Remote Sensing and GIS

Day 2, Track 1, P3 B2&4

National Fire Technical Workshop

New Orleans, LA

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RS and GIS Themes

- Activity and systems support of *present* EI process: QC
- Research roles for remote sensing
- Consistent methods with most specific data available
  - Intricate yet transparent activity data collection and processing
  - But how to incorporate “local knowledge”?
- Automated
- Facilitate third party data products
  - Frequently updated or geographically specific
  - But is other data used appropriately?

Remote Sensing for Fire EI

- Remote sensed fire activity mapping
  Strengths, limitations, availability?
- Burn perimeter vs. blackened area assessment (acres)
- Fuel loading / vegetation assessment (ton/acre)

GIS for QC and Augmentation

- Fuel loading assignment by location
- Georeference by legal location and county
- FIPS, timezone assignment for model ready files
- Coordinate system re-projection
- Duplicate and complex checking by proximity, date, reporting system, and name
- QC for spatial domain, water body, etc.

Remote Sensing for Fire EI

- Remote sensed fire activity mapping

  Strengths, limitations, availability?

  – Hotspot + burn scar style detection

  – [others?]
- Burn perimeter vs. blackened area assessment (acres)
- Fuel loading / vegetation assessment (ton/acre)

Current RS Activity Systems

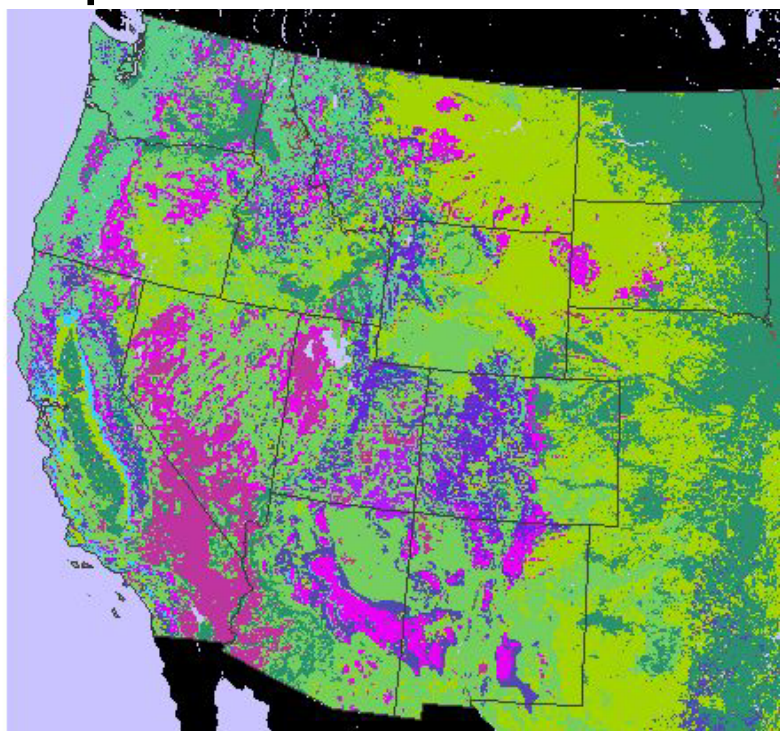
- Available satellites / sensors
  - AVHRR, MODIS, LANDSAT
- Historic and near real-time fire activity detection projects
  - North American Fire Mapping Project
  - Environment Canada

GIS for QC and Augmentation

- Fuel loading assignment by location
  - Clip state veg coverage by fire polygon
  - Overlay fire point on national NFDR Fuel grid
- Georeference by legal location and county
  - Interpolate by Nat Atlas TR map, co centroid
- FIPS, timezone assignment for model ready files
  - Overlay point on Nat Atlas county, timezone maps
- Coordinate system re-projection
- Duplicate and complex checking by proximity, date, reporting system, and name
- QC for spatial domain, water body, etc.

GIS Modification to Activity Databases

- Geo-reference to lat/lon using Meridian Township Range and Section
  - MTR located on national map
- Assign NFDRS fuel model codes
  - Coordinates overlain on NFDRS map

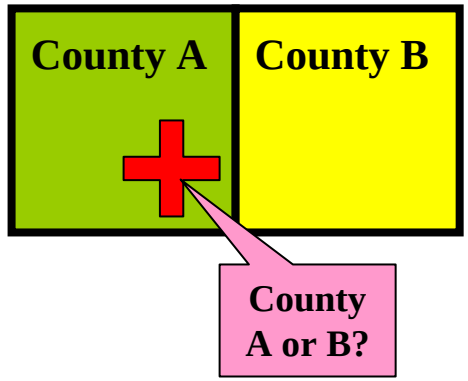


How were activity records selected?

- Necessary amount of data in activity record
- No conflicts within activity record
- Activity records that did not meet requirements were not included in EI

Activity Data QA / Error Checking

- Consistency check: Spatial overlay
  - Lat/long vs. Maps of state, county, and water bodies
  - Mismatches flagged in database



- Sufficiency check: Calculation information
  - Location and fuel loading
  - Information sources recorded in database

- Inconsistent and insufficient records DROPPED
  - Remain in activity database, not included in EI

RS Capabilities & Limitations

Sensor	Detection Limit	Size Accuracy Threshold
AVHRR	500 ac / day	25,000 / event 250 / day (when available)
MODIS	200 ac /day	1,500 / event (50% accuracy) 50 /day
LANDSAT	2 ac / event (not daily)	Event: Very good Daily: N/A

AVHRR and MODIS Notes

- Burned area rather than total inside perimeter
- Unknown performance for understory burns (omission)
- Best for forest and shrub rather than grasslands / range and agricultural
- East vs. West concern for fire size
- Direct remote sensing of plume potentially useful for model performance and EI QA

Present vs. Future Utility

Present

- AVHRR coverage archived for U.S. and Canada
- AVHRR fire nationwide mapping can be processed for 2002, but not currently a project
- Detailed RS can be used for QA of individual events on case by case basis
- GEOMAC has perimeters for Type I incidents, limited application for EI
- Need second opinion on current techniques and research groups for current capability

Future

- MODIS becoming primary sensor
- Fire Lab studying RS burn size to reported burn size. Report expected Dec 04
- Fire Lab working on fire mapping by energy release. Effectively map and estimate biomass consumption. Report expected June 05.

GIS for QC and Augmentation

- Fuel loading assignment by location
  - Overlay fire point on national NFDR Fuel grid
  - Clip state veg coverage by fire polygon
  - GIS to merge/crosswalk veg maps (wildlands and ag)
    - Prioritize data sources, process updates
- Georeference by legal location and county
  - Interpolate by Nat Atlas TR map, co centroid
- FIPS, timezone assignment for model ready files
  - Overlay point on Nat Atlas county, timezone maps
- Coordinate system re-projection
- Duplicate and complex checking by proximity, date, reporting system, and name
- QC for spatial domain, water body, etc.
- Improve QC for other reality checks: wildland areas that are “never burned.” Not burned at certain times of year.