



# ClearSky2 status report

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# Overview of ClearSky agricultural burning (crop residue disposal) decision support system

1. Introduction and review
2. Front-end web application for scenario definition -- status
3. Emissions processing -- status
4. Smoke dispersion modeling -- status
5. Post-processing -- status

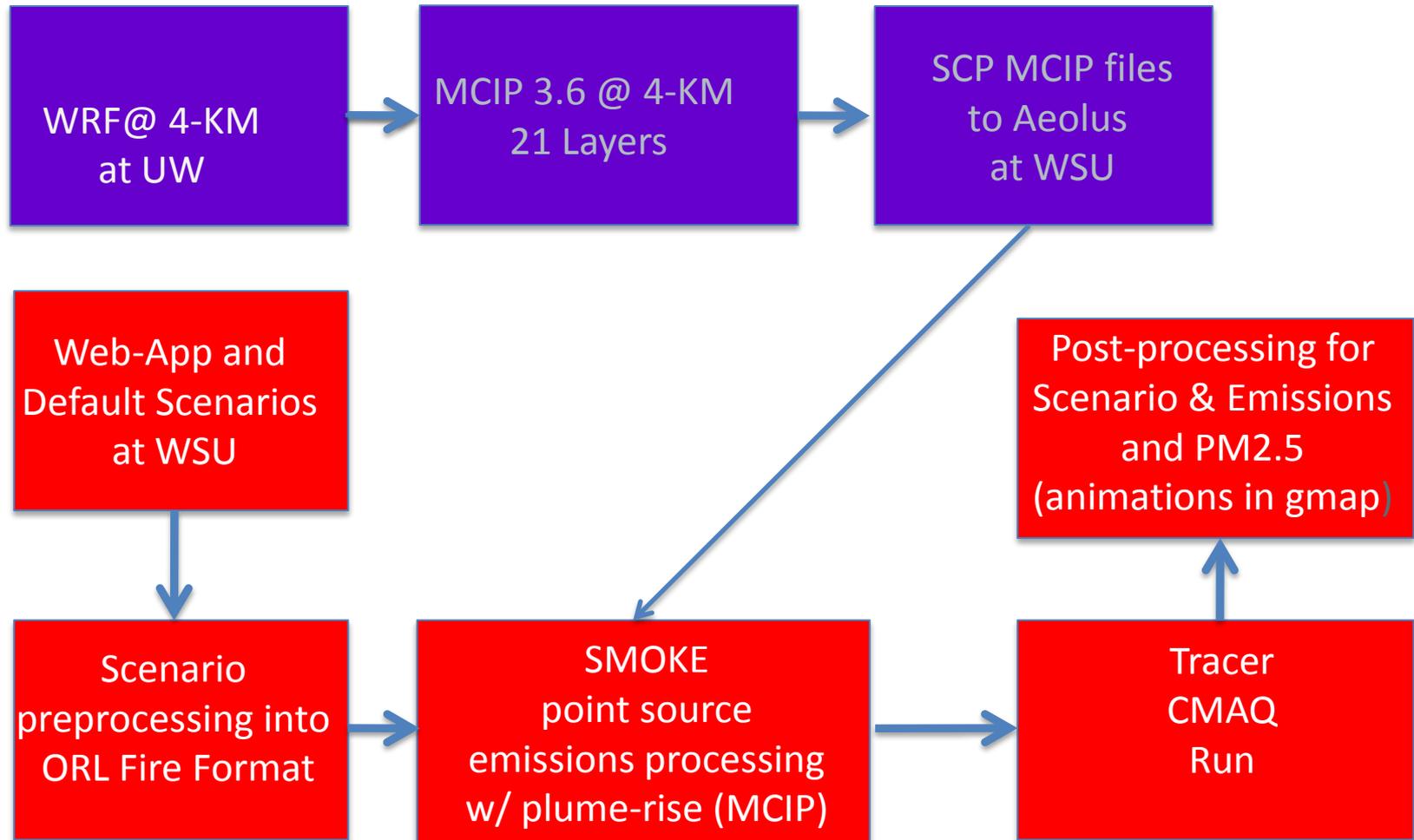
# Introduction and Review

- ClearSky (first version) used 4-km MM5/WRF meteorology and used CALPUFF Lagrangian dispersion model.
- Burning scenarios were (eventually) provided by web application or mostly as default daily scenarios.
- Emissions calculated with WSU and Air Sciences emissions factors.
- Resulting surface layer PM<sub>2.5</sub> results were published to web to a limited community (NPT, ECY, IDEQ, CDA).
- Users observed problems with spatial accuracy and accumulated changes and patches in software eventually made effective maintenance too difficult.... So...
- On to a new ClearSky version... ClearSky2.

# ...ClearSky2

- 4-km WRF meteorology as 21 layers (as for AIRPACT-4)
  - Option of going to 1.33-km WRF...
- CMAQ Eulerian dispersion model, built for advection of tracers without destruction or removal.
- Burning scenarios to be provided via web application or *as default daily scenarios*.
- Resulting surface layer PM2.5 results to be published to web to a limited community (NPT, ECY, IDEQ, CDA), in gmap AIRPACT-4 style.
- Results will be PM2.5 tracer results per scenario.

# Cartoon of ClearSky2



## ClearSky Burn Scenario Input Form



BurnArea, Latitude, Longitude, Acreage, BurnRate, CropType, Load, Start

Field 1: 46.751404, -117.333984, 200, 200, wheat, 4, 10:00

Each time a field is entered the map resets and pushpin for the entered field disappears, making building a scenario awkward.

Issue?: Yes and No!

Enter information into the fields below for submittal to ClearSKY:

**STEP 1:** Click map to get coordinates.

Latitude:

Longitude:

**STEP 2:** Field burn information.

Enter Acreage:

Burn rate (acres/hr):  (integer)

Crop Type:  Wheat  Bluegrass

Fuel loading (tons/acre):  (integer)

Start burn:  Pacific Daylight

Click "**Enter**" to see your selection in the table below. **Additional burn sites** may be added by completing Steps 1 and 2 again before continuing to Step 3.

# Emissions Processing

- A scenario is one-to-many fields burned and considered as a unitary management decision.
- Each scenario is processed for PM2.5 emissions.
- Each scenario's PM2.5 is modeled as a unique tracer.
- Requires:
  - unique SMOKE execution for each scenario (21)
  - relabeling of PM2.5 to appropriate tracer
  - merging of SMOKE emissions files across all scenarios
- Should scenarios be assigned handy names?

# Issues

- SMOKE emissions processing throws ABORT messages
  - Various flavors of ABORTS have been observed. Arbitrarily?
  - Checking & looping being used to get emissions results out.
  - Not too bad for single scenario; but adds up with multiple scenarios.
  - Results in poor turn-around
  - Not adequate for a near-real-time application (even assuming the CMAQ and post-processing would be!
  - For Daily Defaults a faster emissions process may be possible!
- CMAQ execution issues are also being debugged, related to files:
  - ICON (zeroed)
  - BCON (zeroed)
  - EMISSION input formats.
- No CMAQ results yet...

# Near-term Objectives

- Resolve problems!
- Test ClearSky2 using results from RARE field campaign of Elleman *et al.* of July 2013.
- Demonstrate ClearSky2 at 2014 Agricultural Smoke Mgmt Meeting At CDA Casino/Resort July 9-10.

# Status

1. Front-end web application is operational for scenario generation -- but with issues (Jen)
2. Default daily scenario treatment not yet built (Joe)
3. Emissions processing has issues (Joe & Randall)
4. CMAQ has issues with files (Joe)
5. Post-processing still to be built (Joe & Jen)

Evaluation vs. RARE observations has not yet begun  
(Joe)

(end)