

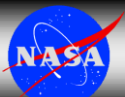


# Environmental Public Health Application Systems

## ENPHASYS Review September 21-23, 2009

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William Sprigg (Co-I), UA;  
Heidi Krapfl (Co-I) NM/DOH, EPHTS**

**Mulberry Inn Savannah, GA**



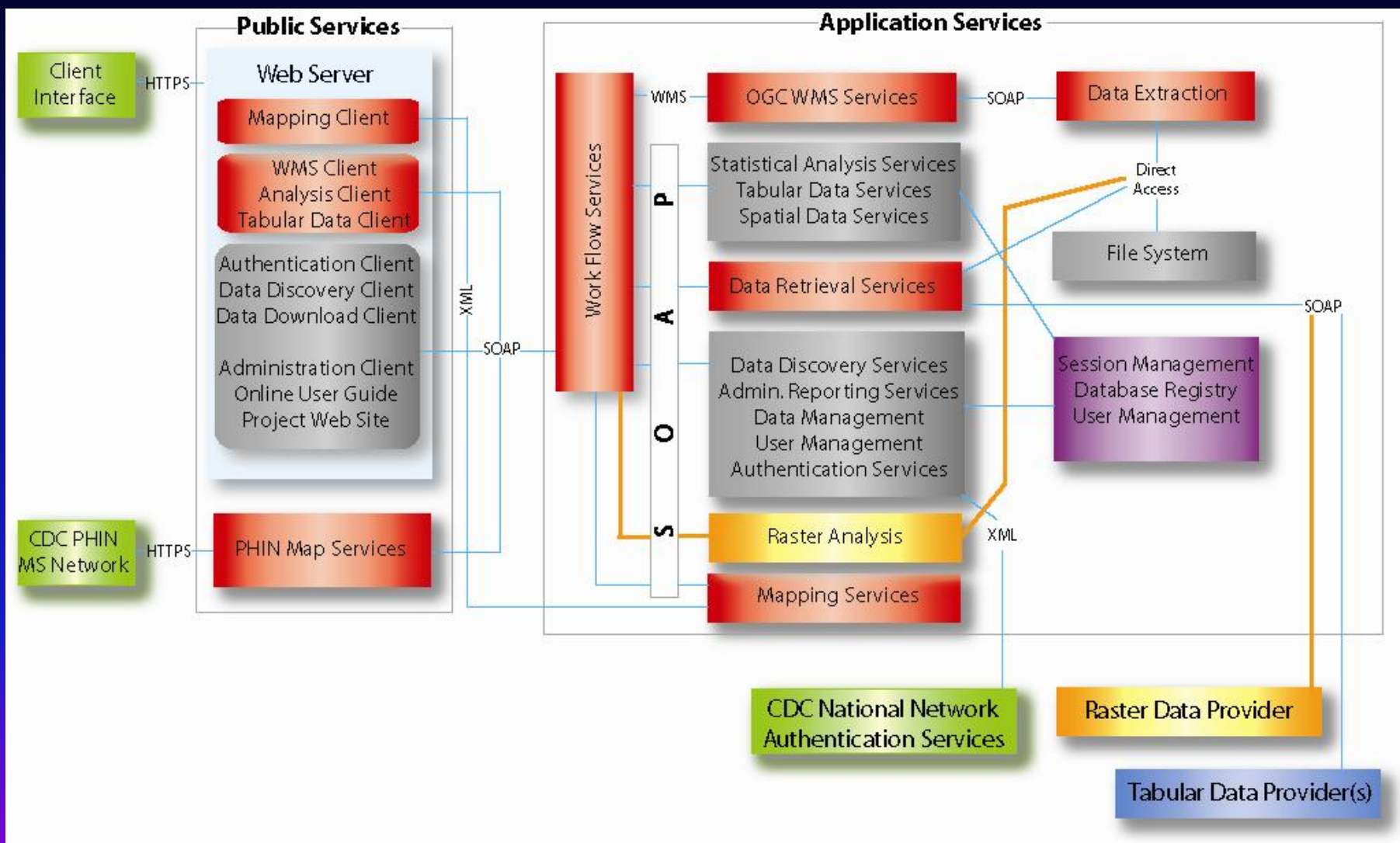


# Project Goals & Accomplishments

1. Enhance NM/DOH-EPHTS Architecture
2. Ingest NASA Measures of Aerosols and Ozone into EPHTS
3. Assimilate and Evaluate Monthly Dust Source Updates in DREAM/eta
4. Integrate CMAQ & DREAM/eta capabilities
5. Evaluate CALIOP Curtains as V&V for CMAQ
6. Transition ENPHASYS Results to Practice



# 1. Enhance NM/DOH-EPHTS





# EPHTS Map & Graph Capabilities

**NEW MEXICO**  
DEPARTMENT OF  
**HEALTH**

Building a Healthy New Mexico

Environmental  
PUBLIC HEALTH  
Tracking + EPHT

CDC

NATIONAL  
Environmental Public  
Health Tracking  
Program

New Mexico EPHT Application Home Log Out Data Discovery Graphs Mapping Applications

NM Tracking Home

How to use this map

The layers that you have requested to map are listed below. To add them to the map click 'add to map'. When you first add your EPHT query layer it will appear above the other layers in your map. You can use the arrowed buttons beside each layer in the table of contents to move layers up and down in the list for viewing. Navigation controls for the map are just below the map. Hovering over any of the controls gives you directions for their use. You must have popups enabled in your web browser in order to be able to query features in the map. You can use the small locator map above to zoom on the map in addition to using the zoom button below the map, just click and drag.

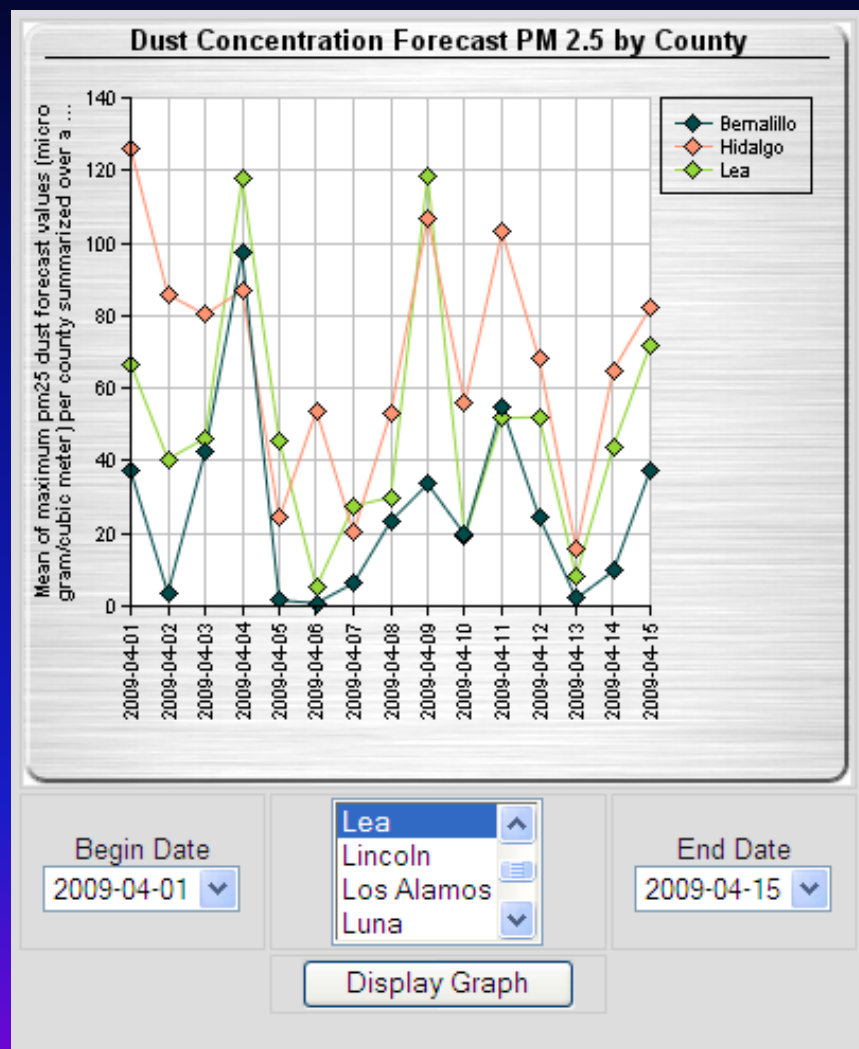
### Map Layers from: your EPHT data search

DREAM dust output PM2.5 - Classified 24-Hr Mean 2009-04-11T00:00:00Z [add to map](#)

lon: lat:

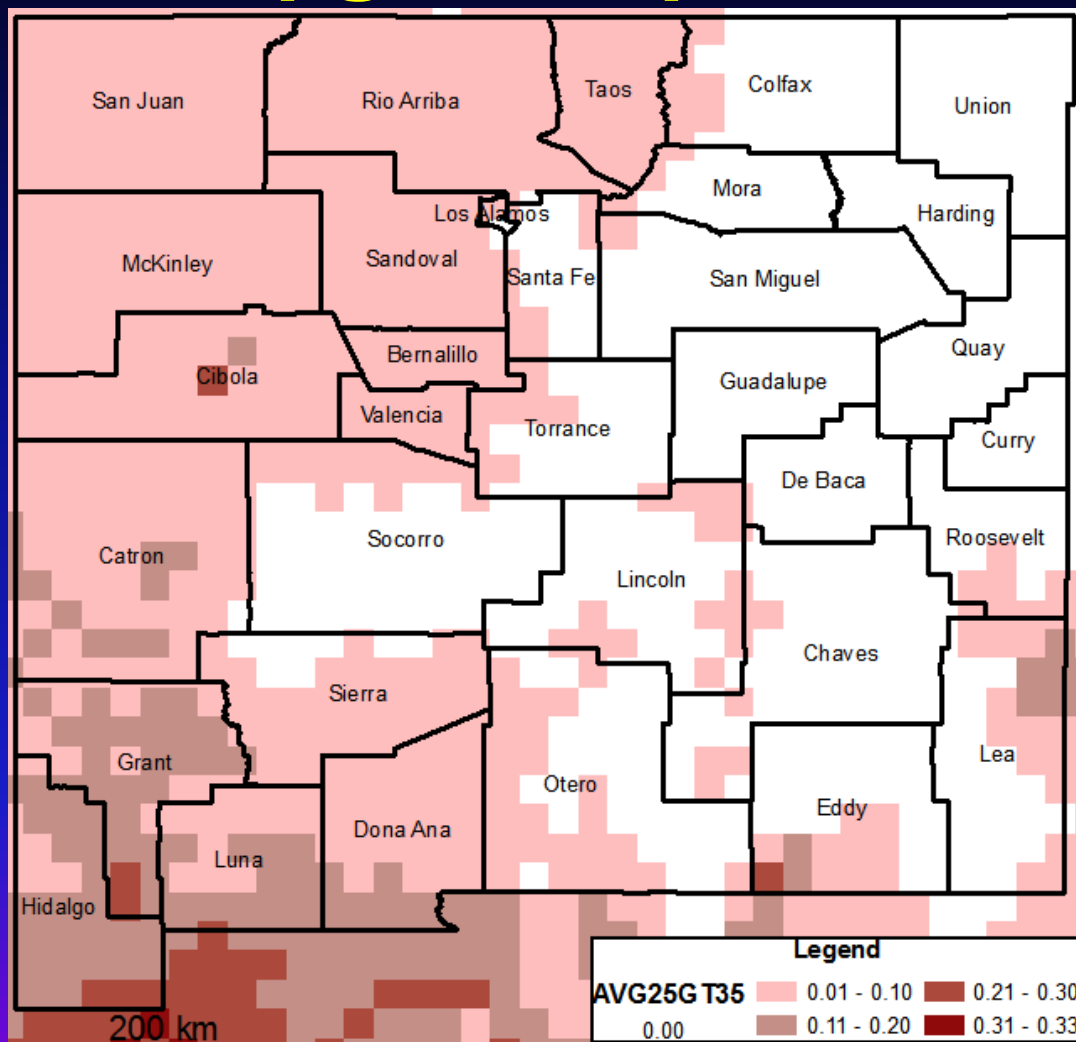
**Table of Contents**

- ☒ DREAM dust output PM2.5 - Classified 24-Hr Mean 2009-04-11T00:00:00Z
  - ☐ Excellent
  - ☐ Good
  - ☐ Moderate
  - ☐ Unhealthy for Sensitive Groups
  - ☐ Unhealthy
  - ☐ Very Unhealthy
  - ☐ Hazardous
- ☒ Water System Boundaries
  - ☒ Water System Boundaries





# Daily Average Dust Forecast >35 $\mu\text{g}/\text{m}^3$ , April 2009



Source NM/EPHTS: Courtesy, Orrin Myers

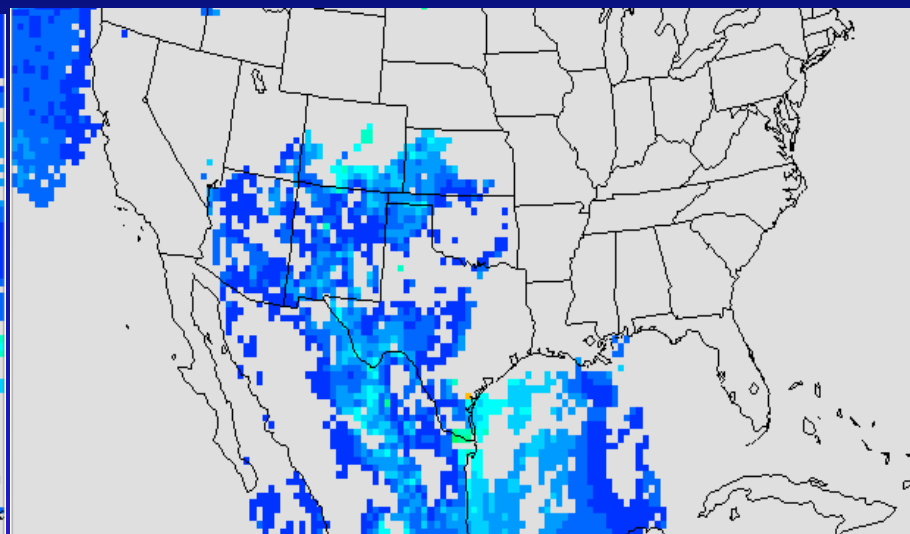
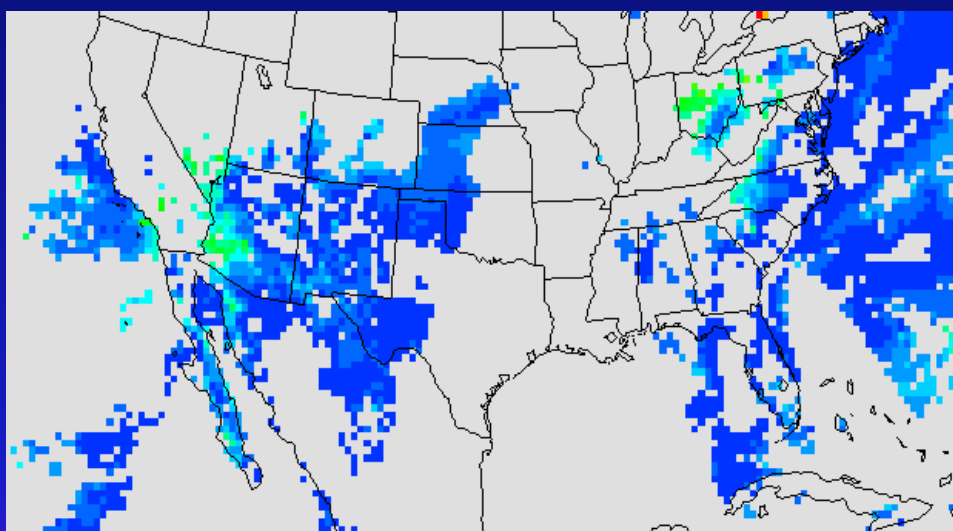


## 2. Ingest NASA Measures of Aerosols and Ozone into EPHTS

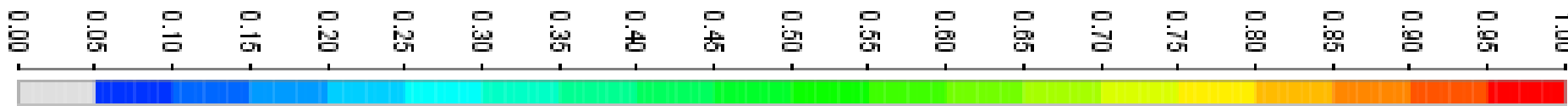
MODIS AOD

18:00:00 UTC

20:00:00 UTC



Dimensionless

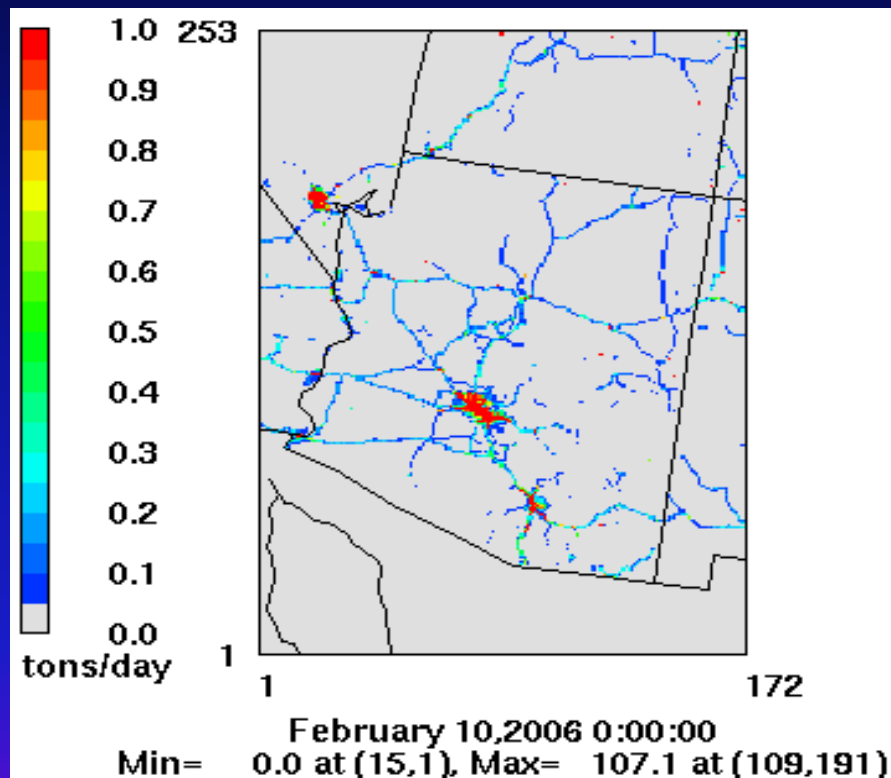




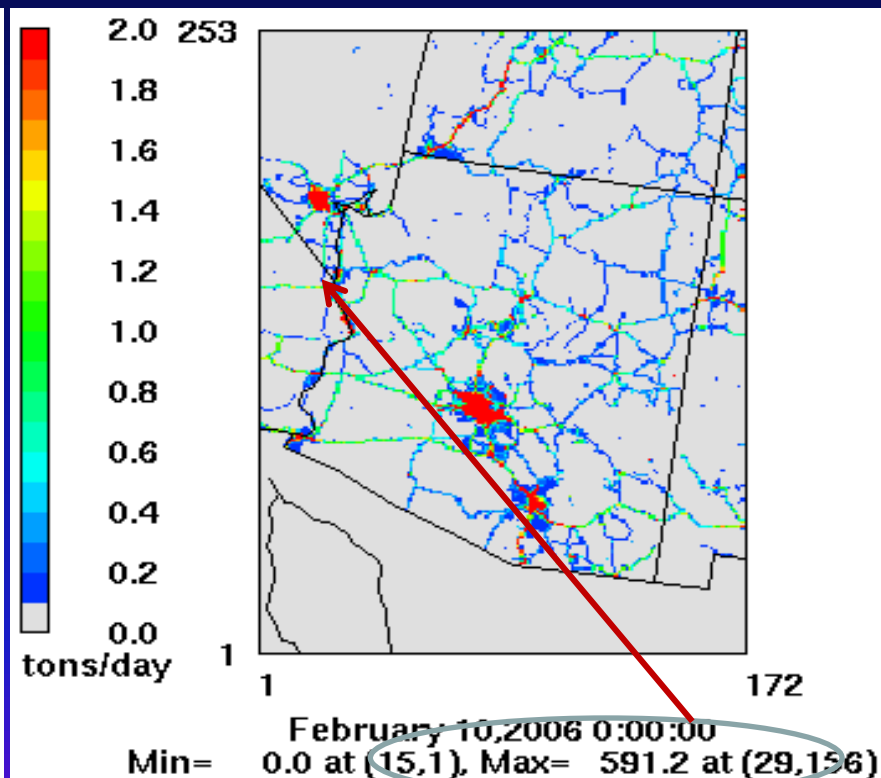


# Air Quality Speciation

## Nitrogen Oxides



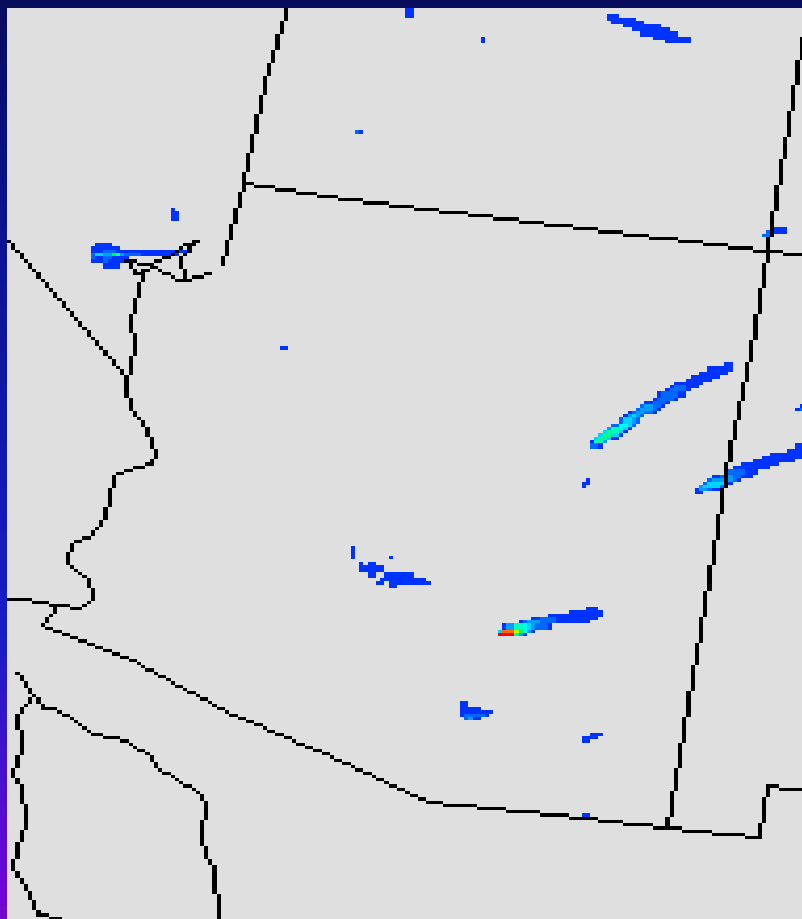
## Carbon Monoxide



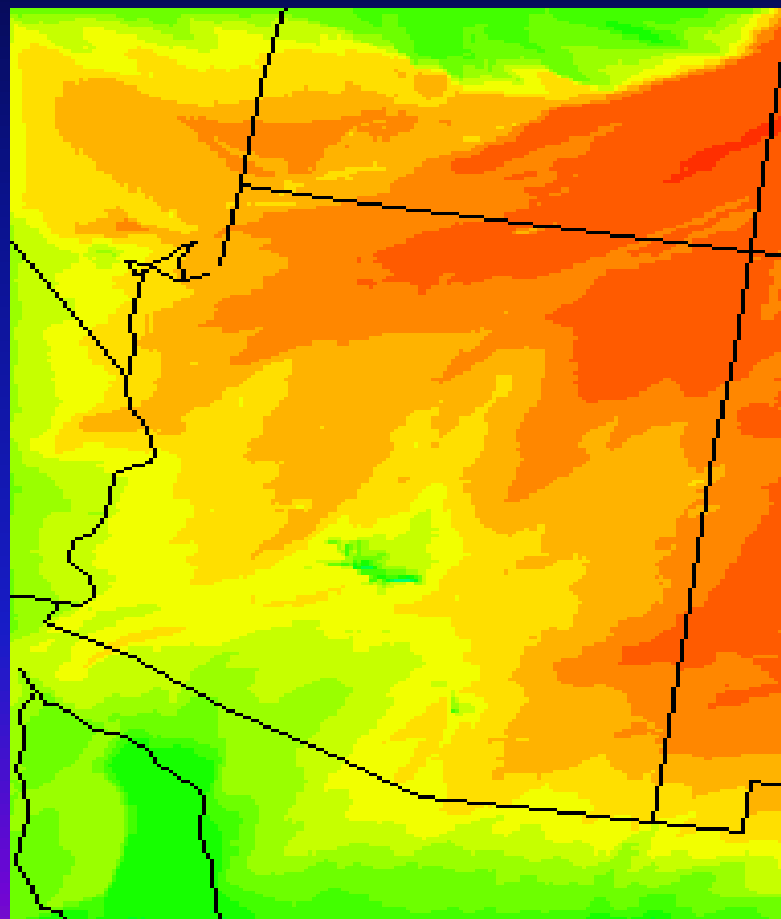


# SO<sub>2</sub> and O<sub>3</sub> 16 Feb 2006

SO<sub>2</sub>



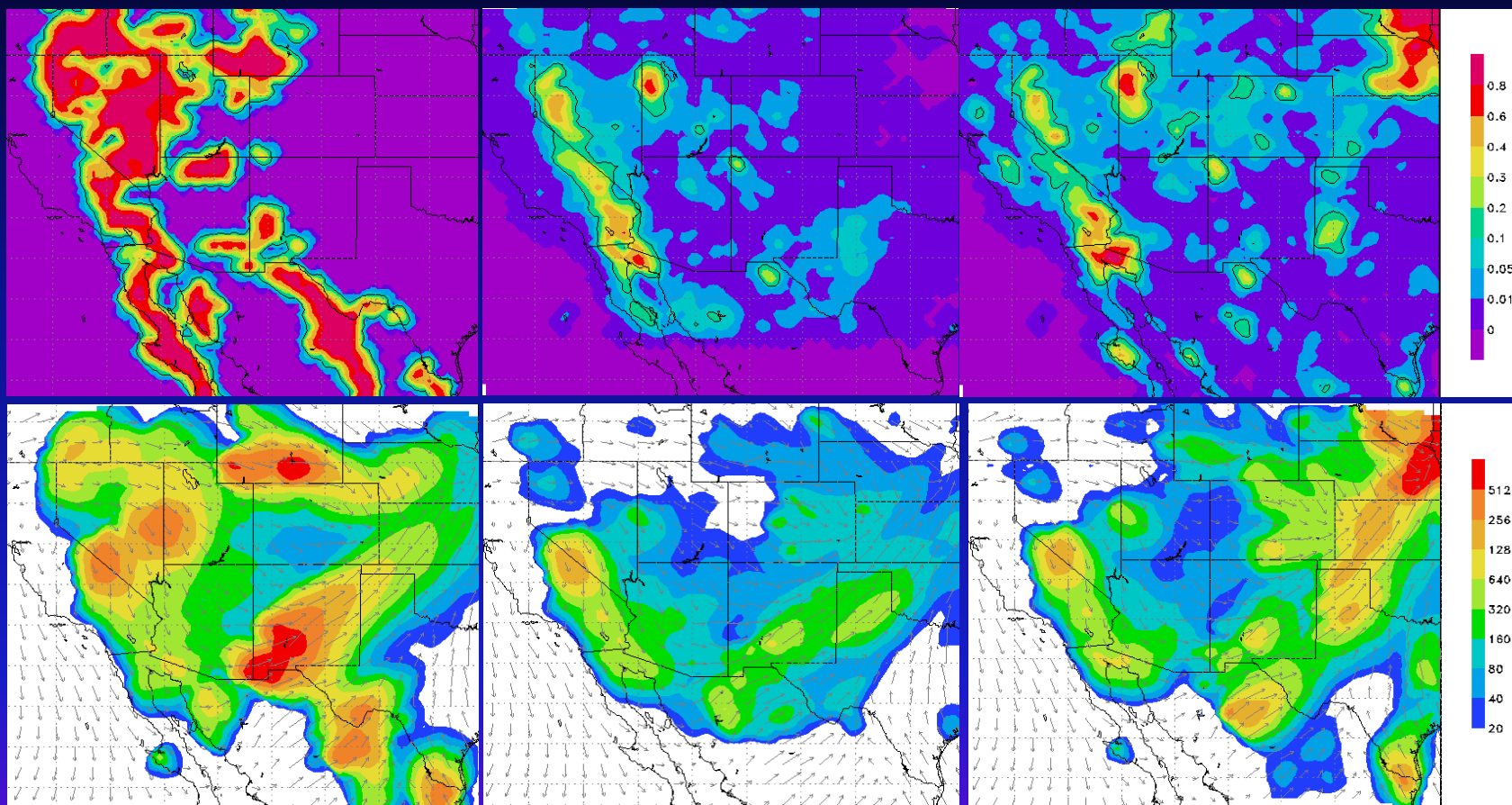
O<sub>3</sub>







# 3. Assimilate and Evaluate Monthly Dust Source Updates

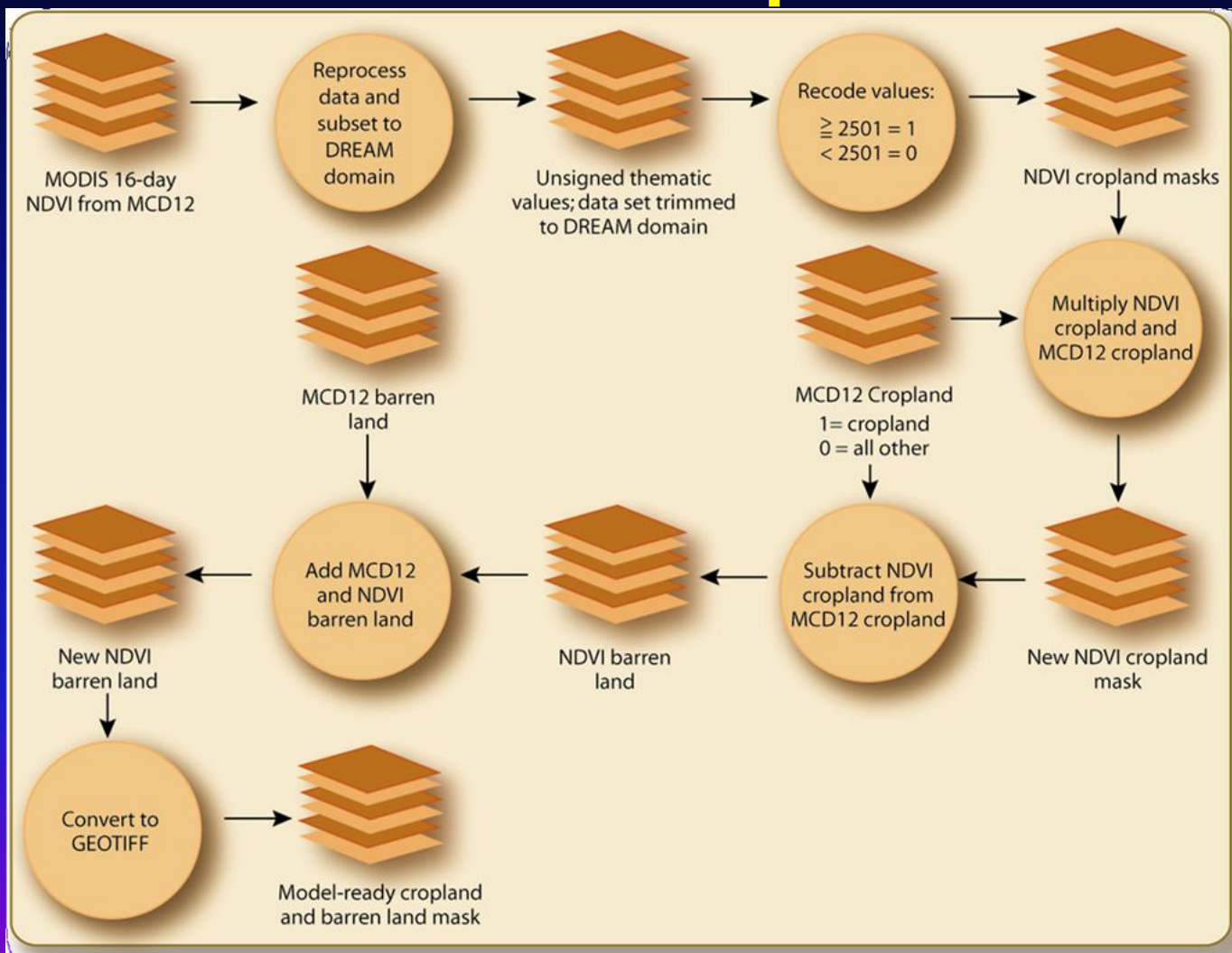


Output from three dust masks (OWE, MOD12Q1, MCD12) for DREAM/eta model outputs (4 bin, 50 km horizontal res.)

Courtesy: Slobodan Nickovic and Goran Pejanovic



# Procedure for Generating Monthly Dust Source Updates





# Analysis of Changing Dust Sources

## NDVI change detection scheme

NDVI Date 1

NC

1

C

3

NDVI Date 2

NC

5

C

10

$$1 + 5 = 6$$

$$3 + 5 = 8$$

$$1 + 10 = 11$$

$$3 + 10 = 13$$

6

nc/nc

8

c/nc

11

nc/c

13

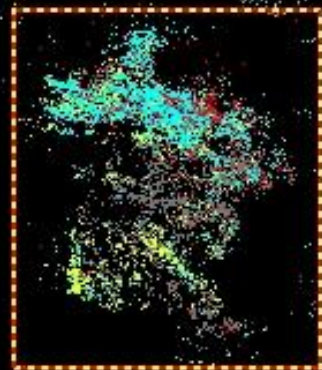
c/c



6



5



7



4



3



2



1

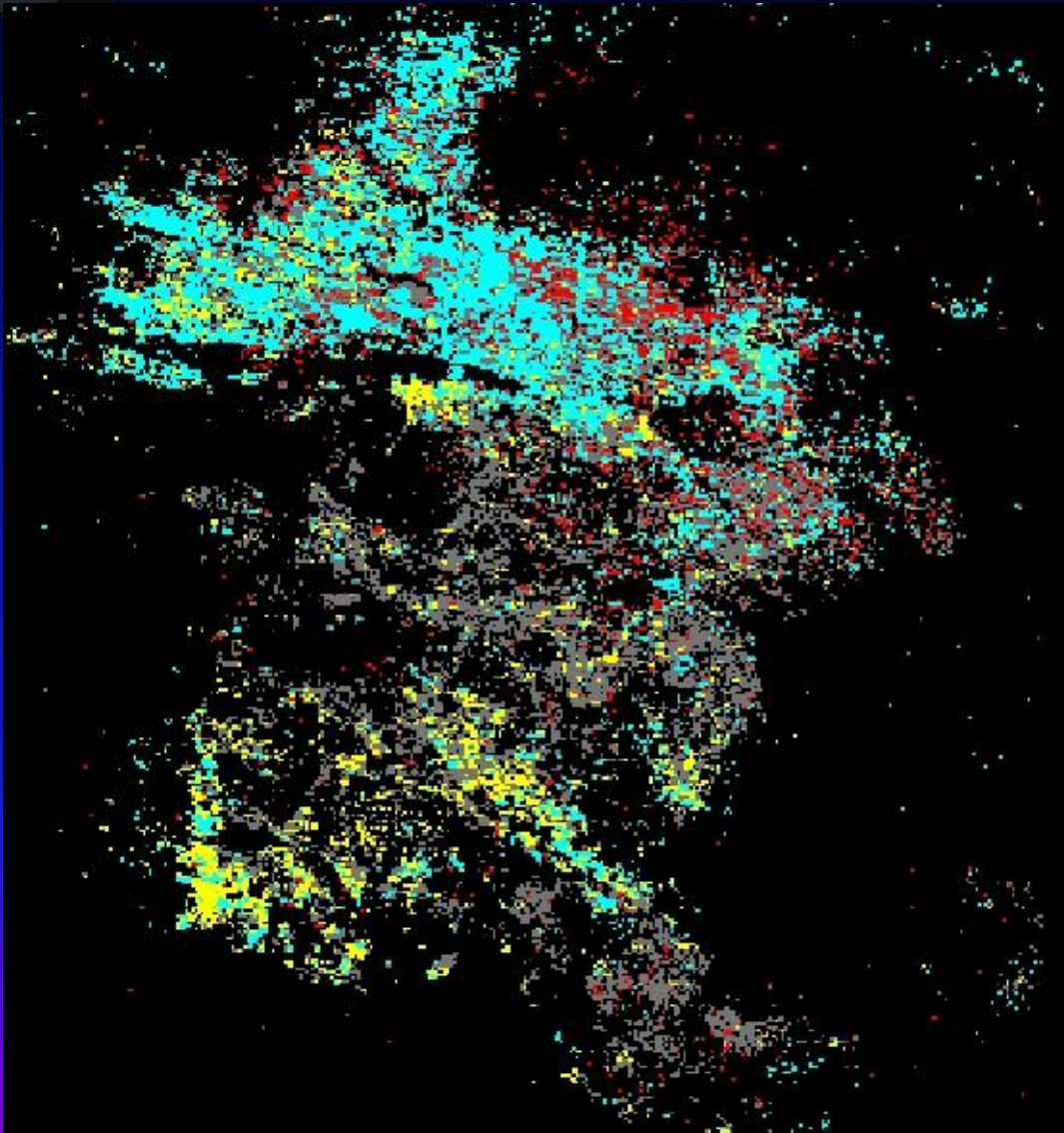
1=Inland Empire; 2=Lower Colorado River; 3=Phoenix/Tucson; 4=El Paso; 5=Albuquerque/Estancia; 6=San Luis Valley; 7=Llano Estacado





# Changes Between 4'09 and 5'09

## Llano Estacado

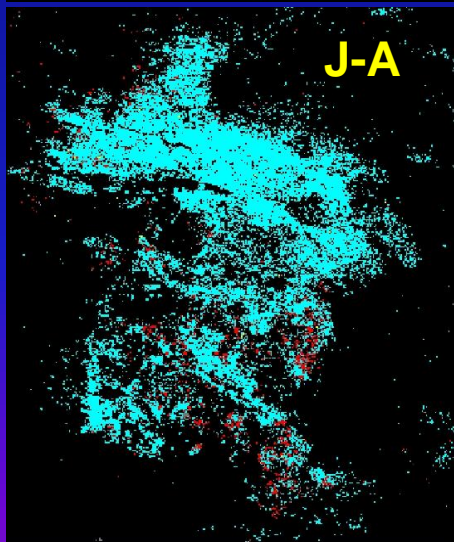
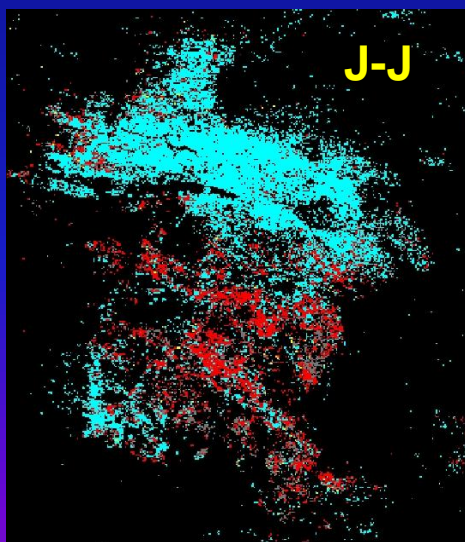
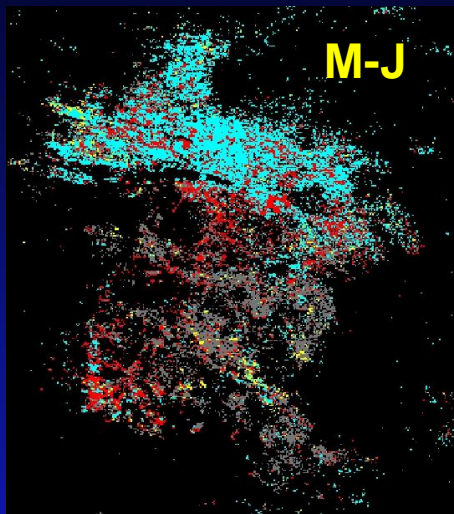
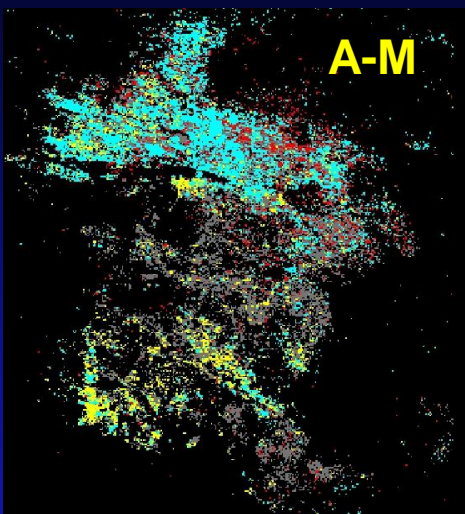


For Llano Estacado 80% of the entire area is non-ag. Of the remaining 20%:  
7.8% was nc/nc = no change;  
7.0% was c/c = no change;  
2.8% changed from c/nc; &  
2.4% changed from nc/c.

At this time of year, only 5.2% of ag-land changed. Is this enough to cause measurable differences in dust model performance? We have good evidence that the changes have pronounced health effects.



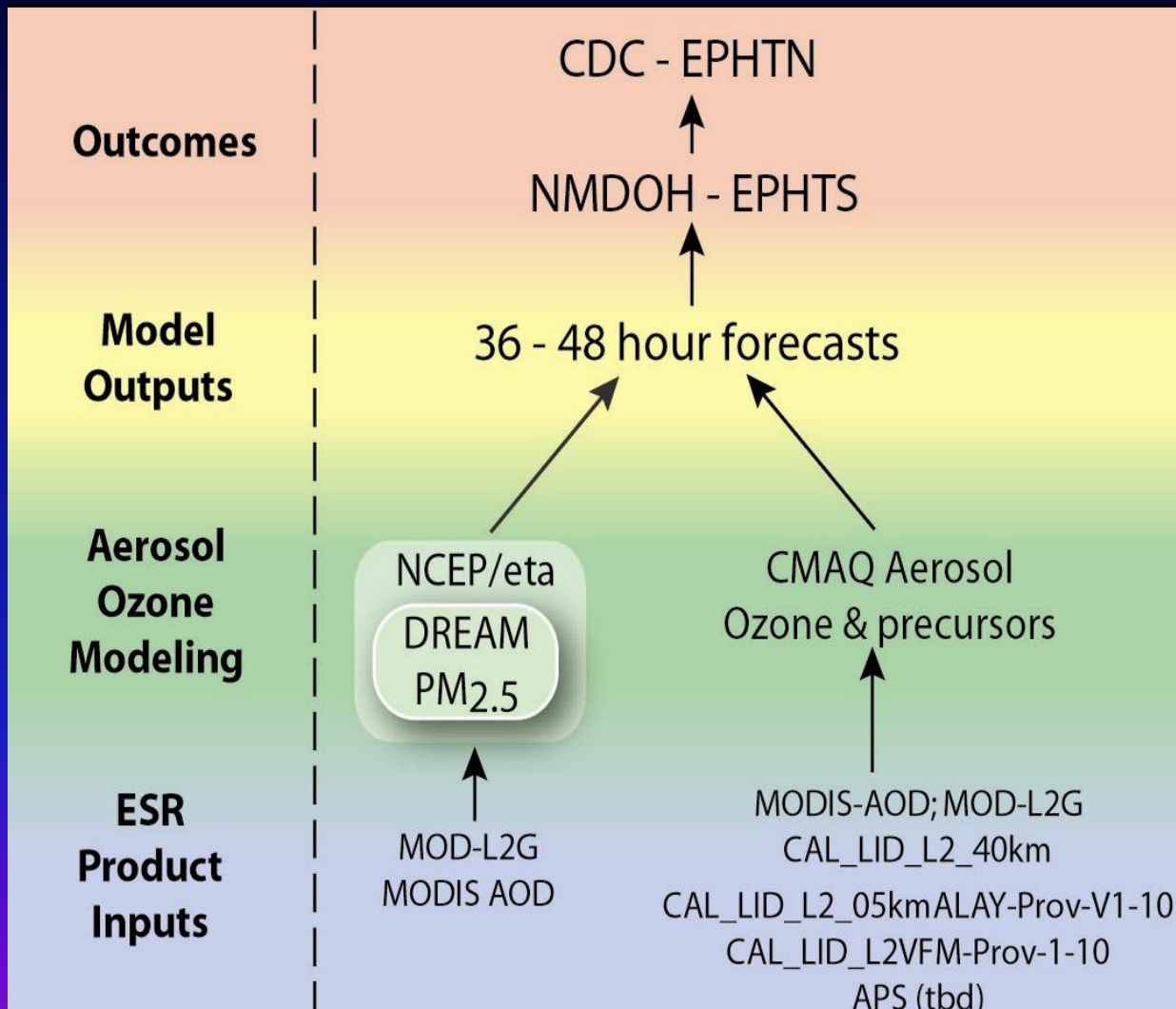
# Dust Source Changes Apr.-Aug.'08



Type of Change	% of Change			
	A-M	M-J	J-J	J-A
Gray nc/nc	7.8	5.4	1.3	0.2
Blue c/c	7.0	8.6	13.7	18.5
Yellow c/nc	2.8	0.8	0.1	-0-
Red nc/c	2.4	5.2	4.9	1.3



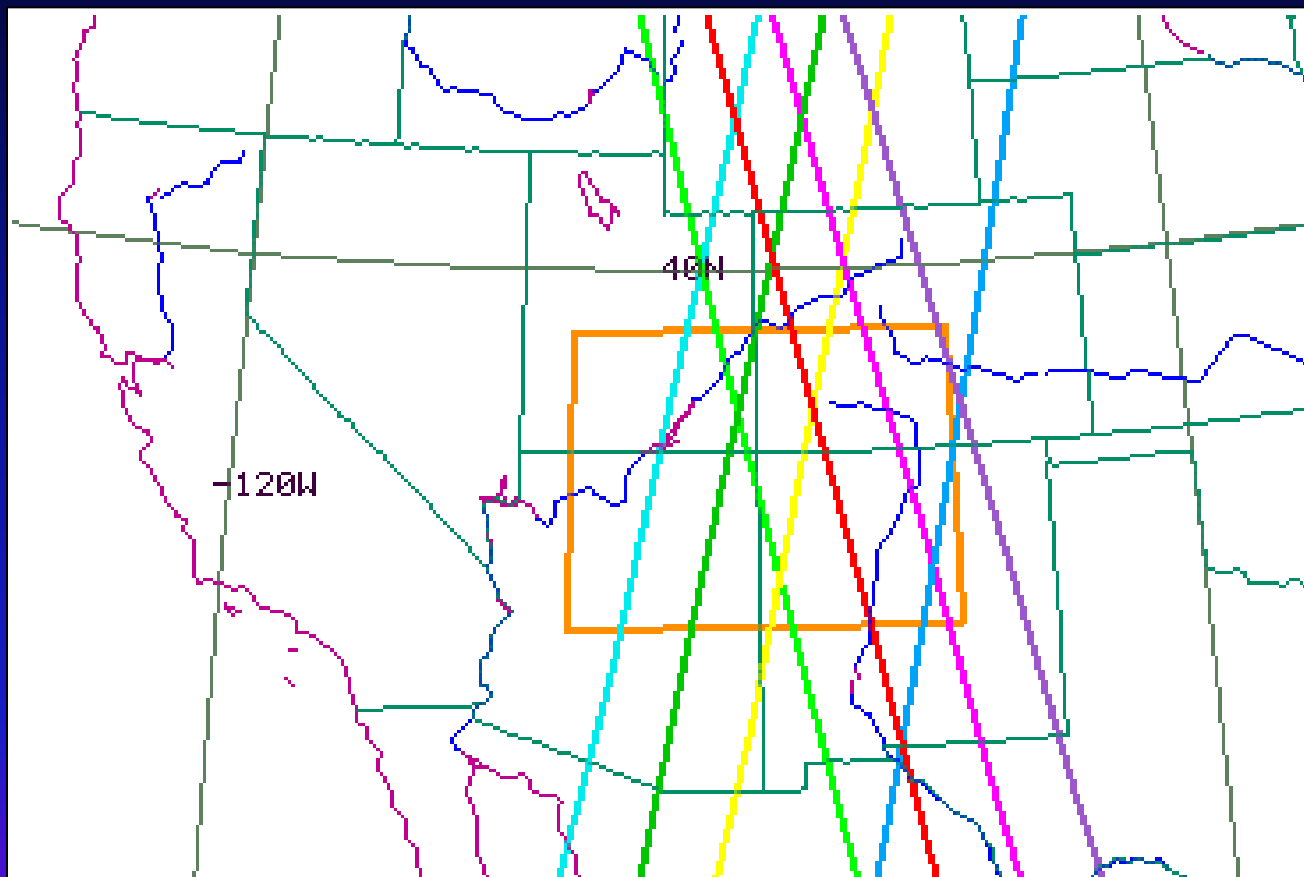
# 4. Integrate CMAQ and DREAM/eta Capabilities







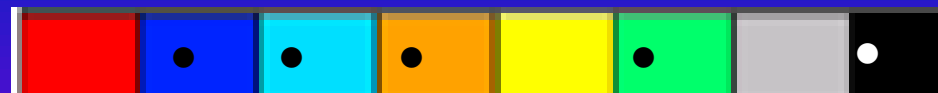
## 5. Evaluate CALIOP Curtains as V&V for CMAQ



CAL\_LID\_L2\_05kmALay-Prov-V1-10 Date range: 28Feb07 – 11Mar07 (most recent from LARC-ASDC)



Swath for CAL\_LID\_L2\_05kmALAY\_Prov\_V1-10



red=missing data; blue=clear air; lt. blue=cloud; orange=aerosol; yellow= stratosph. feature; green=surface; grey=subsurface; black=total attenuation



## 6. Transition ENPHASYS Results to Practice

- Presentations in CDC conferences 2'09 & 10'09
- Presentation at ISRSE-33 5'09
- Participation in AQ WG, ESIP Sum. Mtg. 7'09
- EPHTS user training course at UNM 7'09
- Presentation at AGU 12'09
- Preparing book on *Environmental Tracking for Public Health Surveillance* (includes several NASA Public Health Projects)
- Proposal to deliver daily synopses of dust and AQ to APS



# APS DRAFT Asthma Action Plan

Albuquerque Public Schools

## ASTHMA ACTION PLAN

Date distributed and to whom: \_\_\_\_\_

Student Name: \_\_\_\_\_ Date of Birth: \_\_\_\_\_ School: \_\_\_\_\_ Student ID: \_\_\_\_\_ Grade: \_\_\_\_\_ Medication Allergies: \_\_\_\_\_

Asthma symptoms are triggered by: ☐ Exercise ☐ Illness ☐ Pollen ☐ Smoke ☐ Dust ☐ Air Pollution ☐ Animals ☐ Cold Air ☐ Molds ☐ Foods (list): \_\_\_\_\_

Please list any other triggers: \_\_\_\_\_ Activities student participates in at school: \_\_\_\_\_

Usual Asthma Symptoms: ☐ Cough ☐ Shortness of Breath ☐ Chest Tightness ☐ Wheeze ☐ Other: (list) \_\_\_\_\_

If a student has any of the following symptoms: **chest tightness, difficulty breathing, wheezing, excessive coughing, shortness of breath**

1. Stop activity & help student to a sitting position
2. Stay calm, reassure student
3. Assist student with the use of their inhaler
4. Escort student to the health room or call for health room staff for immediate assistance. Never send the student to the health room alone!

**INHALER IS KEPT:** \_\_\_\_\_

**Call 911 for any of these!**

- If breathing does not improve after medication is given
- Student is having trouble walking or talking
- Student is struggling to breathe
- Student's chest and/or neck is pulling in while breathing
- Student's lips are blue, and/or
- Student must hunch over to breathe

**HEALTH CARE PROVIDER, Please complete all items in box:** ICD 9 Code: ☐ 493.90 or \_\_\_\_\_

Asthma Severity: ☐ Intermittent ☐ Mild persistent ☐ Moderate persistent ☐ Severe persistent

Controller Medication given at home: \_\_\_\_\_

Name of Medication /how much-mgs/how often \_\_\_\_\_

Name of Medication /how much-mgs/how often \_\_\_\_\_

	Asthma Symptoms	Asthma Symptoms	Asthma Symptoms
<b>GREEN ZONE</b>	<ul style="list-style-type: none"><li>• No Cough, wheeze or shortness of breath</li><li>• Able to do all normal activities including exercise and play</li><li>• No symptoms at night</li><li>• No need for quick relief medications for symptoms</li></ul> <p>Use quick relief inhaler as ordered below:</p> <p>Name of medication/How much/How often _____</p> <p>*Peak Flow _____ 80 to 100% of personal best</p>	<b>YELLOW ZONE</b> <ul style="list-style-type: none"><li>• Coughing, wheezing, shortness of breath, or chest tightness</li><li>• Using quick relief medication more than usual</li><li>• Can do some but not all of usual activities</li><li>• Asthma symptoms at night</li></ul> <p>Parent/guardian-call medical provider if using quick relief medication more than twice a week or no symptom improvement.</p> <p>Add or change these medications:</p> <p>Name of medication/How much/How often _____</p> <p>*Peak Flow _____ 50 to 80% of personal best</p>	<b>RED ZONE</b> <ul style="list-style-type: none"><li>• Medication unavailable or not working</li><li>• Getting worse not better</li><li>• Breathing hard and fast</li><li>• Chest/neck pulling in</li><li>• Difficulty walking or talking</li><li>• Lips or fingernails blue</li><li>• Hunched over to breathe</li></ul> <p><b>Take Quick Relief Medication Now!</b> <b>Call 911 &amp; continue to give Quick Relief Medication as ordered below!</b> Contact Provider-See Contact Info Below</p> <p>Name of medication/How much/How often _____</p> <p>*Peak Flow _____ Less than 50% of personal best</p>

Can student self carry medication? Yes ☐ No ☐ Can student self-administer medication? Yes ☐ No ☐

Provider signature \_\_\_\_\_ Provider printed name \_\_\_\_\_ Date \_\_\_\_\_

Provider phone \_\_\_\_\_ Provider fax \_\_\_\_\_ Provider email \_\_\_\_\_

Implementation of these orders and care includes authorization to contact and discuss this condition and elements of care with healthcare providers. I have reviewed this Health Care Plan and I give permission for my child to participate in asthma education.

Parent/Guardian signature \_\_\_\_\_ Date \_\_\_\_\_

Home phone \_\_\_\_\_ Cell phone \_\_\_\_\_ Work phone \_\_\_\_\_

School Nurse Signature \_\_\_\_\_ Date \_\_\_\_\_ Phone \_\_\_\_\_



# Overall Project Status

- **Earth Science Results:**
  - Good progress has been made on all deliverables;
  - Public health results using EPHTS enhancements have been demonstrated;
  - Routine CMAQ and DREAM/eta outputs, and V&V, commencing;
  - Seasonal dust mask process is operational. Accumulating life-of-project data 4/1/08 thru 3/31/11;
- **Enhancing EPHTS:**
  - All deliverables have been completed and are under refinement;
  - Enhancements and analyses are on schedule for end-of-project;
- **Evaluating CALIPSO:**
  - Most year-1 deliverables have been completed;
  - Team is retrieving CALIOP products. Strategy is to locate curtains over the model domain coinciding with aerosol and dust events to assess their V&V potential;
- Transition deliverables are being met and are on schedule;
- All Management deliverables have been met.





# *Contributors*

- Karl Benedict, William Hudspeth—UNM EDAC, enhancing EPHTS;
- Amy Budge, Thomas Budge—UNM EDAC, dust masks and analysis;
- Brian Barbaris, Slobodan Nickovic, Goran Pejanovic—UA, DREAM/eta modeling and V&V;
- Orrin Myers—UNM-MSC, EPHTS health data and biostatistics;
- Maudood Khan—USRA/MSFC, CMAQ modeling and CALIOP V&V.