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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

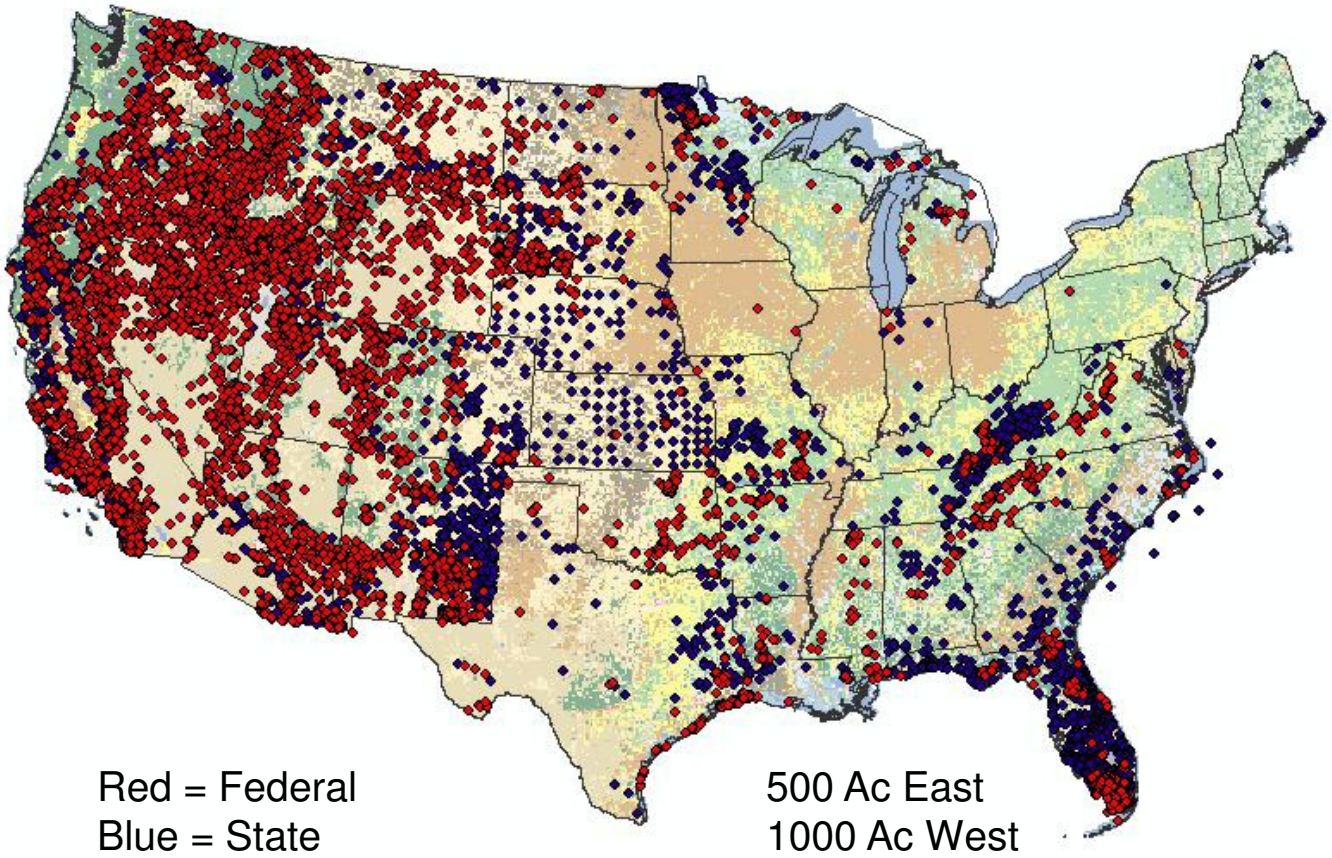
- **MTBS**
  - Funded by DOI and USDAFS
  - USGS/EROS Center and USFS Remote Sensing Application Center sharing the work load
  - Duration: FY06-FY10
  - Fires over 1000 ac in West, 500 ac in East
  - Uses Landsat data and Differenced Normalized Burn Ratio (dNBR) to map burn severity
  - Delivers burn 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



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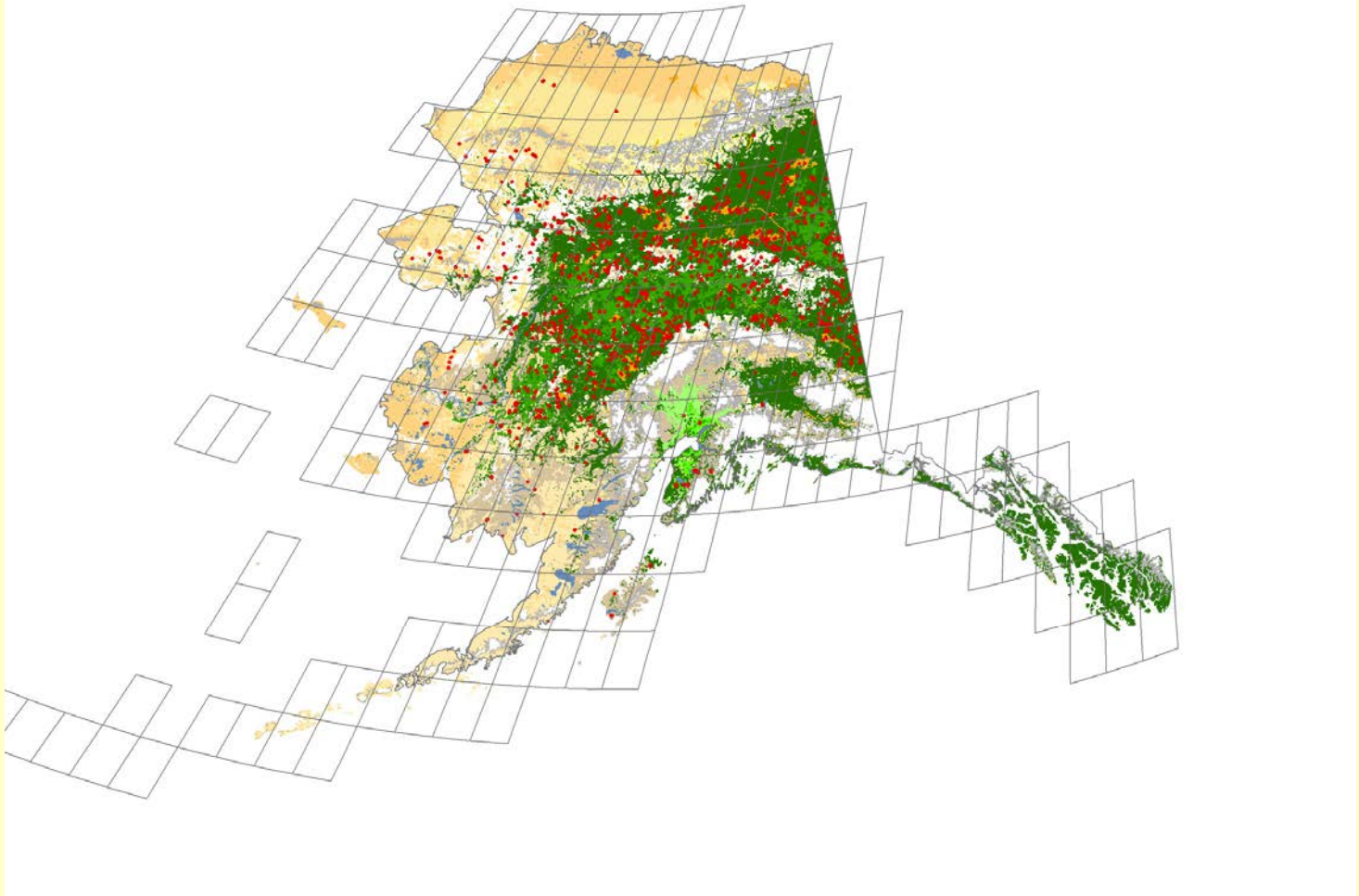
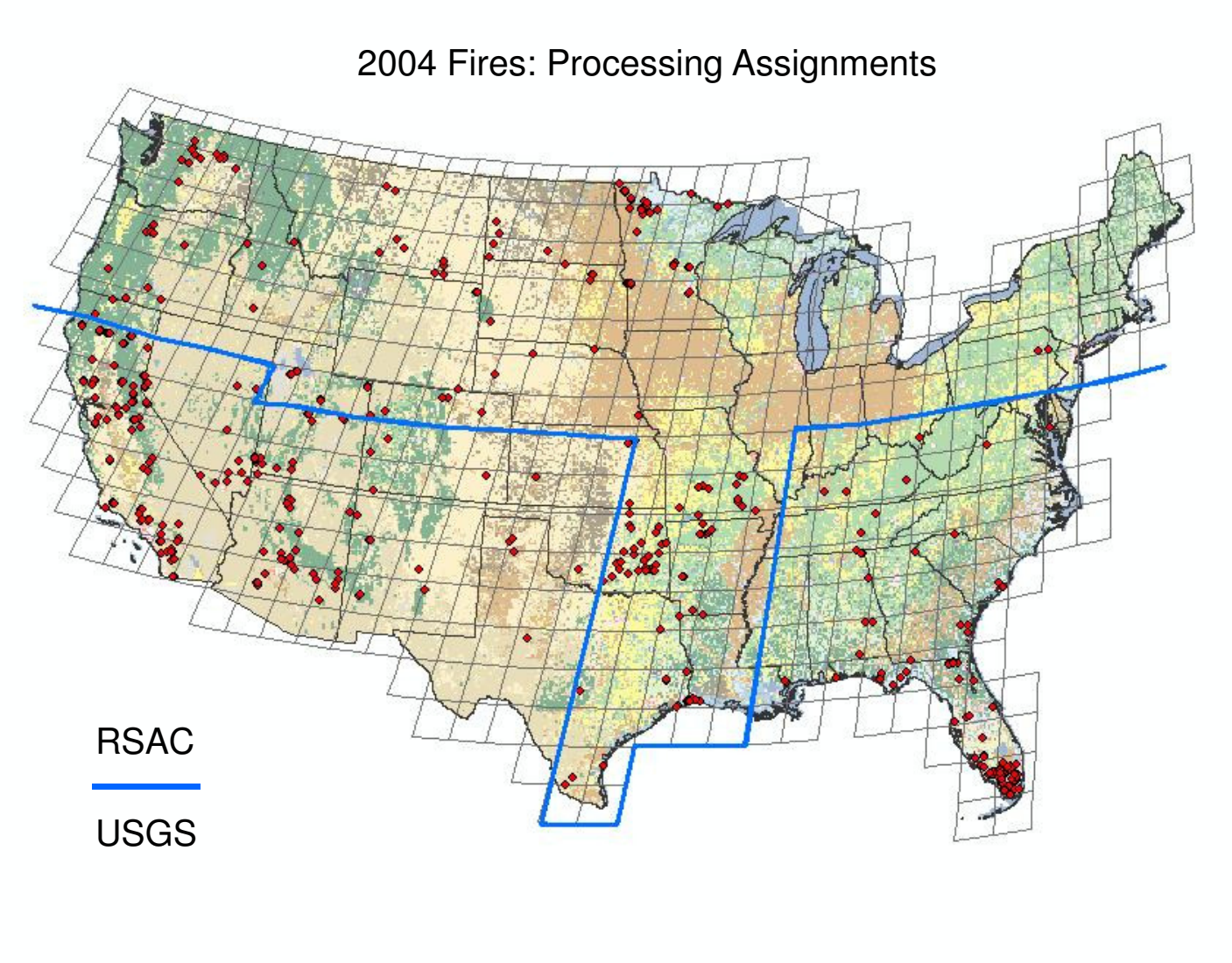


Methods

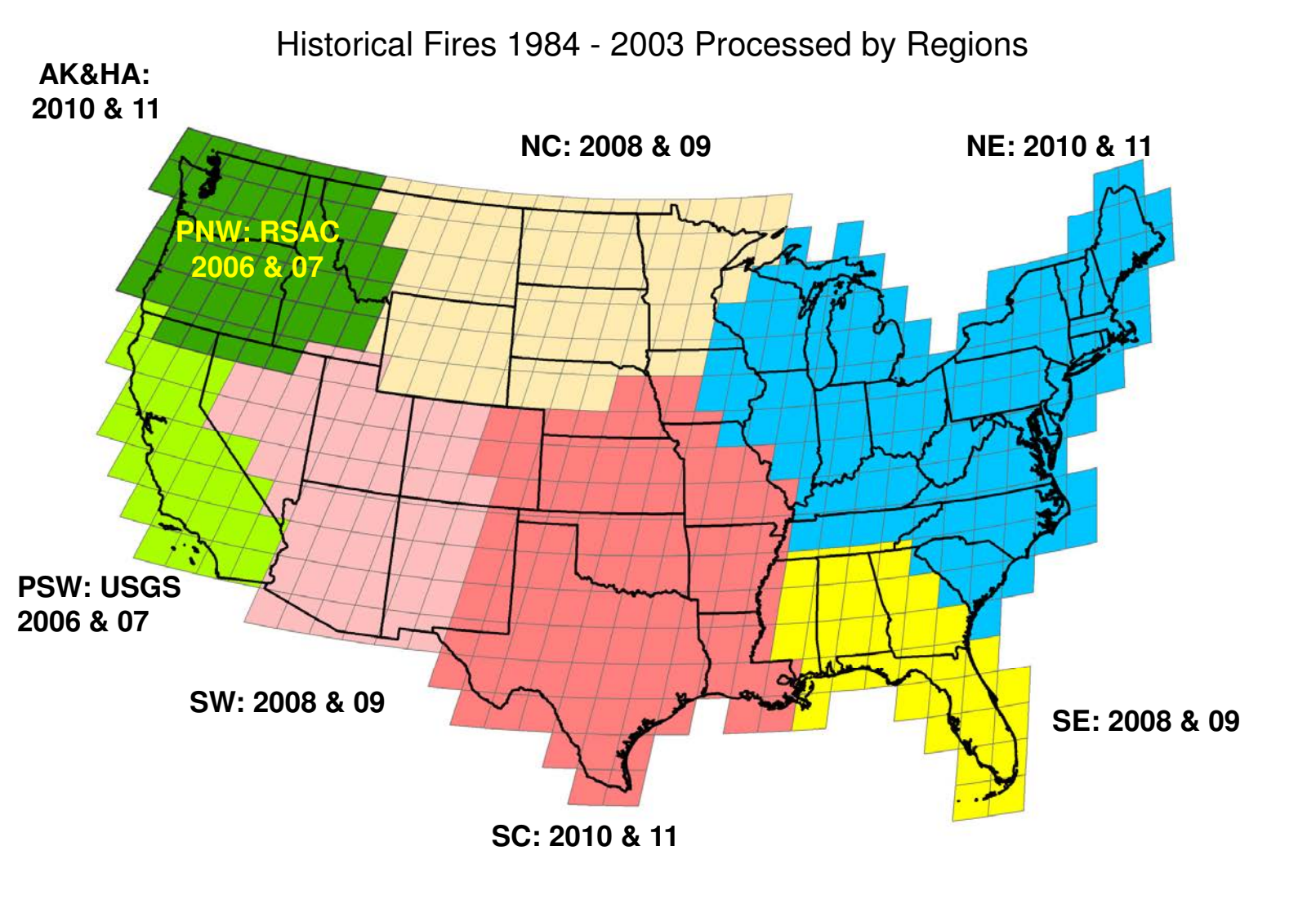
- **Divide Processing Responsibilities**
  - Process ‘Yearly’ fires each year for entire country
    - 2004 fires (extended assessments means 2005 imagery)
      - RSAC Northern & South Central US, parts of Alaska
      - USGS California, SW, & SE US, parts of Alaska
    - 2005 fires responsibilities: 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

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



Assignments: Historical



Development

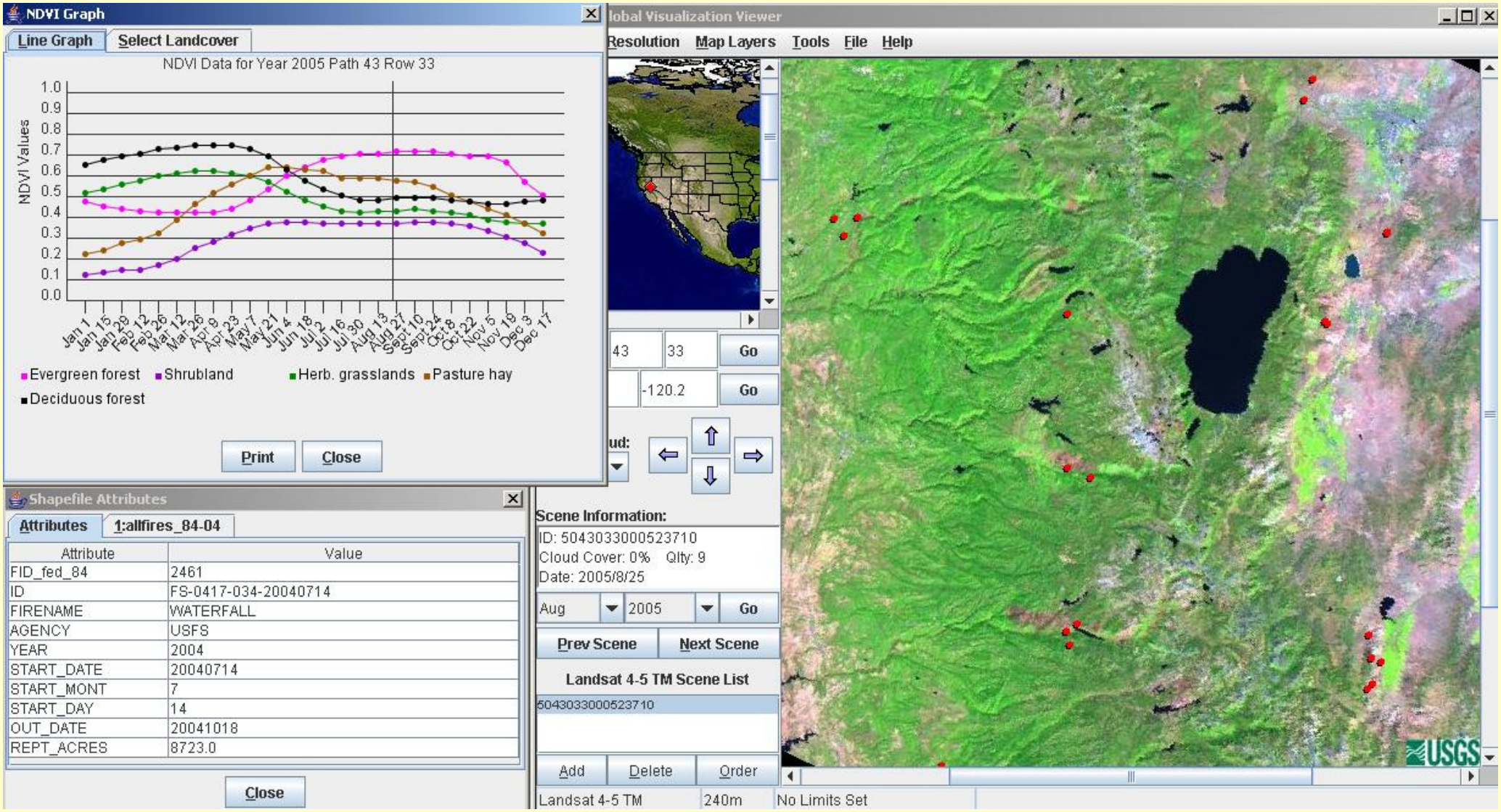
- **Improve NLAPS**
  - Precision Terrain Correction: Faster
  - At-Satellite Reflectance, NBR generation, Tassell Cap, Geo-TIFFs

- **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



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