Integrating Satellite Image Data w/ Respiratory Reporting Systems

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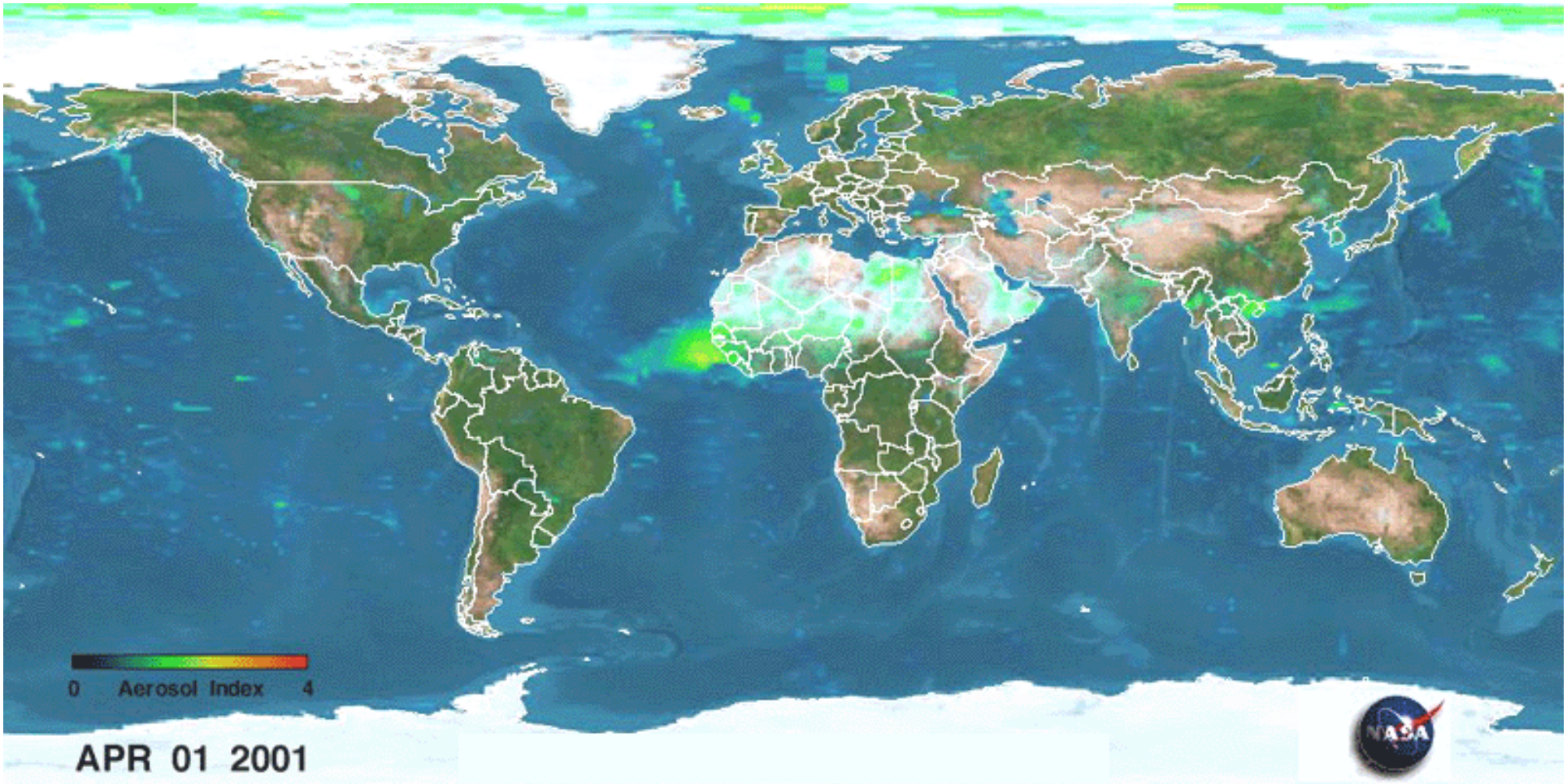
NM Quarterly Epidemiology Meeting
HUD Conference Room, Silver Square
Albuquerque, NM
January 13, 2005

Temporal Visualization of Aerosols



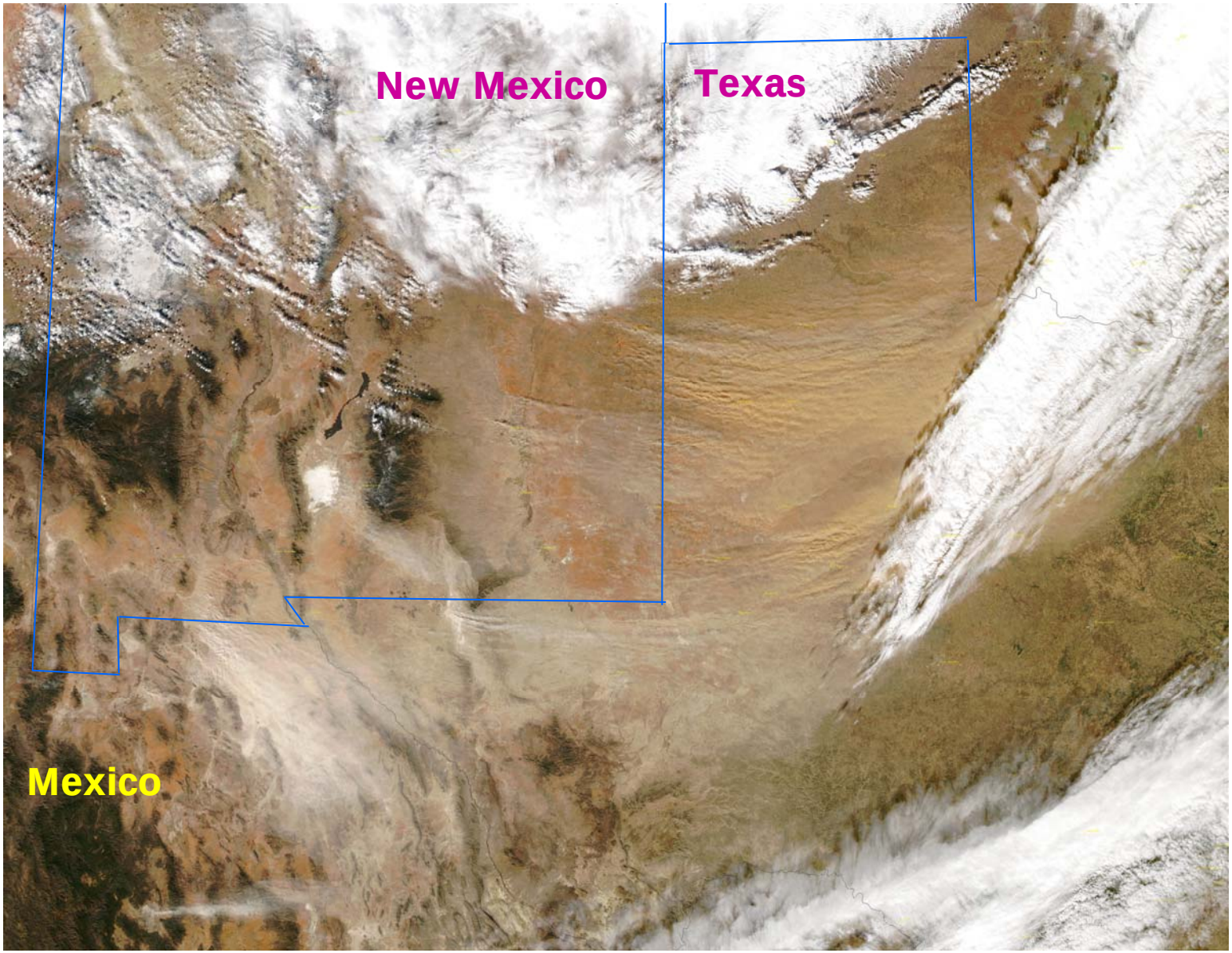
Asthma: Top Ten Cities for Asthma

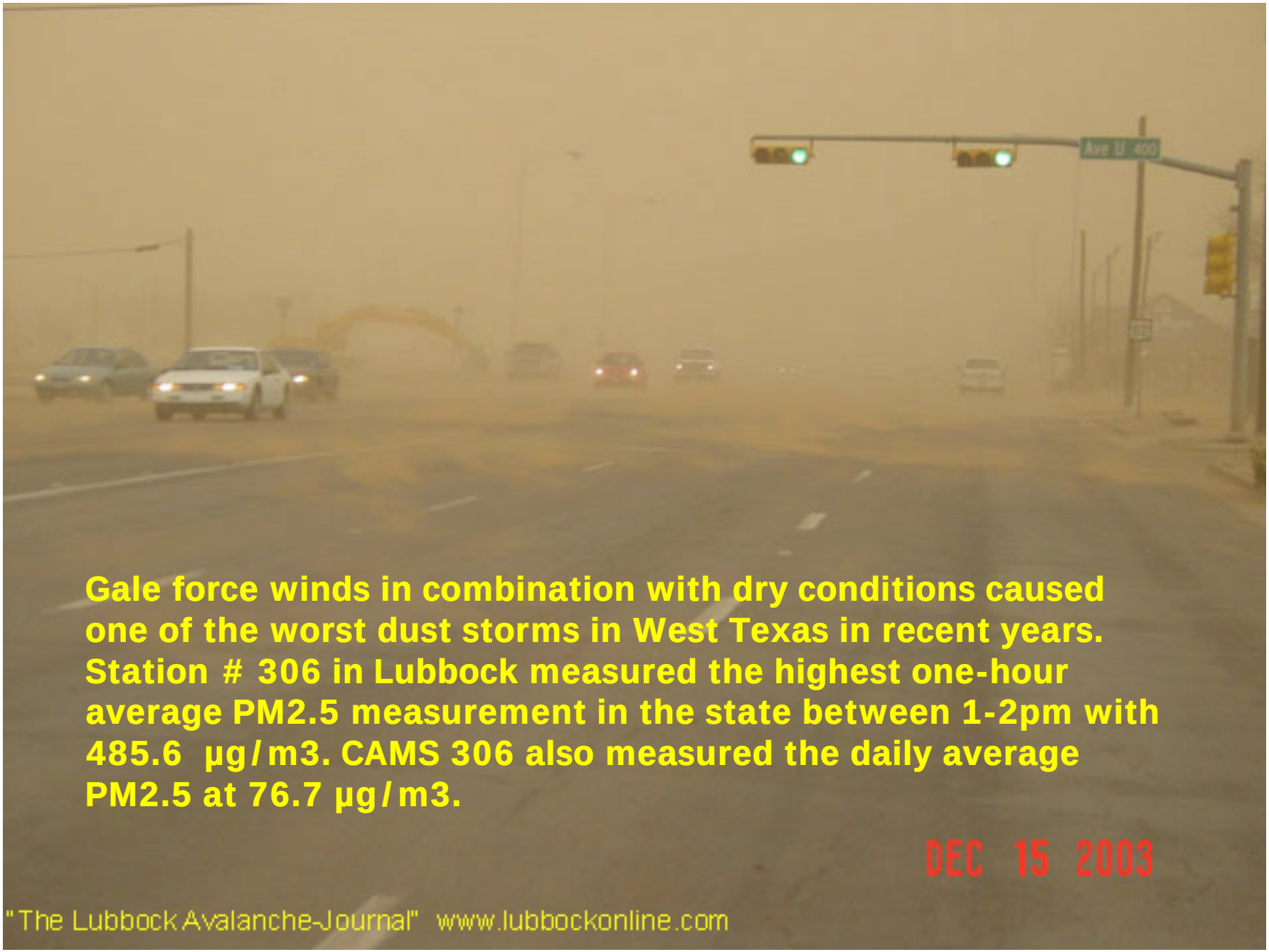
1) Tucson, AZ
2) Kansas City, MO
3) Phoenix-Mesa, AZ
4) Fresno, CA
5) New York, NY
6) El Paso, TX
7) Albuquerque, NM
8) Indianapolis, IN
9) Mobile, AL
10) Tulsa, OK

Reported Predictors &Triggers of Asthma

Respiratory Predictors	***Respiratory Triggers***
1. Urbanicity	A. Outdoor Environment
2. Traffic density	1. Dust/Smoke
3. Age	2. Pollen
4. Gender	3. Ozone
5. Temperature	B. Indoor Environment
6. Precipitation	1. Wall-to-wall carpet
7. Humidity	2. Cockroaches
8. Others ?	3. Stuffed toys

New Mexico/Texas Dust Storm





Gale force winds in combination with dry conditions caused one of the worst dust storms in West Texas in recent years. Station # 306 in Lubbock measured the highest one-hour average PM2.5 measurement in the state between 1-2pm with 485.6 µg/m3. CAMS 306 also measured the daily average PM2.5 at 76.7 µg/m3.

Visibility Analysis
12/15/03 9 a.m. CST
Yellow < 7 miles
Orange < 3 miles
Red < 1 mile
COLORADO
KANSAS
OKLAHOMA
NEW MEXICO
ARIZONA
TEXAS
ARKANSAS
LOUISIANA
MISSOURI
MISSISSIPPI
CHIHUAHUA
SONORA
COAHUILA
NUEVO LEÓN
TAMAULIPAS
SINALOA
DURANGO
MEXICO
UNITED STATES
Navajo Indian Reservation
Zuni I.R.
Albuquerque
Santa Fe
Las Vegas
Gallup
Grants
Taos
Amarillo
Lubbock
Clovis
Roswell
Carlsbad
Hobbs
Lamesa
Plainview
Hereford
Dalhart
Dumas
Borger
Wheeler
Guymon
Liberal
Woodward
Alva
Enid
Ponca City
Oklahoma City
Tulsa
Muskogee
Bartlesville
Miami
Joplin
Rogers
Paragould
Jonesboro
Memphis
Searcy
Fort Smith
Little Rock
Hot Springs
Mena
Clarksdale
Greenville
Texarkana
El Dorado
Magnolia
Idabel
Ada
McAlester
Lawton
Altus
Childress
Ardmore
Durant
Wichita Falls
Sherman
Paris
Plano
Greenville
Dallas
Fort Worth
Marshall
Shreveport
Tyler
Corsicana
Waco
Abilene
Big Spring
Midland
Odessa
Pecos
San Angelo
Crockett
Lufkin
Nacogdoches
Natchez
Alexandria
Killeen
Temple
Brady
College Station
Livingston
Huntsville
Baton Rouge
Austin
Beaumont
Lake Charles
Lafayette
Houma
Brenham
Houston
San Antonio
Gonzales
Victoria
Beeville
Corpus Christi
Ciudad Acuña
Boquillas del Carmen
Piedras Negras
Melchor Múzquiz
Sabinas
Ciudad Anáhuac
Nuevo Laredo
Sabinas Hidalgo
Reynosa
Monclova
Parras de la Fuente
China
Monterrey
Torreón
Saltillo
Guanaceví
Los Mochis
Topia
Santiago Papasquiaro
Ciudad Juárez
Agua Prieta
Ascensión
Nuevo Casas Grandes
Buenaventura
Peña Blanca
Madera
Ojinaga
Chihuahua
Cuauhtémoc
Ciudad Delicias
Ciudad Camargo
Ciudad Jiménez
San Juanito
Álamos
Choix
El Chorro
Hidalgo del Parral
Silver City
Alamogordo
Socorro
Gila
Pecos
Rio Grande
Red
White
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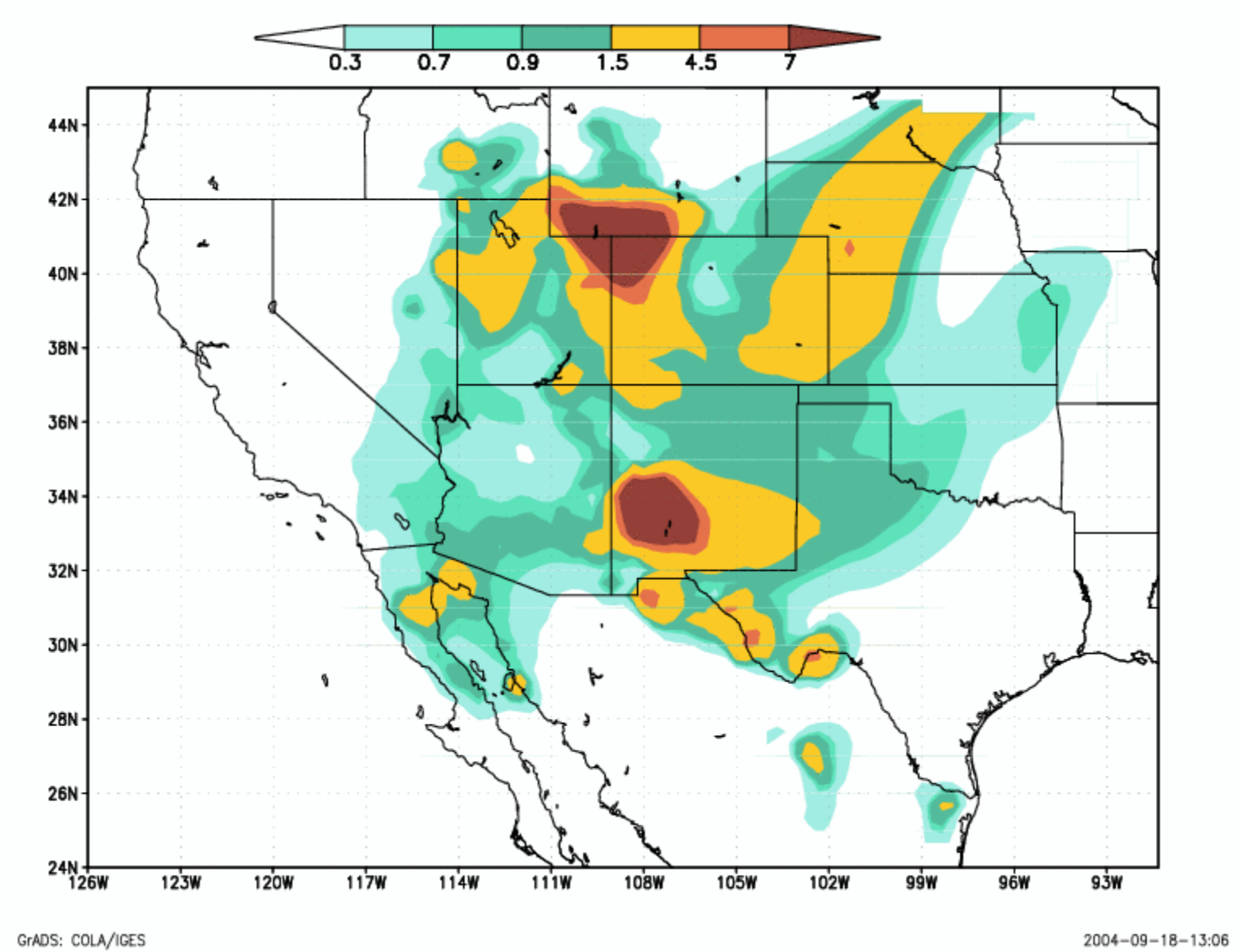
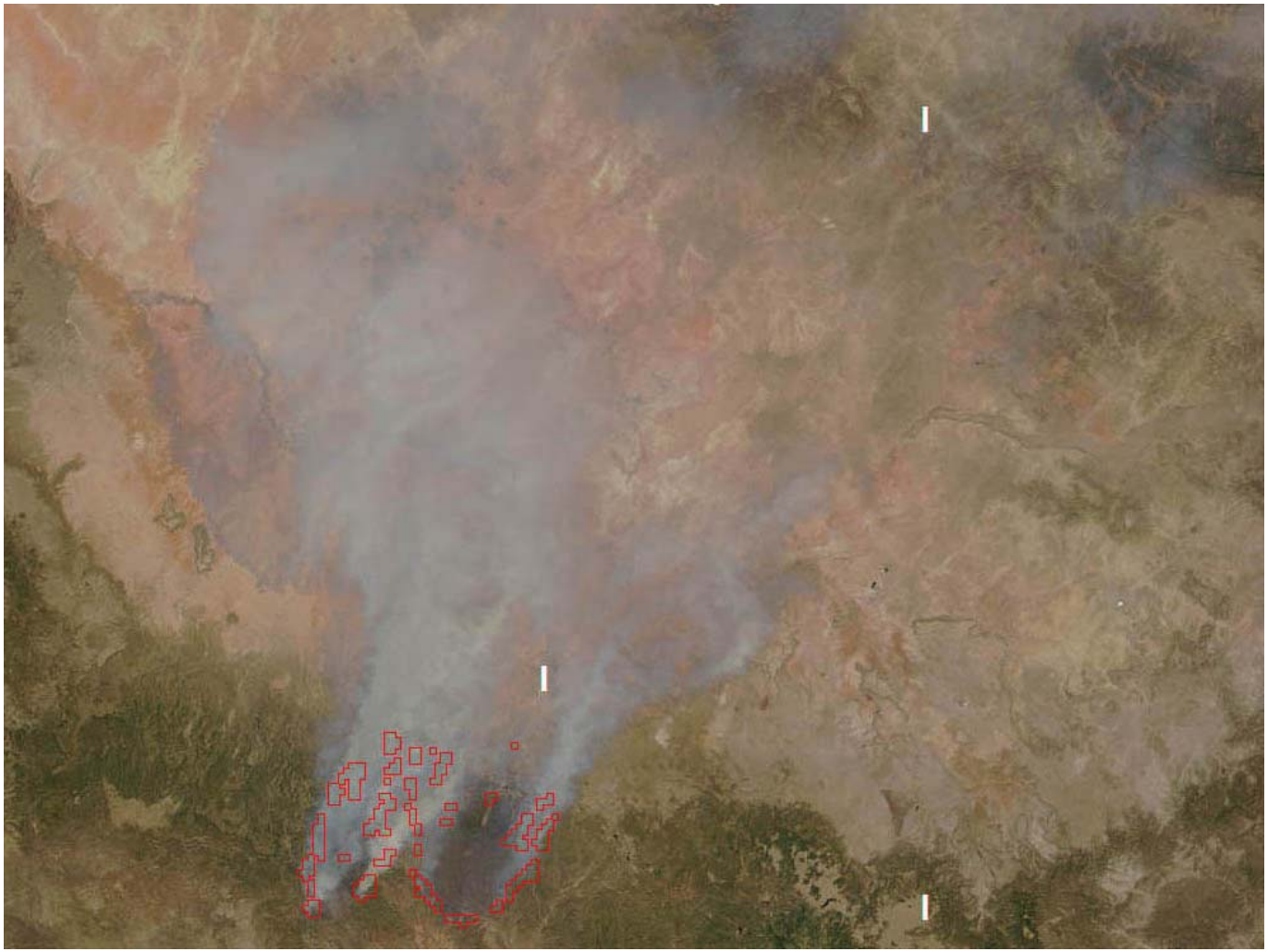
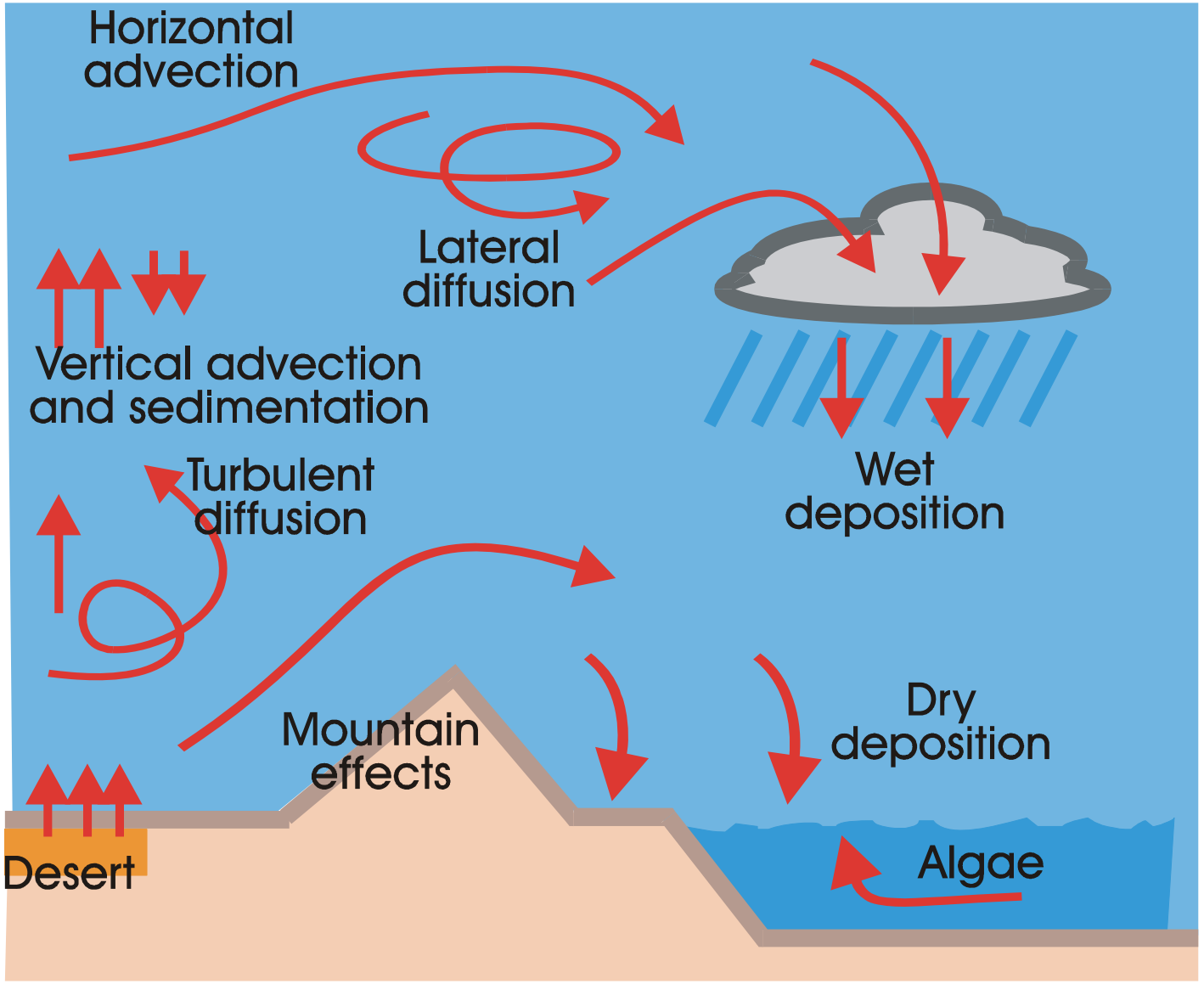

0.3
0.7
0.9
1.5
4.5
7
44N
42N
40N
38N
36N
34N
32N
30N
28N
26N
24N
126W
123W
120W
117W
114W
111W
108W
105W
102W
99W
96W
93W
GrADS: COLA/IGES
2004-09-18-13:06



Governing Concept for DREAM



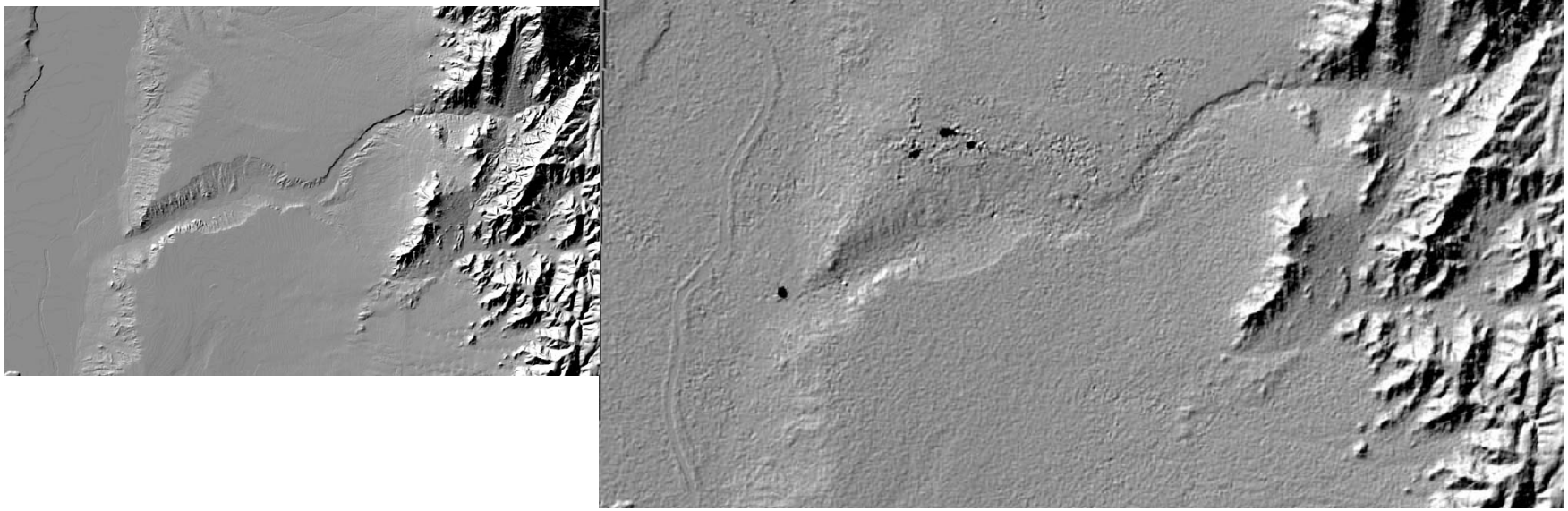
DREAM Inputs & Upgrade Potential

Static Inputs	Dynamic/Variable Inputs	Assimilation Potential
Global topography (1x1 km)	Latitude/longitude, thinned grid standard	ASTER-AST 14/SRTM Digital elevation
Global soil types FAO 2x2 minute (converted into texture classes)	10 pressure levels	NRCS: SSURGO and STATSGO
Global vegetation types USGS (1x1 km)	Geo-potential height	MOD 15 vegetation LAI, FPAR (1km)
Items in blue are NASA-generated products. Idea is to migrate from static to dynamic inputs	Wind components	Addressed by NCEP/Eta
	Specific humidity	AIRS/AMSU-A atmospheric humidity
	Surface fields (soil temp, moisture, and albedo)	MOD 11 soil temp TRMM 3A-53 5-day rain map (2 x 2 km)

Surface Roughness

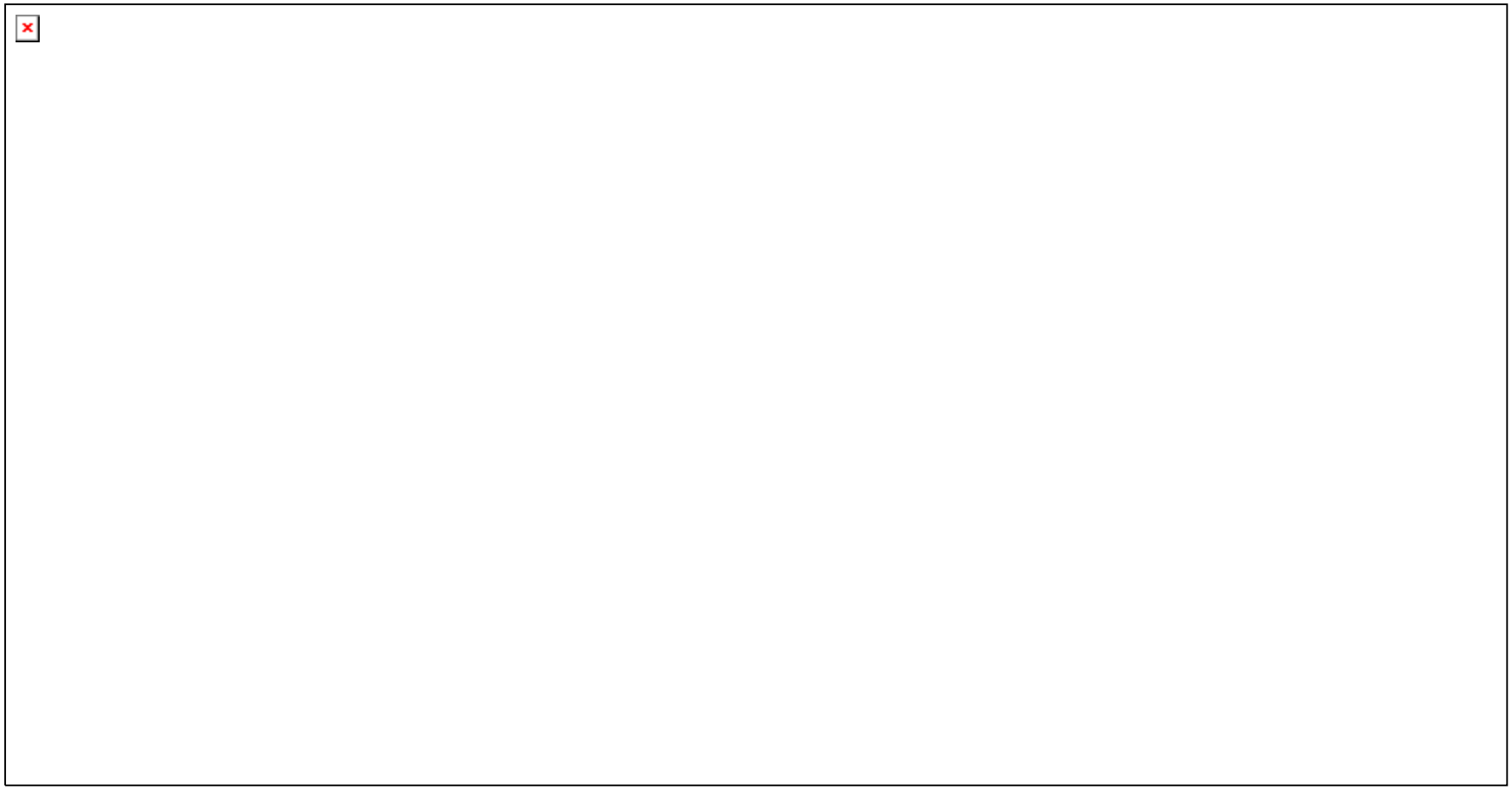
Shuttle Radar Terrain Mission Data

National Elevation Data

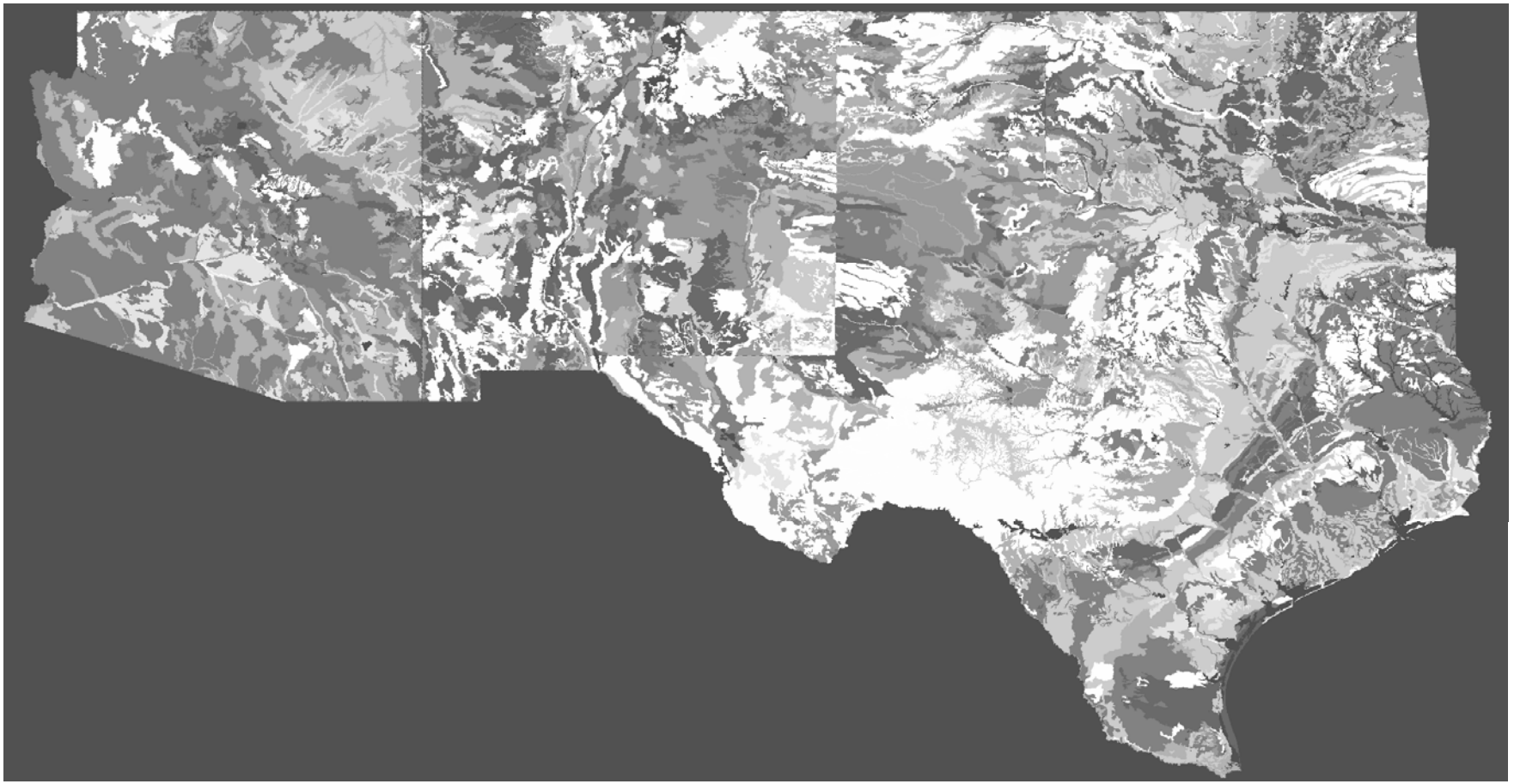


(Experimental)

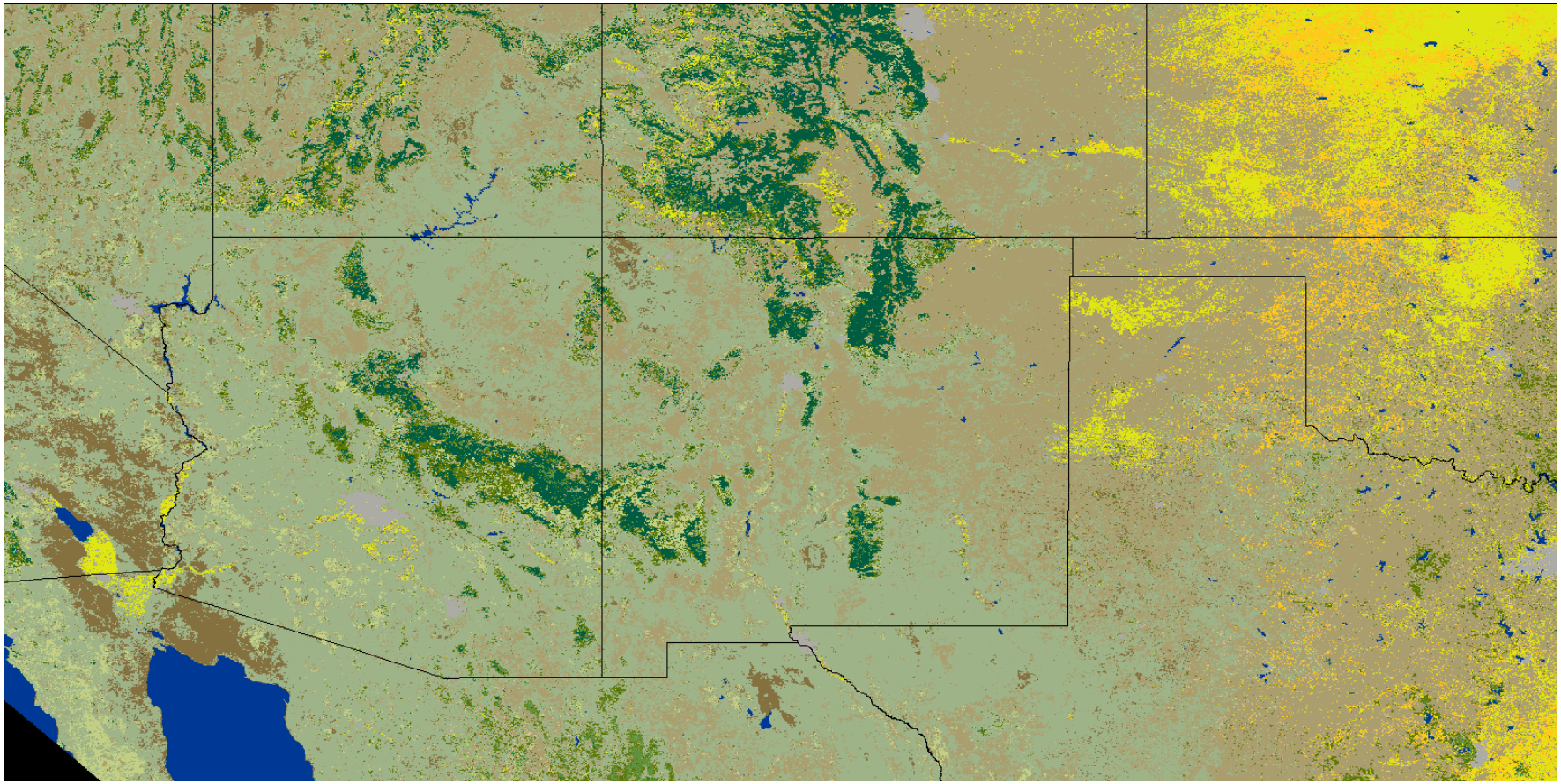
Surface Soil Textures in the SW



Wind Erodibility Groups in the SW



MOD12Q1—(Version 004) Land Cover Type for 2001



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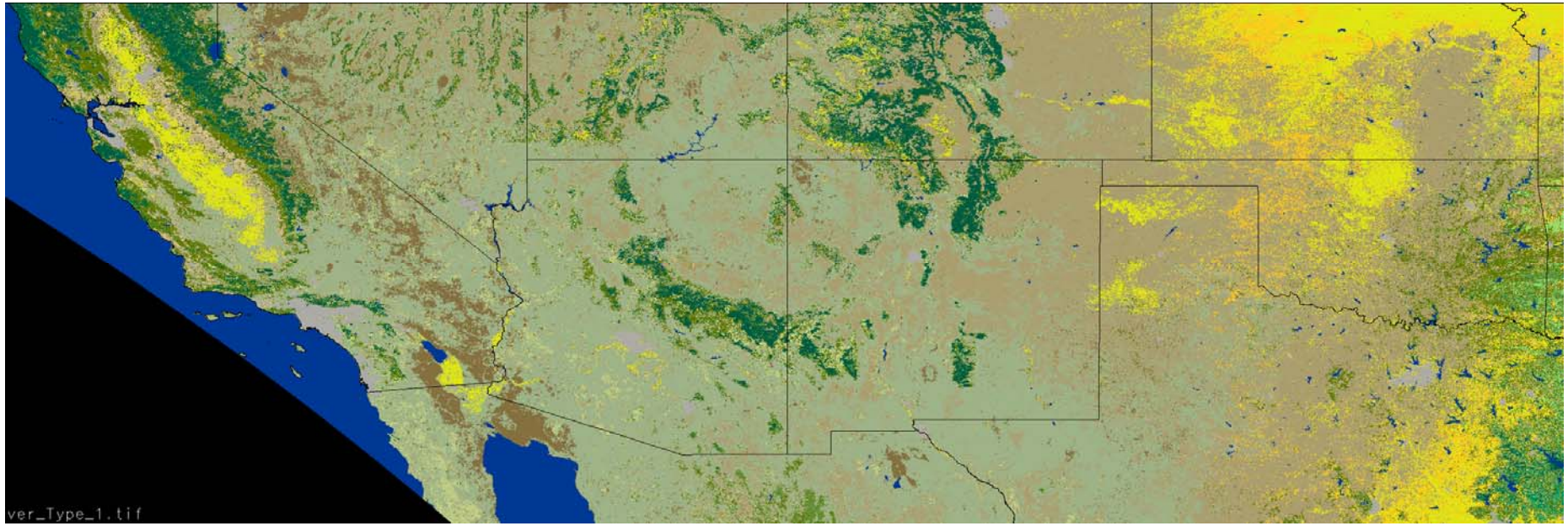
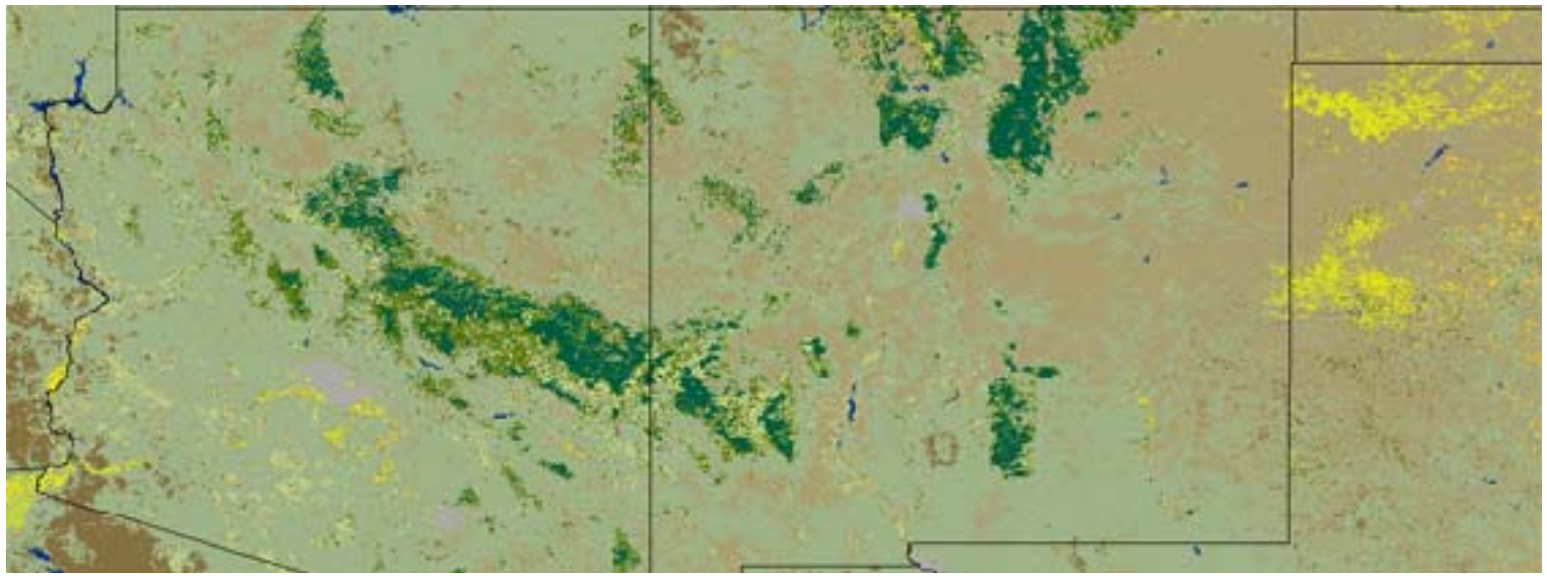
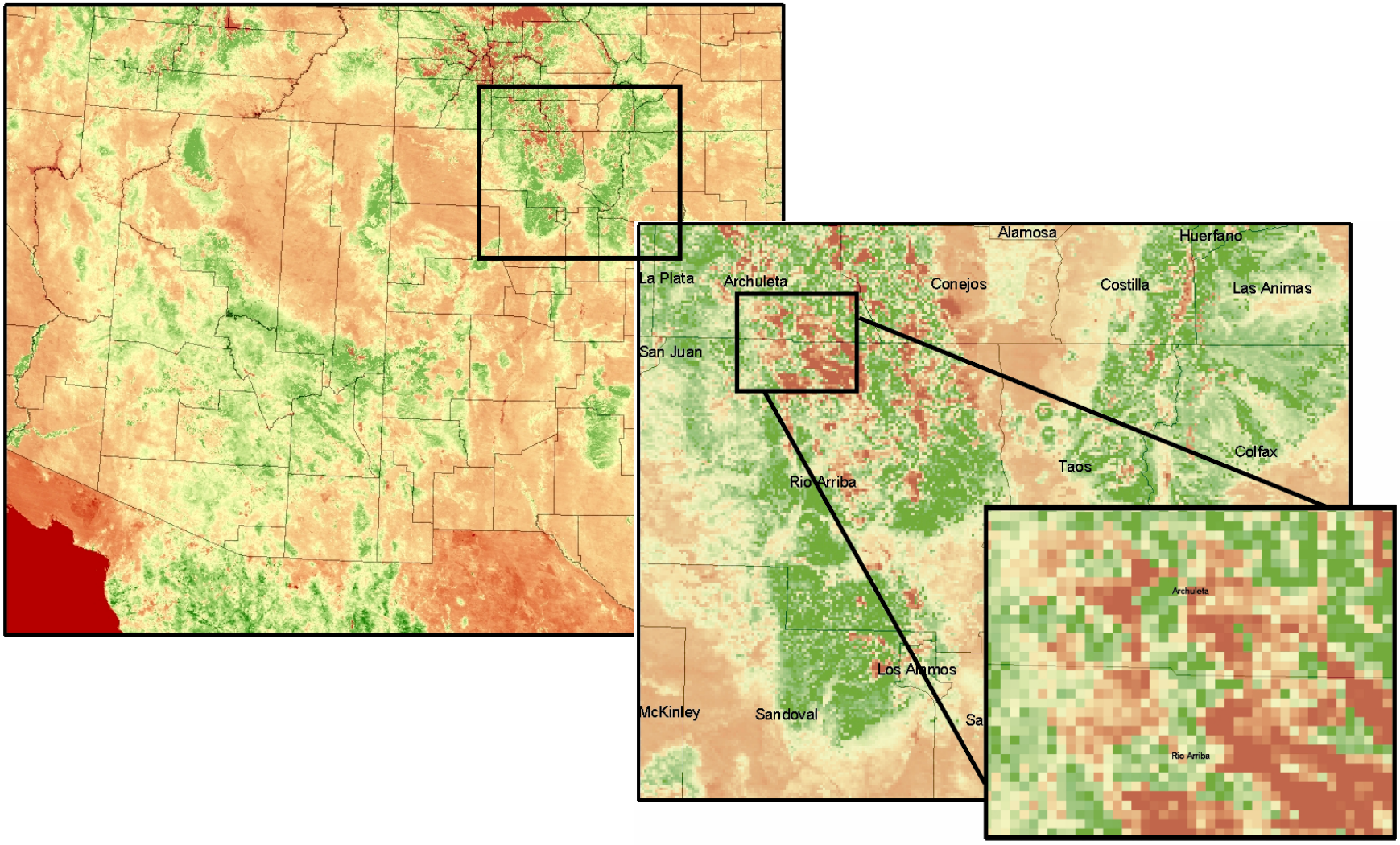
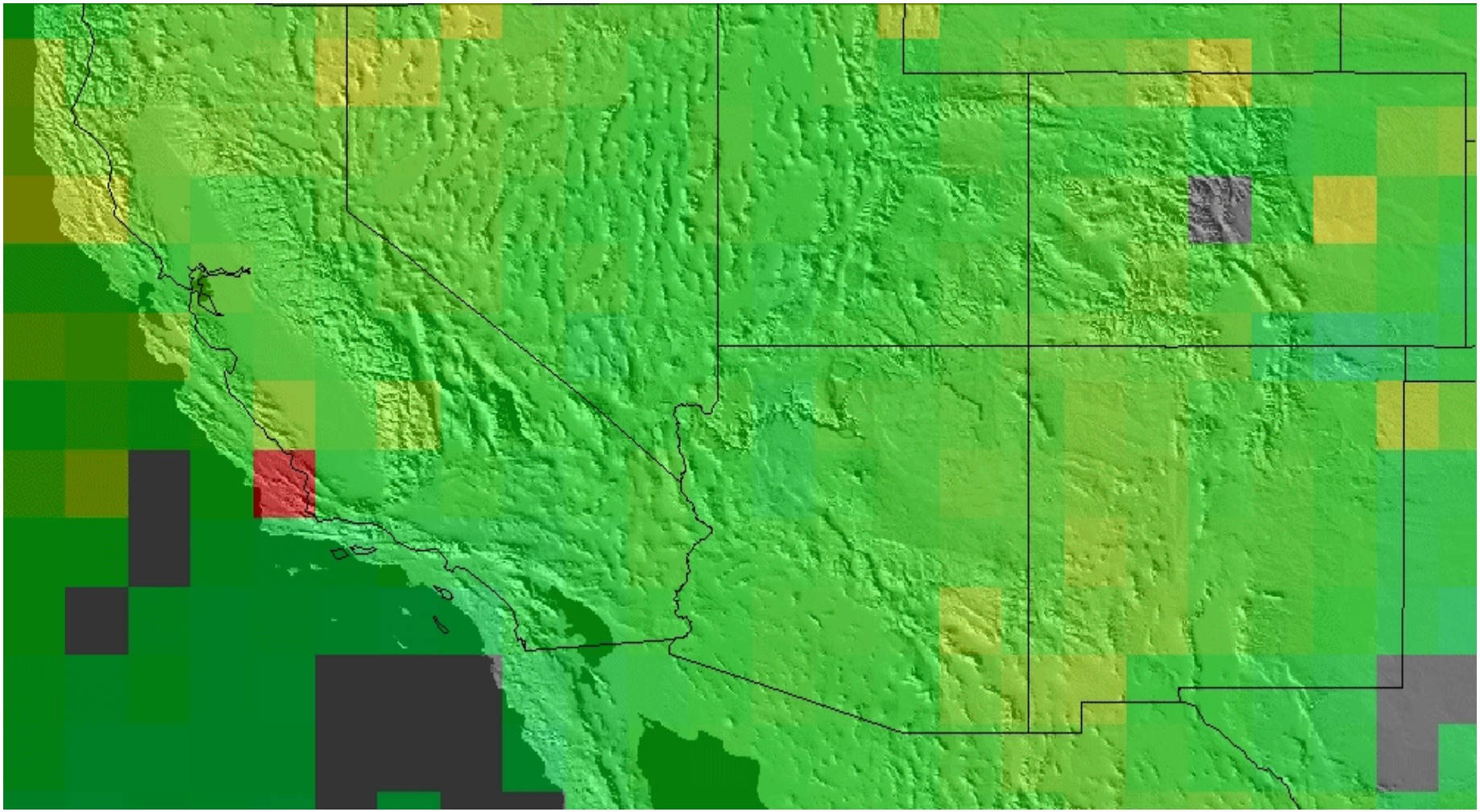




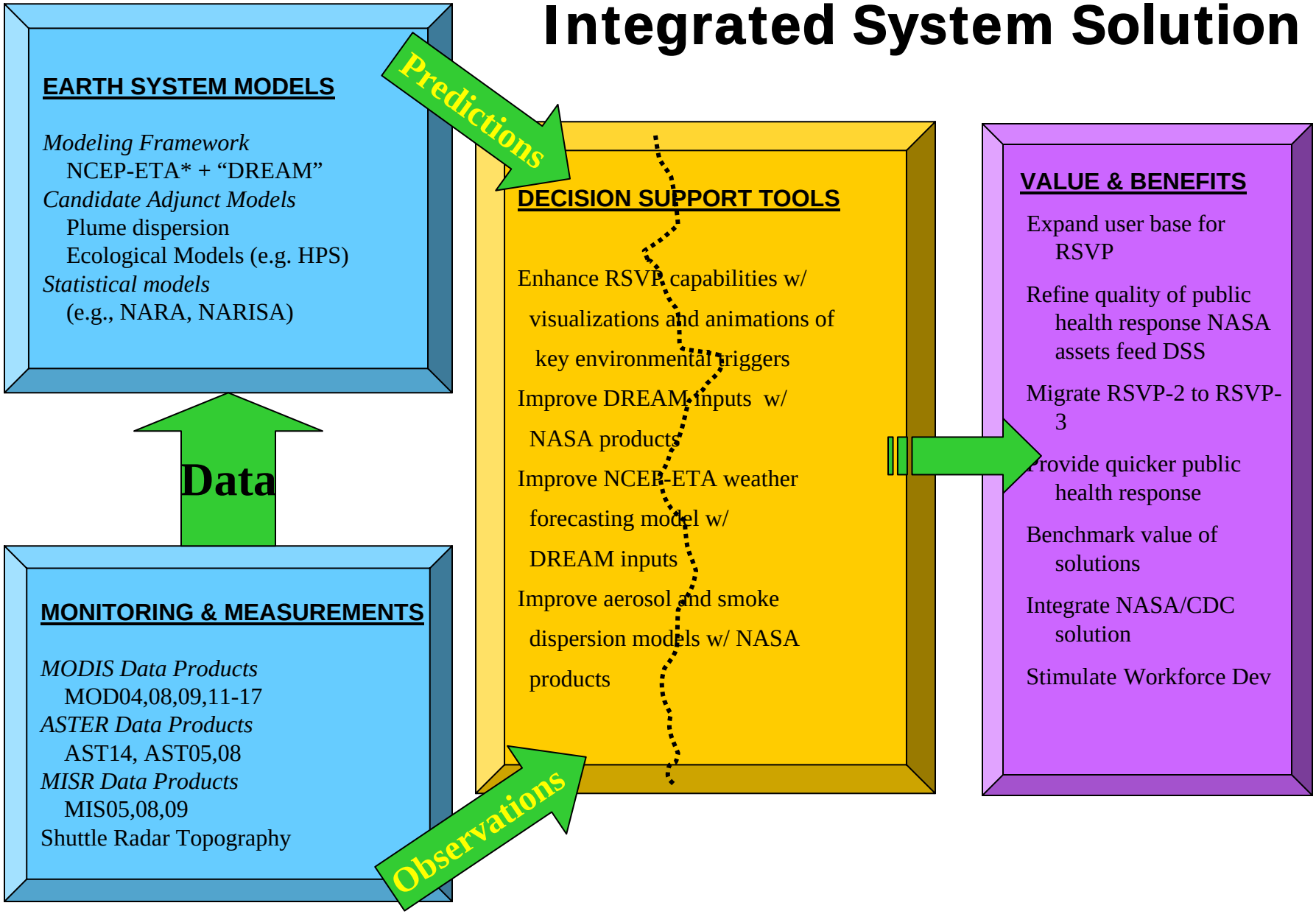
AZ/NM (MOD13A4) 16-Day Vegetation Index 1-km



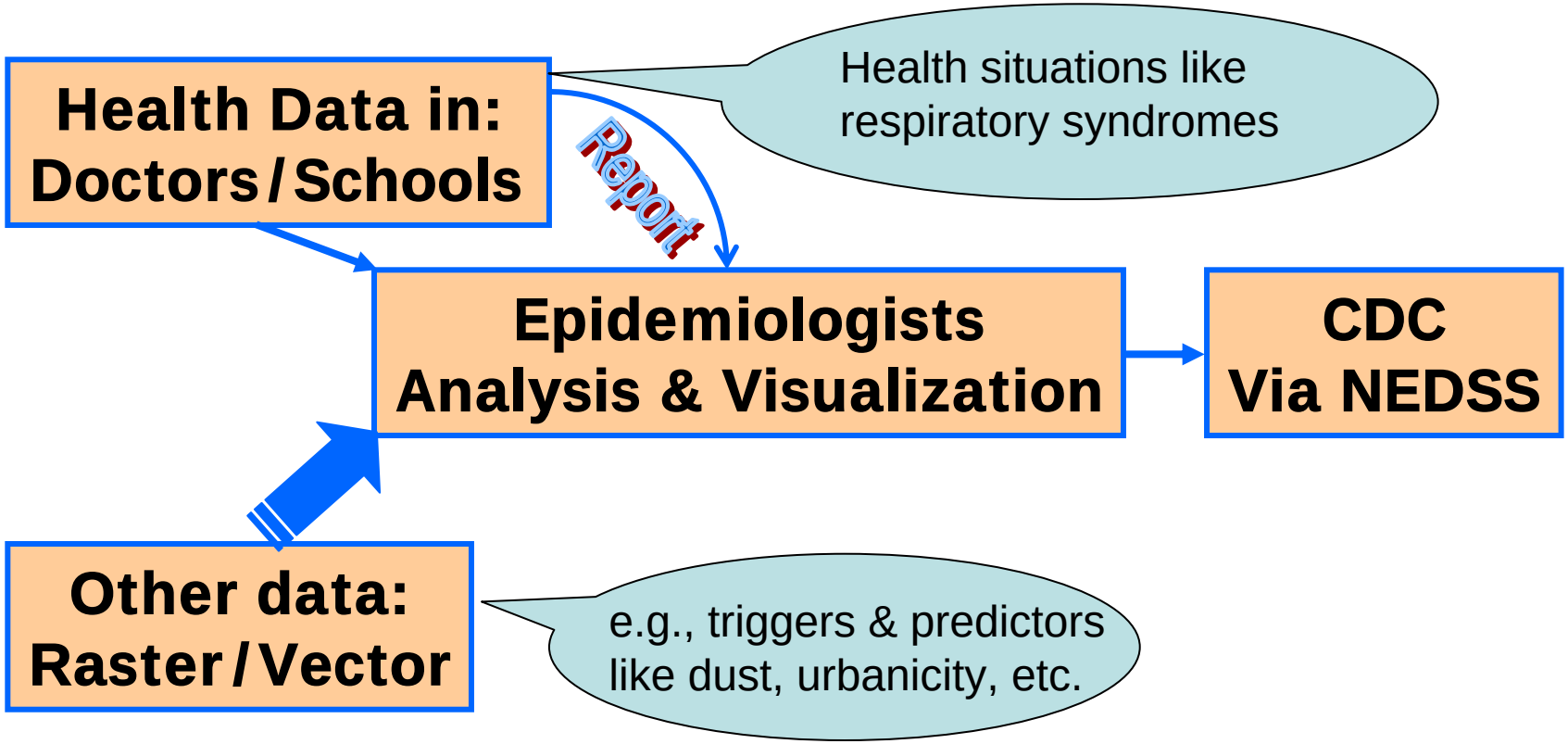
Migrating Ozone Concentrations



Integrated System Solution



Data Assimilation Concept



Project Participants

UNM	U of A		SNL	Stake-holders
	Atmos. Sci.	Opt. Sci. Ctr.		
Stan Morain	Bill Sprigg	Kurt Thome	Susan Caskey	NM/AZ-DOH
Amy Budge	Brian Barbaris	Chris Cattrall		NM/AZ-DEQ
Karl Benedict	Dazhong Yin			Hospitals
Bill Hudspeth	Beena Chandy			Private Firms
Tom Budge	Slobodan Nickovic			Health Sci Ctr, TxTech
Chandra Bales				
Gary Sanchez				