

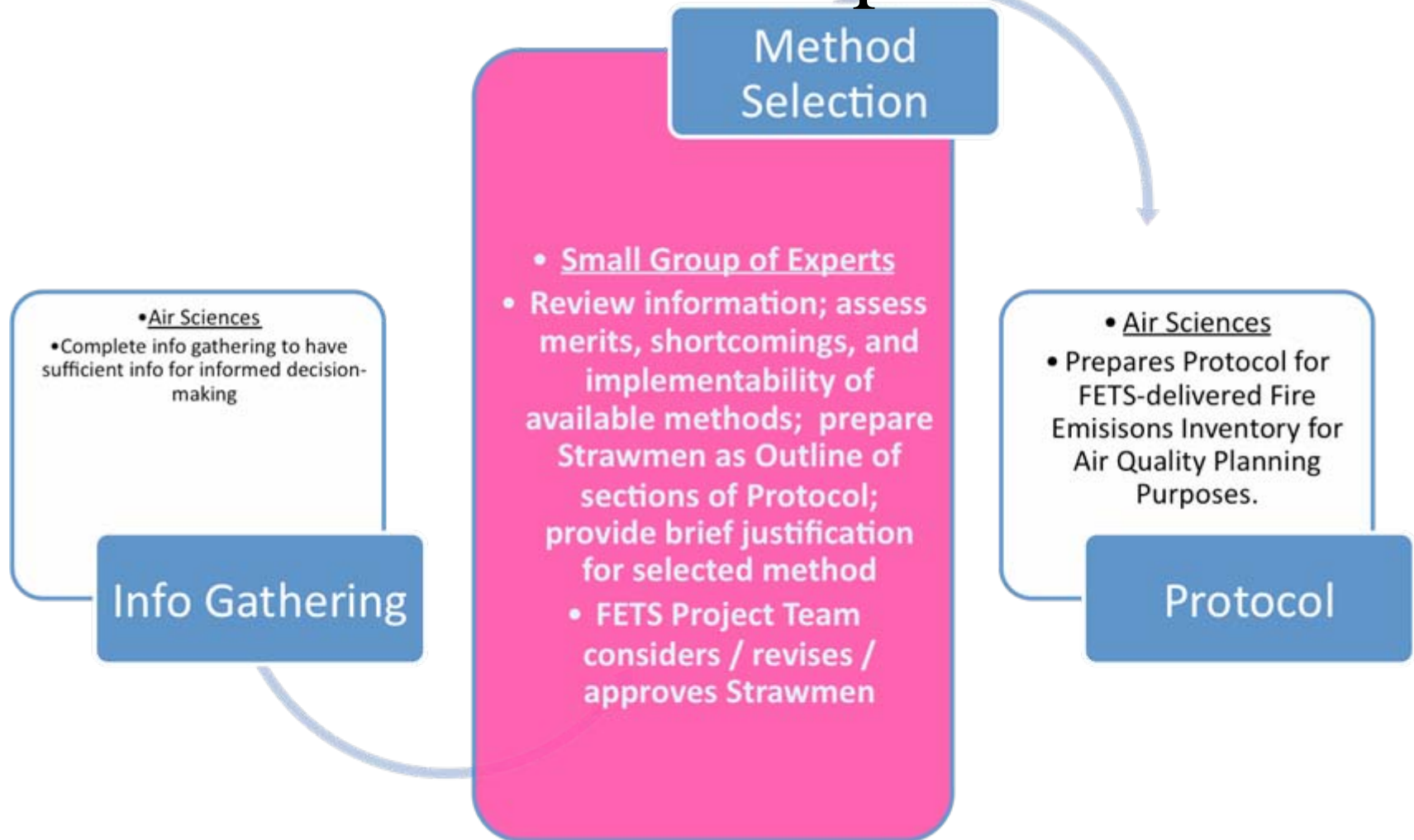
**Developing a Technical Protocol for 2008-09-10
Fire Emissions Inventories
for Regional Air Quality Analysis and Planning**

August 31 – September 1, 2010

Boise, ID

Call In Info: 1-866-206-0240 Access: 839702

FETS Protocol Development Workshop



FETS Protocol is the Roadmap

Fire activity data collection and forecasting efforts of others.

Technical data processing steps in the FETS

Refined fire emissions datasets for air quality management and planning.

Regional Haze Rule
Ambient Air Quality Standards
Exceptional Events Policy

FETS Features & Functions

Web-based manual data entry pages.

Several options for automated data upload, including: FTP, Web Services, and email.

Map tool showing planned and accomplished fire events (all fire types) and locations of satellite fire detections for the previous 48 hours.

A pop-up table showing the current status of fire data submittals to the FETS.

Two draft report functions.

Critical documentation and metadata.

FETS Design Goals

Provide the most complete and comprehensive data set possible including augmenting the FETS to estimate emissions from additional pollutants.

Create and maintain a comprehensive, coherent data set that is transparent, accessible, and reflects the awareness of the limitations and heterogeneity of ground-based fire-tracking across states and tribes.

Serve as the portal for all sources of fire activity within (and perhaps beyond) the WRAP modeling domain. Reduce reporting obligations for states and tribes down to a single data submittal.

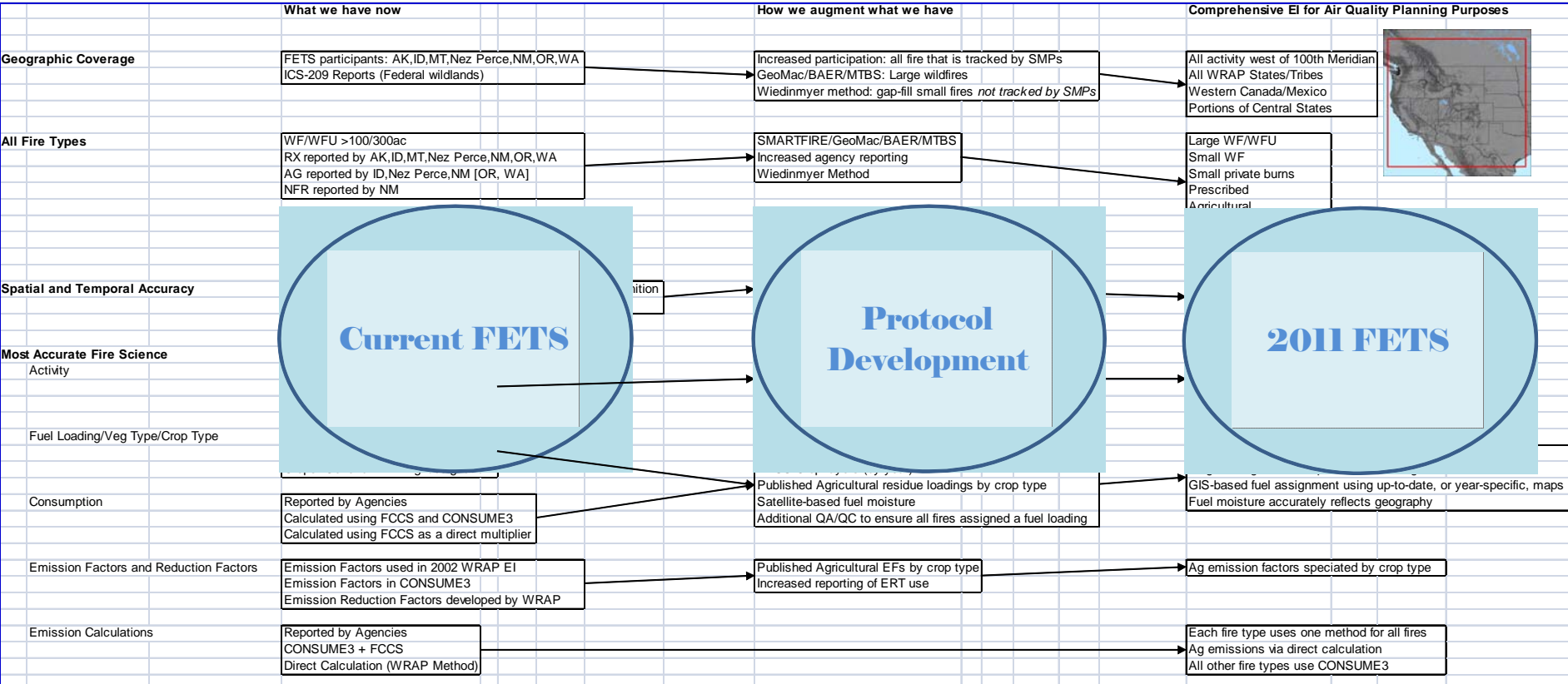
Augment the FETS data by using one of several available fire activity data sets developed from satellite imagery. Result: higher spatial and temporal accuracy; more complete fire activity data.

Protocol Development – Big Picture Themes

- Eligibility Requirements for Data Mining, Fire Science Technical Processing, and Data Selection:
 - data layers and technical methodologies must exist and be available.
 - Technical method must be implementable in the FETS
 - Probably means system-wide treatment vs. instance-by-instance
- “Choosing” Data in the FETS to Use in the AQ EI
 - Use data as is...QA/QC'd but no decision as to whether the data is “best.”
 - Drive data quality up front in order to establish confidence and use later.
 - Store and process “competing” data, develop selection criteria, and automate routines to evaluate and select “best” data.

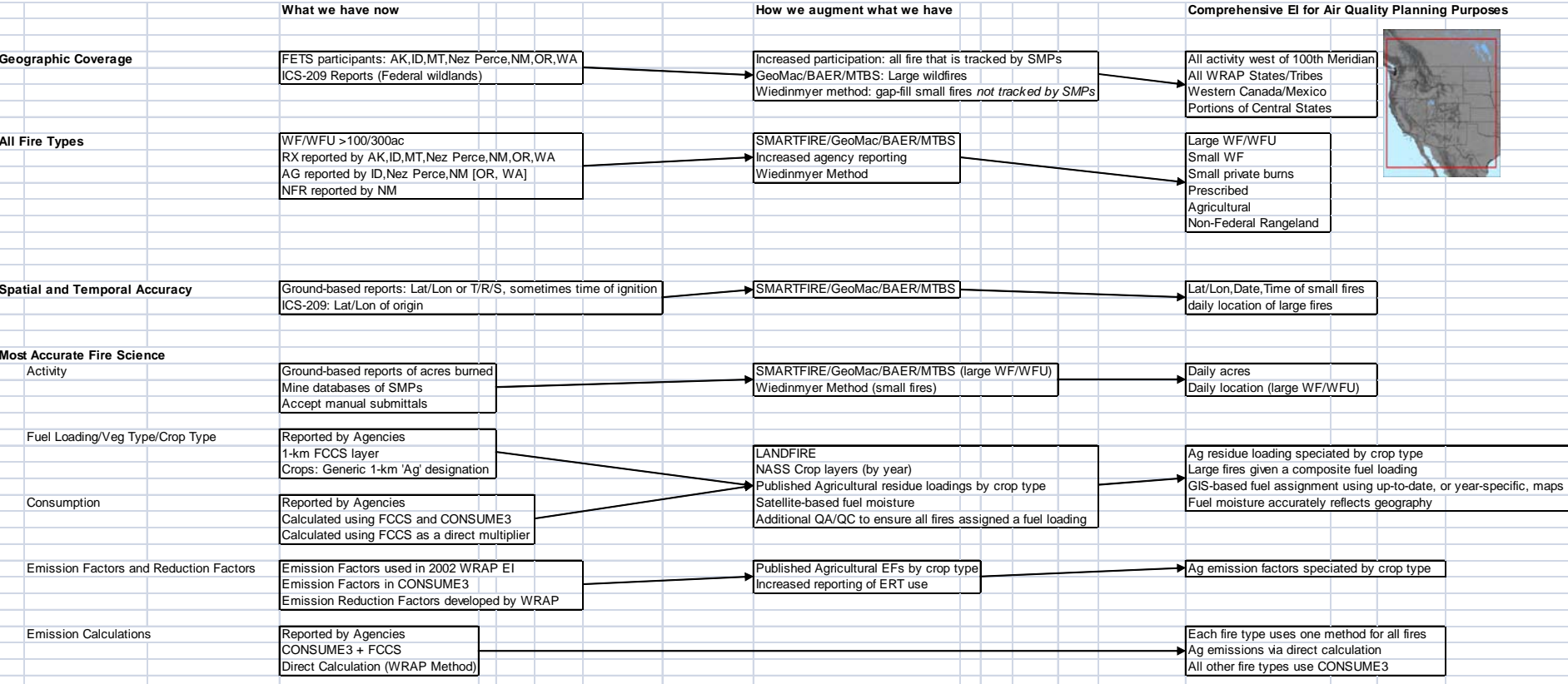
Protocol Development – Big Picture Themes

- Data Augmentation vs. Data Replacement
 - Example: Large wildfire data from SMARTFIRE replaces ICS 209-based wildfire data in FETS.
 - Example: Wiedenmyer-method fire detections (satellite) in areas where no small fires are reported augment prescribed fire data in FETS.
- What is the acceptable time lag?
- Are the data sources reliable into the future?



Notes:

- [ICS-209](#): For 2008 and 2009, Daily, and for 2010, weekly, reports of wildland fires >100 acres in timber, >300ac in brush/grassland. Does not include fires managed exclusively with State resources (relevant to Alaska).
- [GeoMac](#): USGS web-based system for reporting daily fire perimeters. Used by Federal agencies.
- [BAER](#): Burned Area Emergency Response program headed by the Remote Systems Applications Center (RSAC). Uses satellite imagery to quickly determine burn severity and extent for some large wildfires.
- [MTBS](#): Monitoring Trends in Burn Severity. RSAC program to consistently map burn severity and fire perimeters across the US through 2010. Latest available data as of May 2010 is the 2007 fire year.
- [Wiedinmyer Method](#): A method of constructing fire emission inventories using MODIS fire products. Intended as a gap-filling technique for areas with little or no reporting.
- [SMARTFIRE](#): A burn-reconciliation program that creates daily products of burned area by combining satellite fire detections with ICS-209 ground-based reports (see Note 1).
- [LANDFIRE](#): A 30-meter vegetation classification product cross-walked to FCCS, making it useful for emissions calculation with CONSUME3. One of the intent of LANDFIRE is to regularly update vegetation layers to account for changing landscapes.
- [NASS Crop Layers](#): National Agricultural Statistics Service 30-meter vegetation layers, by State, classified by crop type. For many States layers exist for multiple years, allowing for more-accurate GIS-based crop type assignment for burns with no reported crop type.



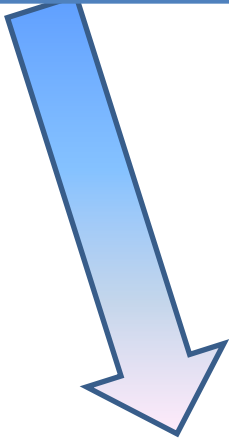
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Topic 1 – Fire Activity: Completeness

Current Status:

The lack of full coverage (by geographic area; fire type)



Goal(s):

All activity west of 100th Meridian

Area– All WRAP States/Tribes, Western Canada and Mexico, and portions of Central States.

Fire Type– Large WF/WFU, Small WF, Small private burns, Prescribed, Agricultural and Non-Federal Rangeland.

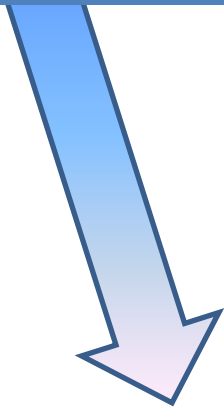
Options (from Protocol flow):

- Increased participation: all fires that are tracked by SMP.
- For large wildfires, using SMARTFIRE, GeoMac, BAER, and/or MTBS.
- For fires not tracked by SMP's, using MODIS or HMS to gap-fill the small fires.

Topic 2 – Fire Activity: Accuracy

Current Status:

Relatively rough estimates of daily acres burned over life of large fire events (including daily movement of fire location)



Goal(s):

A day-by-day centroid of large fires with acreages burned in that 24 hour period. Lat/long, Date, Time
Daily location of large fires
Daily acres

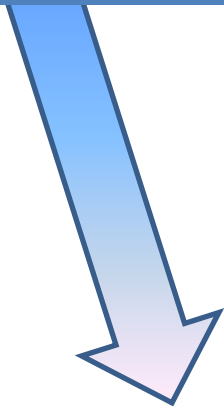
Options (from Protocol flow):

- SMARTFIRE and GeoMac
- Replace ICS-209 with GeoMac
 - GeoMac and HMS
 - GeoMac and MODIS
- BAER
- MTBS

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Options we can rule out:

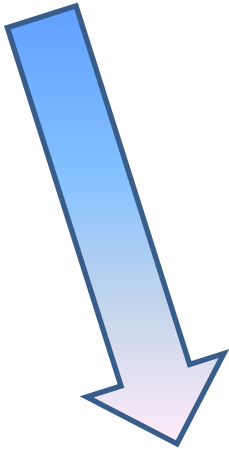
- BAER
 - Only large fires receiving treatment
 - Accuracy affected by weather/terrain
- ~~-MTBS~~ *MTBS will be used as it becomes available*
 - Comprehensive for wildfire, ~~but 2010 data will not be available in time.~~

Topic 3 – Fire Science: Fuel Loading /

Consumption Options:

Current Status:

As provided and/or single fuel loading and fuel consumption for entire event.



Goal(s):

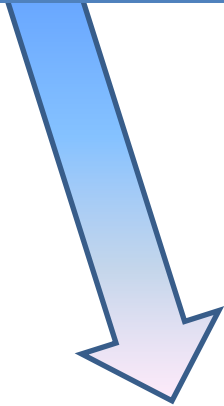
- Ag residue loading speciated by crop type
- Large fires given a composite fuel loading
- GIS-based fuel assignment using up-to-date, or year-specific, maps
- Fuel moisture accurately reflects geography

- LANDFIRE
- Satellite-based fuel moisture
- Additional QA/QC to ensure all fires assigned a fuel loading
- For Agricultural burns
 - NASS Crop layers (by year)
 - Published Agricultural residue loadings by crop type

Topic 4 – Fire Science: Emissions

Current Status:

User provided and/or WRAP (EPA/ EC/R / AP-42) and/or CONSUME for silvicultural burns. User provided and or WRAP (UC Davis) for agricultural burns.



Goal(s):

-Estimates of all pollutants required as input to Chemical Transport Model (CTM).
-Speciate emissions according to best available fire science.

Options:

- CONSUME 3.0 + FCCS
- Direct Calculation WRAP Method
- Published Agricultural EF's by Crop Type
- Modified AP-42 calculation method
- Continue using scalars published in EPA/OAQPS reference documents
- Ozone Measuring Instrument ([OMI](#)) on the EOS Aura satellite
- Andreae & Merlet, 2001 (biomass EFs)
- Upcoming Yokelson publication
- FEPS (executables and PYTHON scripts)
- Fire Radiative Power – inadequate satellite data

CTM Input Requirements:

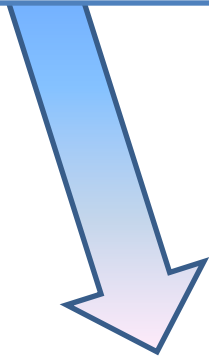
NO, NO₂, HCHO, ETH, PEC, POC, etc.

Topic 5 – Fire Science: Release Height / Plume

Parameters

Current Status:

WRAP-method (empirical observation-based): physical plume characteristics (Lay1F; PBOT; PTOP) assigned to each hours-worth of emissions based on surrogate for heat release (fire size and fuel loading)



Goal(s):

- Method that best reflects fire science.
- Dynamic assignments of physical plume characteristics.
- Method that results in “best” CTM performance.

Options:

- WRAP / Air Sciences => empirical plume height parameter assignments
- SMOKE / Briggs Plume Rise Algorithm
- DAYSMOKE Plume Rise Algorithm developed for Rx fires in the SE.
- NASA => post fire plume height verification
- NOAA’s Air Resource Laboratory’s use of HYSPLIT

Topic 6 – Emission Reduction Techniques

Current Status:

As provided ERT and control efficiency (CE) information and/or FEJF's ERT Seasonal Suite lookup table is used . Emissions averted are calculated and stored. CE's PM2.5-based but applied to all pollutants.

Options:

- Improved reporting of the use of ERT's.
- Updated/improved CE's for PM2.5.
- Pollutant-specific CE's.
- Improved technical implementation of ERT Seasonal Suite tool.

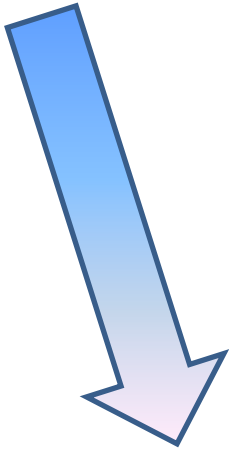
Goal(s):

- Complete reporting of the application rate of ERT's (including ERT's considered but not applied).
- Reporting of Alternatives to Burning.
- Estimates of ERT application rates (e.g., ERT's applied to 50% of managed burns) as measure of Reasonable Further Progress.

Topic 7 – Fire Science: Fuel Moisture

Current Status:

GIS-interpolated fuel moisture maps from WIPS and fire centroid location used to assign fuel moisture



Goal(s):

-Improve fuel moisture data to accurately reflect meso scale changes – Rain shadow, localized rain events, etc.

Options:

- Continue with the WIMS interpolation methods currently used.
- Increase number of sample points
- Dasgupta (2007) method?

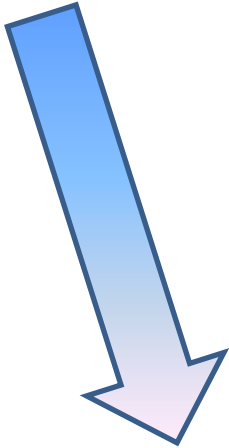
Topic 8 – Database System

Current Status:

SQL database architecture (housed at CSU/CIRA). Fire location based on lat/lon coordinates (single point).

Options:

- Upgrade server / change host location
- Continuing with lat/long coordinates



Goal(s):

-Transition to current large fire recording structure (using shapes/polygons to represent fire size and location).