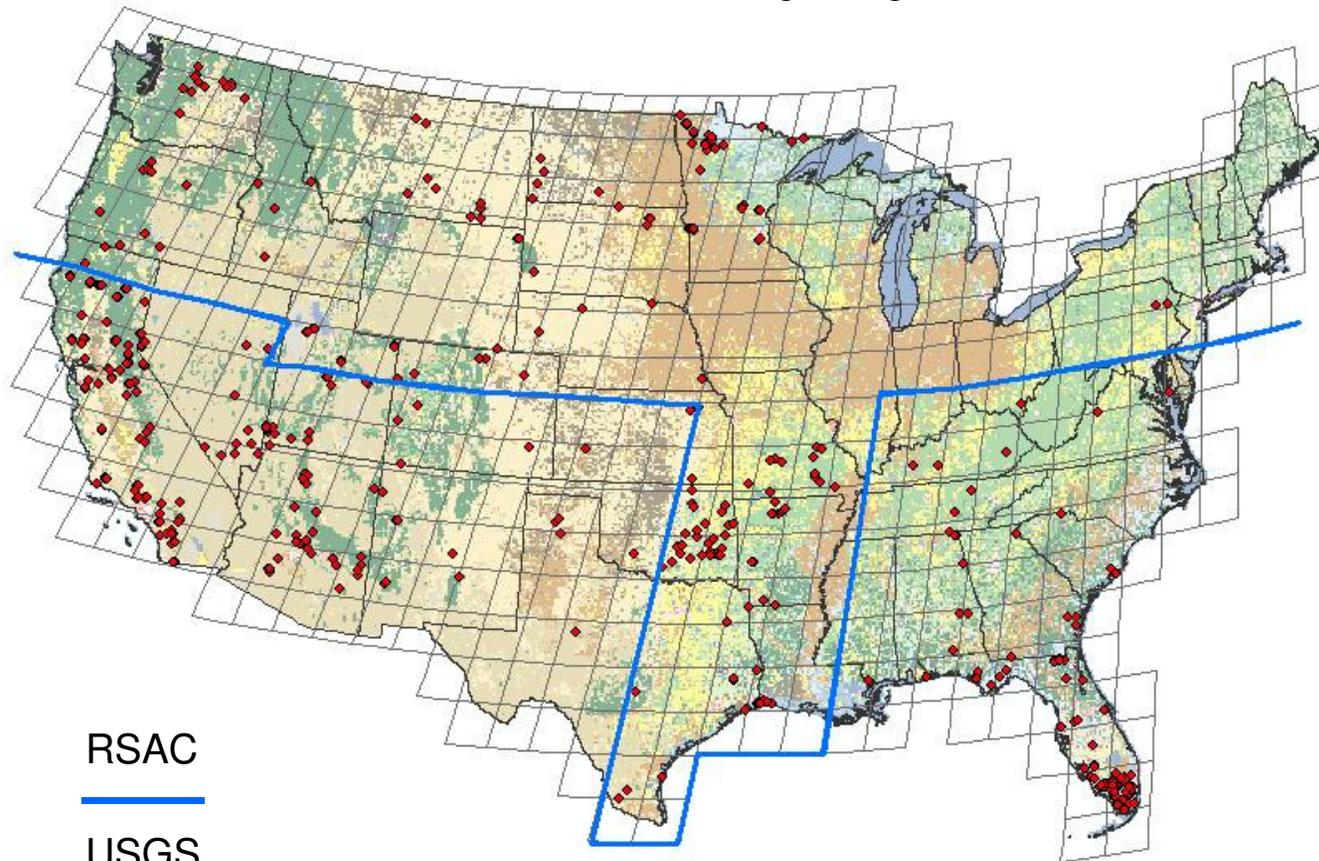
- **Divide Processing Responsibilities**

- ◆ Process ‘Yearly’ fires each year for entire country
 - 2004 fires (extended assessments means 2005 imagery)
 - ◆ RSAC Northern & South Central US, parts of Alaska
 - ◆ USGS California, SW, & SE US, parts of Alaska
 - 2005 fires responsibilities: TBD
- ◆ Process ‘Historical’ fires (1984 – 2003) regionally:
 - Pacific NW (RSAC) and California (USGS): CY 2006 and 2007
 - SW, SE, & North Central US: CY 2008 and 2009
 - South Central, NE, Alaska & Hawaii: CY 2010 and 2011

Assignments: 2004

2004 Fires: Processing Assignments

Fires assigned to Path Rows (P/R), P/Rs assigned to either RSAC or USGS



Assignments: Historical

Historical Fires 1984 - 2003 Processed by Regions

AK&HA:
2010 & 11

NC: 2008 & 09

NE: 2010 & 11

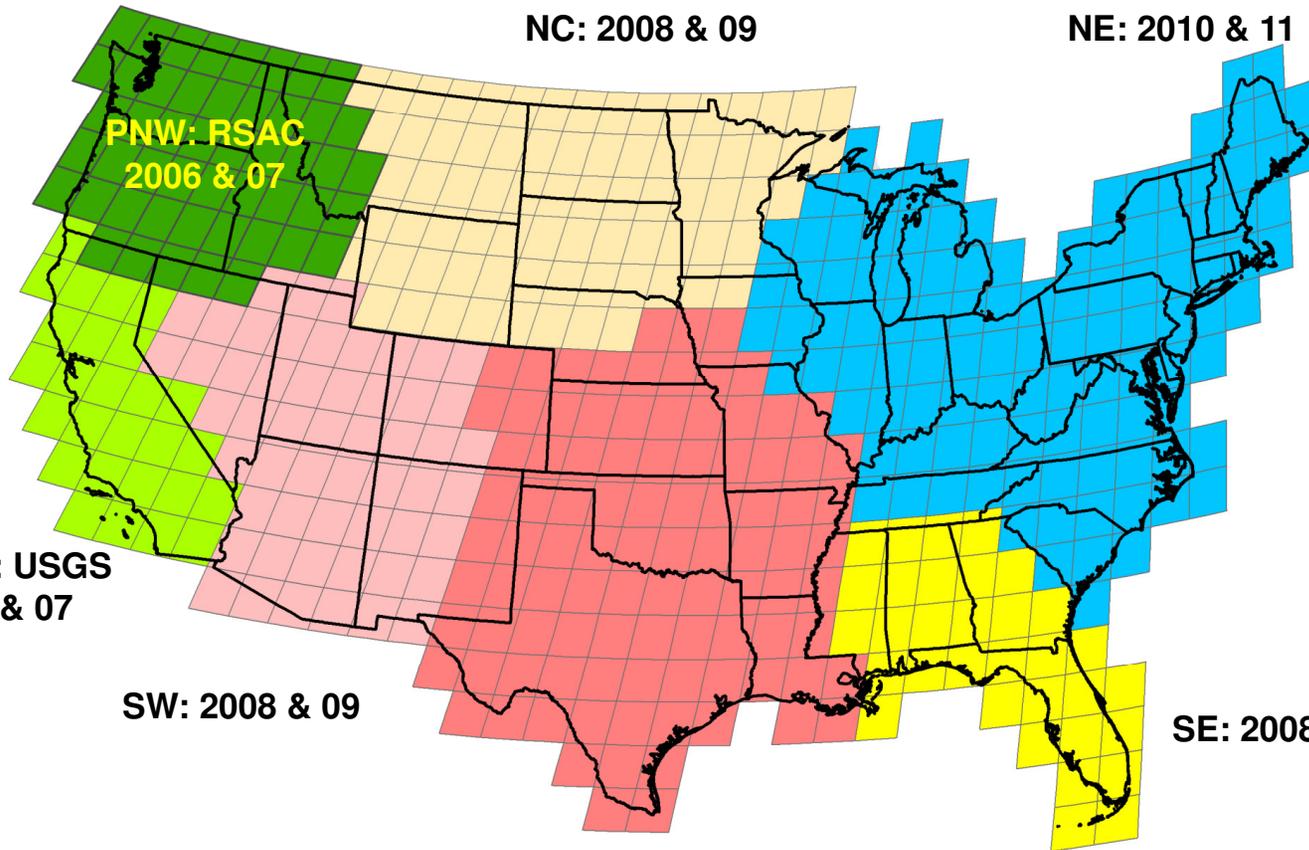
PNW: RSAC
2006 & 07

PSW: USGS
2006 & 07

SW: 2008 & 09

SC: 2010 & 11

SE: 2008 & 09





Development

- **Improve NLAPS**

- ◆ Precision Terrain Correction: Faster
- ◆ At-Satellite Reflectance, NBR generation, Tassell Cap, Geo-TIFFs

- **MTBS Process Tracking Tool**

- ◆ P/R (fire) Assignments, Order tracking, Processing Status

- **MTBS Process Automation**

- ◆ Analysts develop fire perimeter, determine processing parameters
- ◆ Fire-Specific Output products automatically generated

- **Scene Selection Tool**

- ◆ Estimated over 7,800 scenes required for entire project
- ◆ GLOVIS enhanced to speed selection of pre and post fire scenes based on phenology and fire date:
 - Display user-supplied shape files (Point fire Locations)
 - Display land cover-based NDVI curves
- ◆ Generate scene list for automated mass-load NLAPS scene order

GLOVIS: Scene Selection

NDVI Graph

Line Graph | Select Landcover

NDVI Data for Year 2005 Path 43 Row 33

Legend:

- Evergreen forest
- Shrubland
- Herb. grasslands
- Pasture hay
- Deciduous forest

Buttons: Print, Close

Global Visualization Viewer

Resolution | Map Layers | Tools | File | Help

Coordinates: 43, 33, -120.2

Buttons: Go, Go, Navigation arrows

Shapefile Attributes

Attributes | 1:allfires_84-04

Attribute	Value
FID_fed_84	2461
ID	FS-0417-034-20040714
FIRENAME	WATERFALL
AGENCY	USFS
YEAR	2004
START_DATE	20040714
START_MONT	7
START_DAY	14
OUT_DATE	20041018
REPT_ACRES	8723.0

Buttons: Close

Scene Information:

ID: 5043033000523710
 Cloud Cover: 0% Qty: 9
 Date: 2005/8/25

Aug 2005 Go

Buttons: Prev Scene, Next Scene

Landsat 4-5 TM Scene List

5043033000523710

Buttons: Add, Delete, Order

Resolution: Landsat 4-5 TM 240m No Limits Set



GLOVIS: <http://glovis.usgs.gov>



MTBS Processing

- **Analyst :**

- ◆ Pre-Fire NBR – Post-Fire NBR = dNBR
- ◆ Delineate Fire Perimeter (Manual or Automated)
- ◆ Determine Burn Severity Thresholds
 - Burned-Non Burned, Low, Medium, High
- ◆ Fire-Specific Subset coordinates (ULX, ULY, LRX, LRY)

- **Automation (to be implemented): Fire Specific Products**

- ◆ Subset generation (Pre & Post fire Landsat, dNBR)
- ◆ Generation of Thematic Burn Severity Map
- ◆ Summary of Burn Severity Statistics
- ◆ Metadata



MTBS Products

- **Scene Based:**

- ◆ Standard MRLC Product suite..... PLUS.....
- ◆ Differenced Normalized Burn Ratio (dNBR)
- ◆ National Albers Projection, Geo-TIFF

- **Fire Specific Subset suite:**

- ◆ Pre and Post fire Landsat
- ◆ dNBR
- ◆ Thematic Burn Severity
- ◆ Fire Perimeter (and cloud mask if necessary)
- ◆ Burn Severity Statistics (Acres of Burn Severity by Land Cover)
- ◆ Metadata



MTBS : Future

- **Data Distribution**

- ◆ Stage products on a USGS/EROS web-based map server
- ◆ Develop partnership with RSAC for distribution

- **Technology Transfer**

- ◆ Develop project methodology documentation
- ◆ Develop dNBR burn severity application workshop
- ◆ Develop web-based training modules
- ◆ Publish and present results in professional venues