

Developing Emission Inventory Systems Using GIS

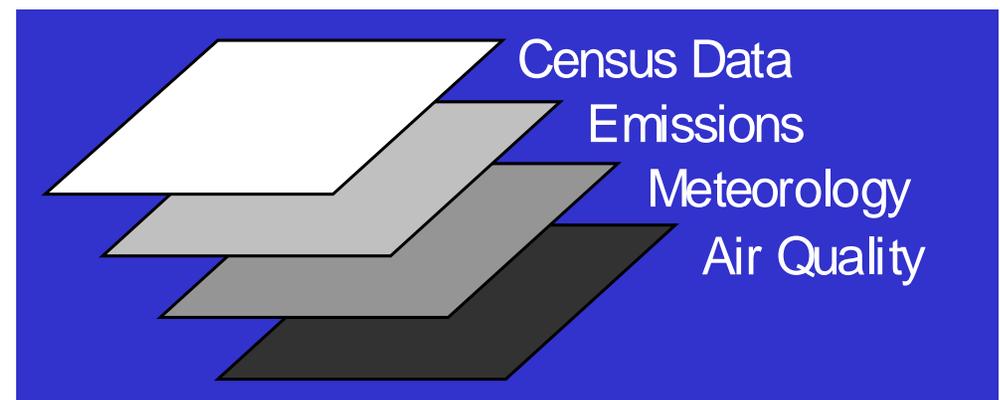
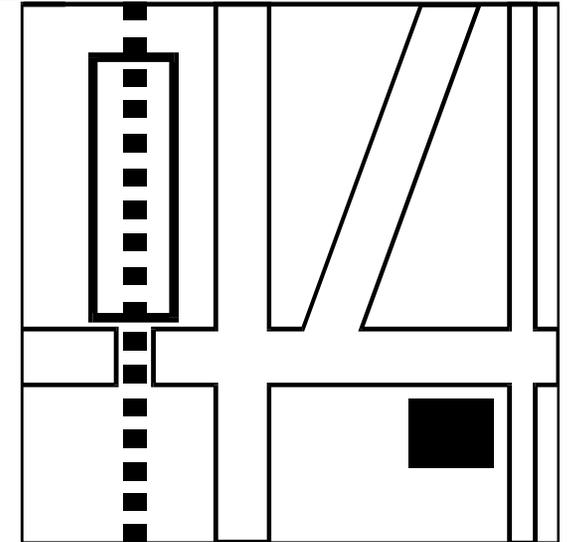


Emission Inventory Branch
Planning and Technical Support
Division

District Inventory Workshop
November 14, 2001

Our Work is Geographical

- ❖ Emissions are estimated for specific locations or regions
- ❖ Air quality is measured at specific locations
- ❖ Meteorology varies by location
- ❖ Control measures are implemented for specific regions and districts



But Often our results are...

The magic of CEIDARS!

0.02523	120	5509.3	65	62	57	105	7	0	6	1	4	18
0.07344	3153	32352.9	640	1428	1016	756	38	4	117	1529	2209	3897
0.12471	3931	32876.3	1823	1987	2060	3087	276	6	187	491	733	1693
0.12468	5641	47313.1	2769	3074	2825	4550	355	39	505	450	1643	2992
0.12546	6024	45536.4	1860	2866	2847	2409	167	16	1005	2116	4012	7316
0.12781	7719	58234.9	2406	3819	3624	2946	281	30	1485	2701	4939	9436
0.12547	6910	55758.3	1691	3647	3349	1512	200	37	440	4807	6050	11534
0.12870	4253	30139.9	1118	1935	1944	911	301	17	1092	1558	2654	5622
0.16068	3399	22946.2	1894	1799	1888	3180	144	18	185	160	359	866
0.16811	7454	42662.5	3556	4249	2923	4960	479	71	215	1447	3366	5578
0.15508	6542	40566.2	2648	3337	2954	4697	436	40	427	691	1830	3424
0.15661	6595	39244.0	1948	3076	3070	4085	128	9	1052	872	2839	4900
0.15508	3213	20286.3	890	1538	1530	1121	59	17	935	936	1959	3906
0.17156	5449	29260.9	1491	2481	2539	1319	118	20	1281	2282	3485	7186
0.17710	5020	27922.1	1535	2416	2529	929	60	8	3227	721	1318	5334
0.16510	2915	17516.7	717	1459	1433	714	2	1	516	1659	2334	4512
0.16783	4546	27045.2	2397	2090	2449	3873	113	19	410	124	509	1175
0.17379	4774	27533.2	2398	2531	2254	3154	122	21	912	576	1261	2892
0.16757	3591	18117.8	1431	1552	1484	2094	97	20	506	319	800	1742
0.14119	2878	18039.5	886	1316	1370	329	1356	10	164	827	1255	3612
0.15992	3016	18878.2	1733	1318	1701	2781	22	5	185	26	151	389

Where is the spatial information?

California Air Analysis Information System



- My County
- Neighborhood**
- Create Maps
- Create Graphs
- Ask Questions
- Scenarios
- Future
- Air Quality
- Help

Facility Info

Name: ACME Paint and Body

- Facilities
- Schools

Pollutant Info

<u>Pollutant</u>	<u>Quantity</u>	<u>Risk Info</u>
Benzene	300.3	Ref 1
Toluene	3423.3	Ref 2
Chromium	34.33	Ref 3

ARB Programs Addressing These Pollutants

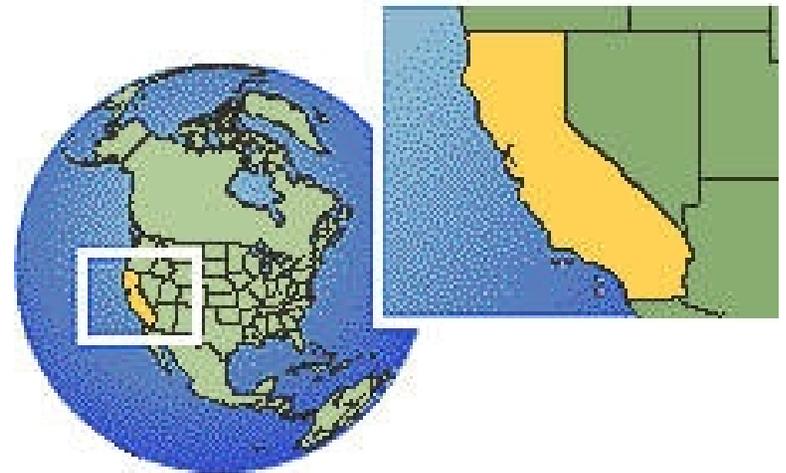
[2588](#), [AB25](#), etc. Click for more info

Geographic Information Systems

- ❖ **Store, analyze, and display spatial data**
- ❖ **Use spatial objects such as points, lines, polygons, boundaries**
- ❖ **These objects relate to real-world features such as census tracts, facility locations, roads, political boundaries**
- ❖ **Items can be combined, interrelated, shared, and analyzed using GIS tools**

GIS – Why Bother?

- ❖ **Improves communication of what we do and what it means**
- ❖ **Enhances accuracy and timeliness**
- ❖ **Provides new analysis tools**
- ❖ **Provides improved consistency and integration**
- ❖ **Fosters additional ARB & District collaboration**



County Ag Burn Emissions Using GIS

UC Berkeley

Ag Burn Emissions Thematic Mapper (UC Berkeley) - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: <http://camfer.CNR.Berkeley.EDU/~jskar/agburn/>

emissions pr phc agburn James Scarborough Index of the HT Character entit

> [Project Homepage](#) < **Ag Burn Emissions Inventory Mapper [DRAFT]** > [CAMFER Ho](#)
UC Berkeley research funded by the California Air Resources Board

UC Berkeley CAMFER Lab - Ag Burn Emissions Mapper
Map of PM10 emissions for October, 2000 (prelim.)

County	Tons
Sacramento:	9.9
Colusa:	113.9
Fresno:	25.0
Glenn:	98.0
Kern:	15.5
Madera:	0.0
Merced:	18.4
Placer:	7.6
San Joaquin:	61.1
Stanislaus:	12.0
Sutter:	53.4
Tulare:	8.9
Yuba:	25.7

PM10 (lbs)

- 0 - 75900
- 75900 - 151800
- 151800 - 227700

Grand Total: 450 tons

0 40 Miles

camfer.cnr.berkeley.edu/agburn Custom map generated on June 25, 2001 14:55 PDT
For research use only. Does not reflect ARB policy. Copyright © 1999-2001 UC Regents

Source inputs

- Agricultural burning
- Wildland fire (TBD)
- Residential wood burning (TBD)

Emission type

Choose pollutant:

This is prototype software to demonstrate GIS mapping of emissions inventories. All "r" emissions figures should be treated as hypothetical. For research use only. Created by CAMFER contract for ARB.

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Spatial Allocation of Ag Burn Emissions Using GIS

UC Berkeley

Ag Burn Emissions Thematic Mapper (UC Berkeley) - Netscape

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Bookmarks Location: <http://camfer.CNR.Berkeley.EDU/~jscar/agburn/>

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[> Project Homepage <](#) **Ag Burn Emissions Inventory Mapper [DRAFT]** [> CAMFER](#)
UC Berkeley research funded by the California Air Resources Board

UC Berkeley CAMFER Lab - Ag Burn Emissions Mapper
Map of PM10 emissions for October, 2000 (prelim.)

GLENN
COLUSA
YUBA
SUTTER
YOLO

PM10 (lbs)
100 - 2400
2400 - 4700
4700 - 7000

Grand Total: 118 tons

0 4 Miles

camfer.cnr.berkeley.edu/agburn Custom map generated on June 25, 2001 14:56 PDT
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Source inputs

- Agricultural burning
- Wildland fire (TBD)
- Residential wood burning (TBD)

Emission type

Choose pollutant:

This is prototype software to demonstrate GIS mapping of emissions inventories. A emissions figures should be treated as h For research use only. Created by CAM contract for ARB.

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Agricultural Burning Location Animation

Based on
Reported Data
(1x1 mile grid cells)

UC Berkeley

UC Berkeley CAMFER Lab- Ag Burn Animation
Showing agricultural burns from Jan 1 to Jan 31, 2000

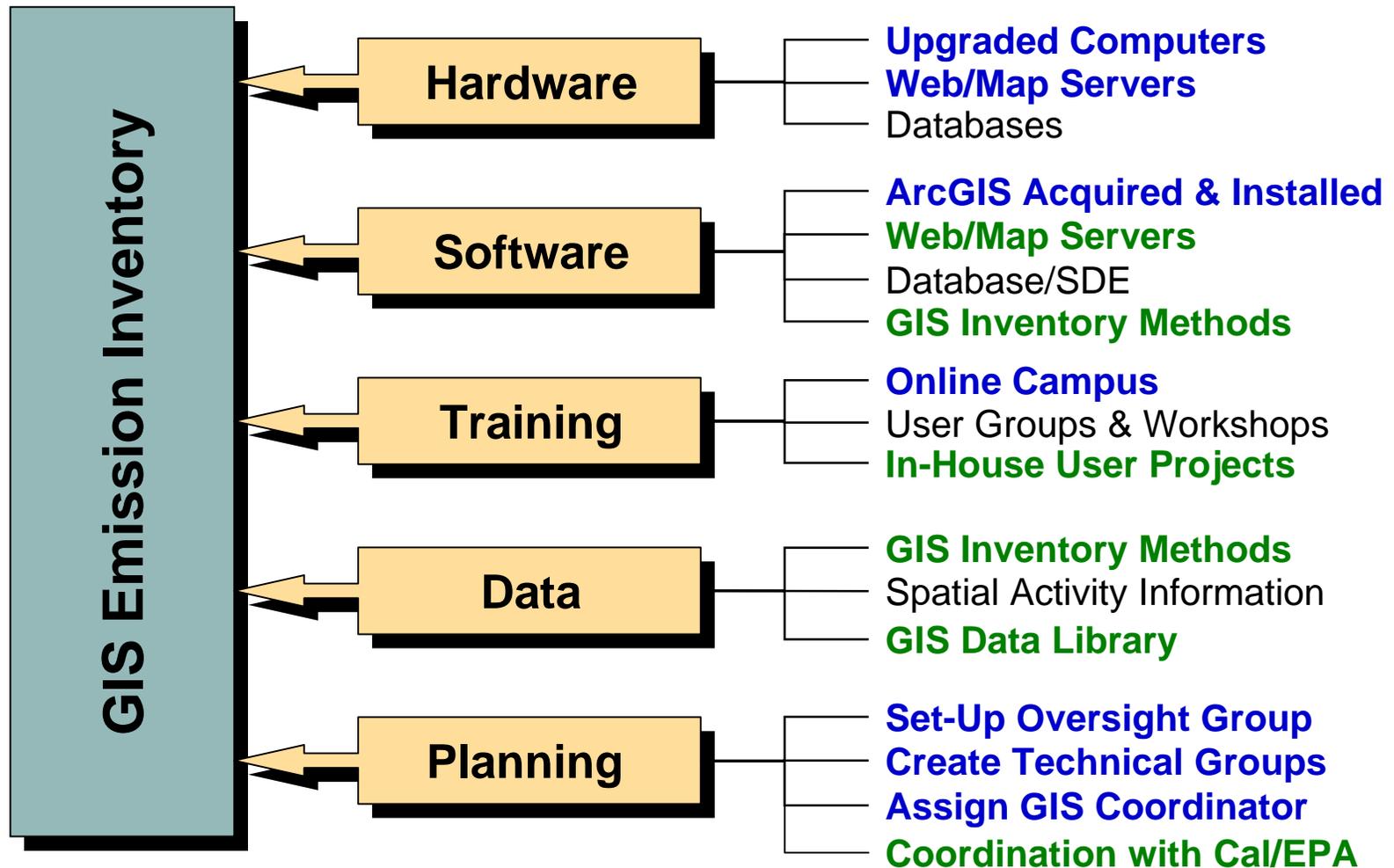


camfer.cnr.berkeley.edu/agburn

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Geographic Emission Inventory Components



Key

Items shown in blue have been completed

Items shown in green are in progress

Items shown in black are being planned

GIS Development Projects

Emission Inventory Systems

All projects improve inventory capabilities

**Development of GIS-Based
Emission Inventory For Small
Sources – Gas Stations**

Vijay Bhargava

**Audit and Correction of Facility
Location Data using GIS**

Andy Alexis

**Development of a Method to
Evaluate Geocoded
Public Health Data**
Cynthia Garcia / Helene Margolis

**Urban and Agricultural Crop
Biogenic VOC Emission
Inventory GIS**
Klaus Scott

**Development of GIS-Based
Emergency Standby Generator
Emission Inventory**
Anna Komorniczak

**Link-Based On-Road Mobile
Emissions for SCAQMD**

Tess Sicat

**Development of Community
Health Air Pollution Information
System (CHAPIS)**

Beth Schwehr

**Census and Demographics
Mapping Analysis Projects**

Don Rake

WIFM

What's
In It
For
Me?



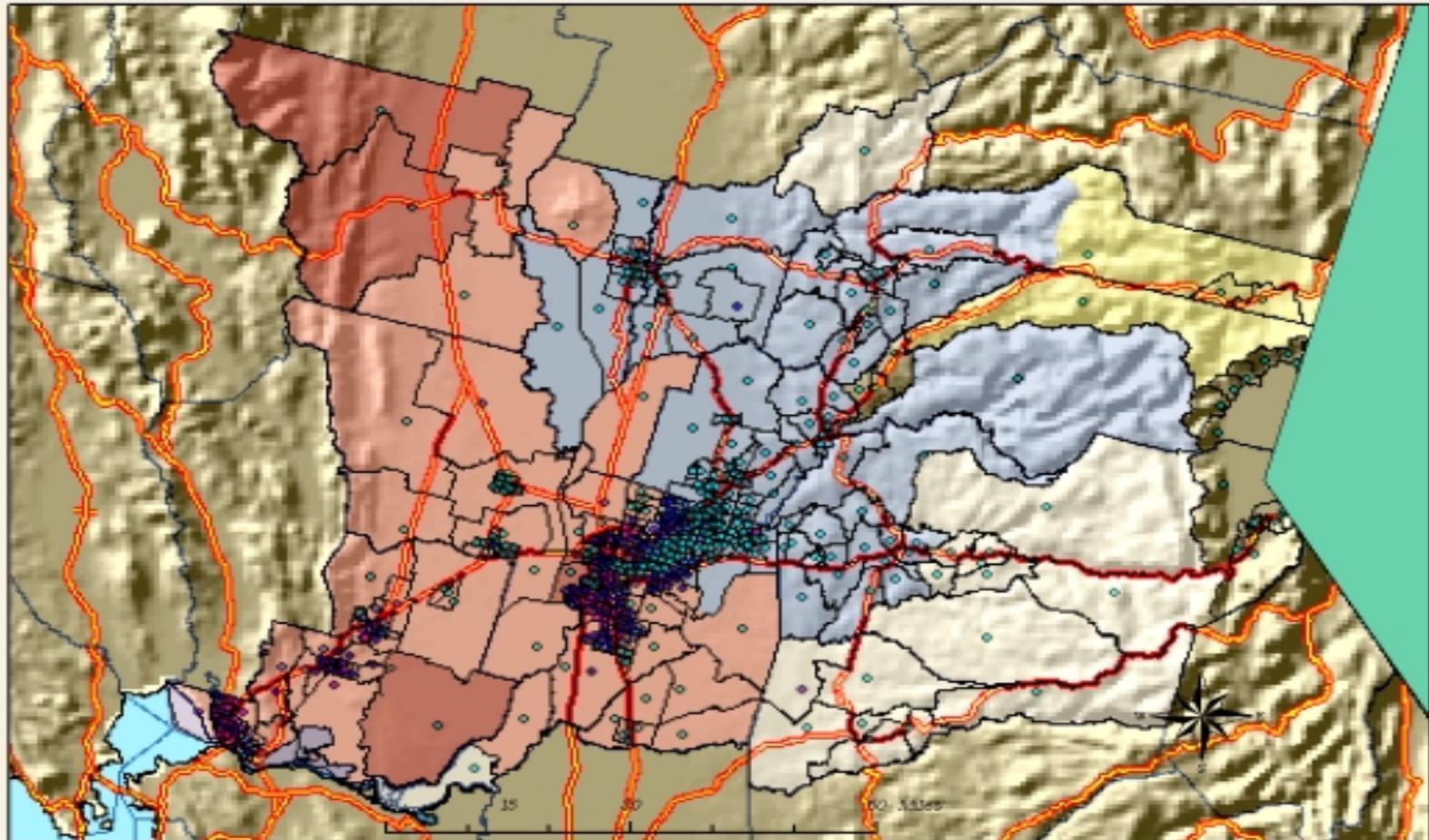


What You'll Get

- ❖ Accurate information about where facilities are located
- ❖ Visual displays of emissions including point, mobile, and area source maps
- ❖ Neighborhood and community level emissions analysis
- ❖ Ability to combine emissions, air quality, and demographic data

Comparing Air Quality and Demographics

SACRAMENTO AND SURROUNDING AREA
PM 2.5 Annual Average of Quarters
Percent of Total Population that is African American by Census Tracts (2000)



1999 PM 2.5 (µg/m³)



African Amer./Total Pop. (%)



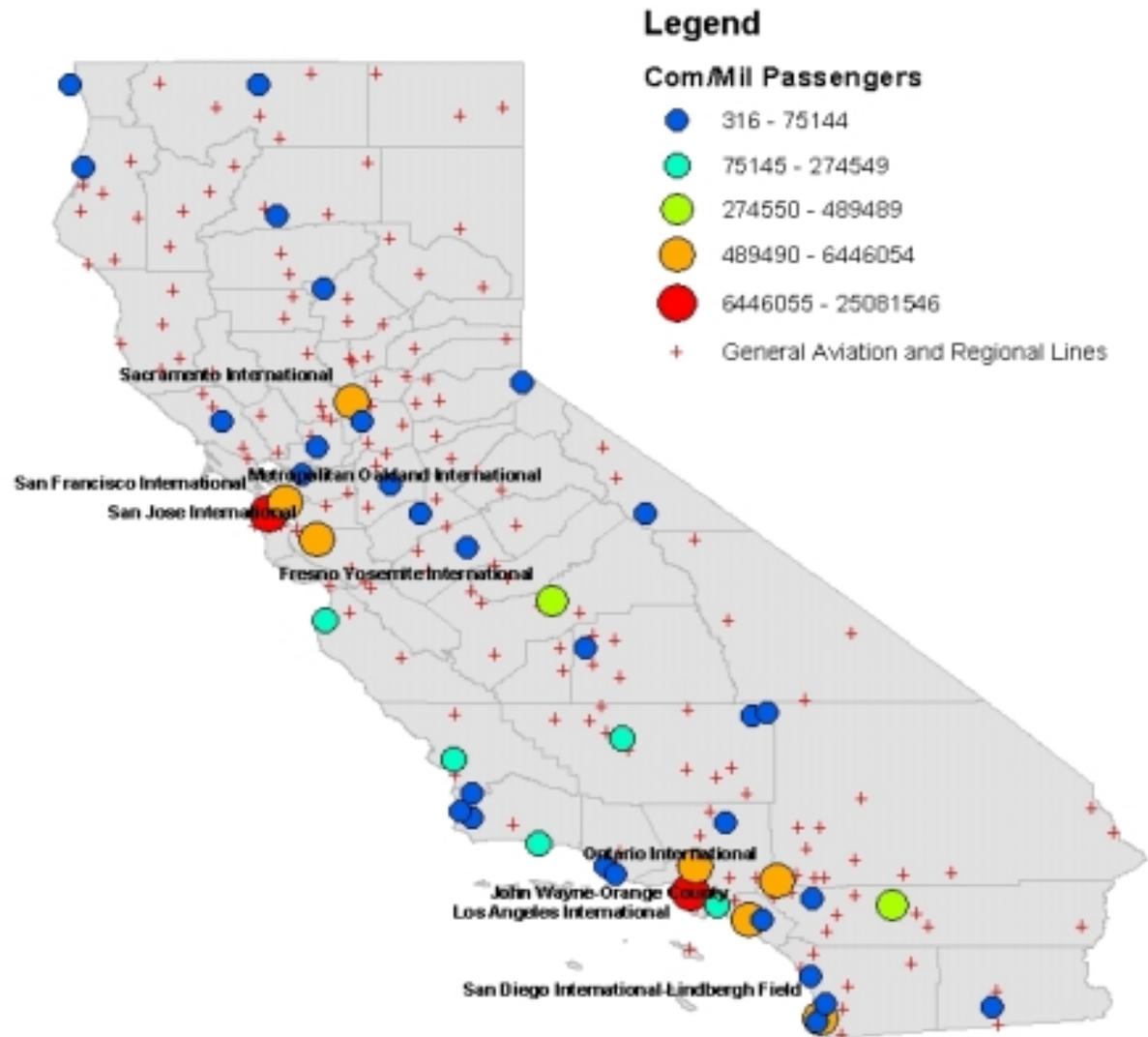
Boundaries



CALIFORNIA RESOURCES BOARD

Cynthia Garcia

California Airports and Passengers



Source: ESRI
Commercial and Military Airports - Airport, Total Enplanements
Total Records - 45
Other Airports - Airport, Service Level
Total Records - 212

OFFROAD Model
Airports - Airport, County, Regional NB LTO, Mj NB LTO, Mj WB LTO, Southwest LTO
Total Records - 33

Tess Sicat



What Do You Want?

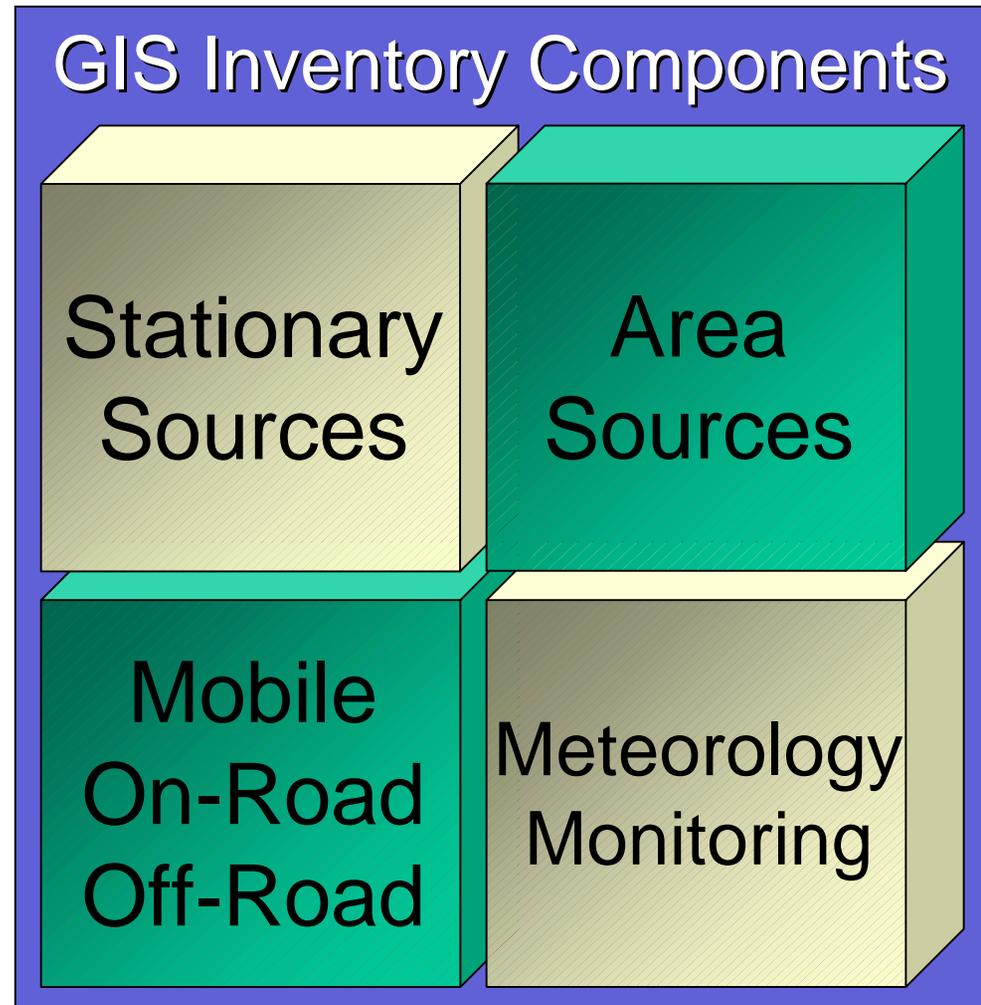
- ❖ Inventory staff will be working with you to identify what you want – data, tools, training?
- ❖ How can you help?
 - Some of this work may require additional standardization
 - Provide your ideas. Are we on the right track?
 - We're making this up as we go with limited resources, so it may try your patience
- ❖ Using GIS methods, how can we make your life easier?

ARB Progress

- ❖ All ARB inventory staff now have access to GIS software and training
- ❖ Staff are now producing tools and maps to better serve districts and the public
- ❖ We are building the foundation for an **integrated and consistent** emissions database and analysis system
- ❖ District help is critical to success

Prototype GIS Inventory System

- Develop GIS methods
- Develop data structures
- Enhance our collaboration
- Identify challenges
- Improve responsiveness

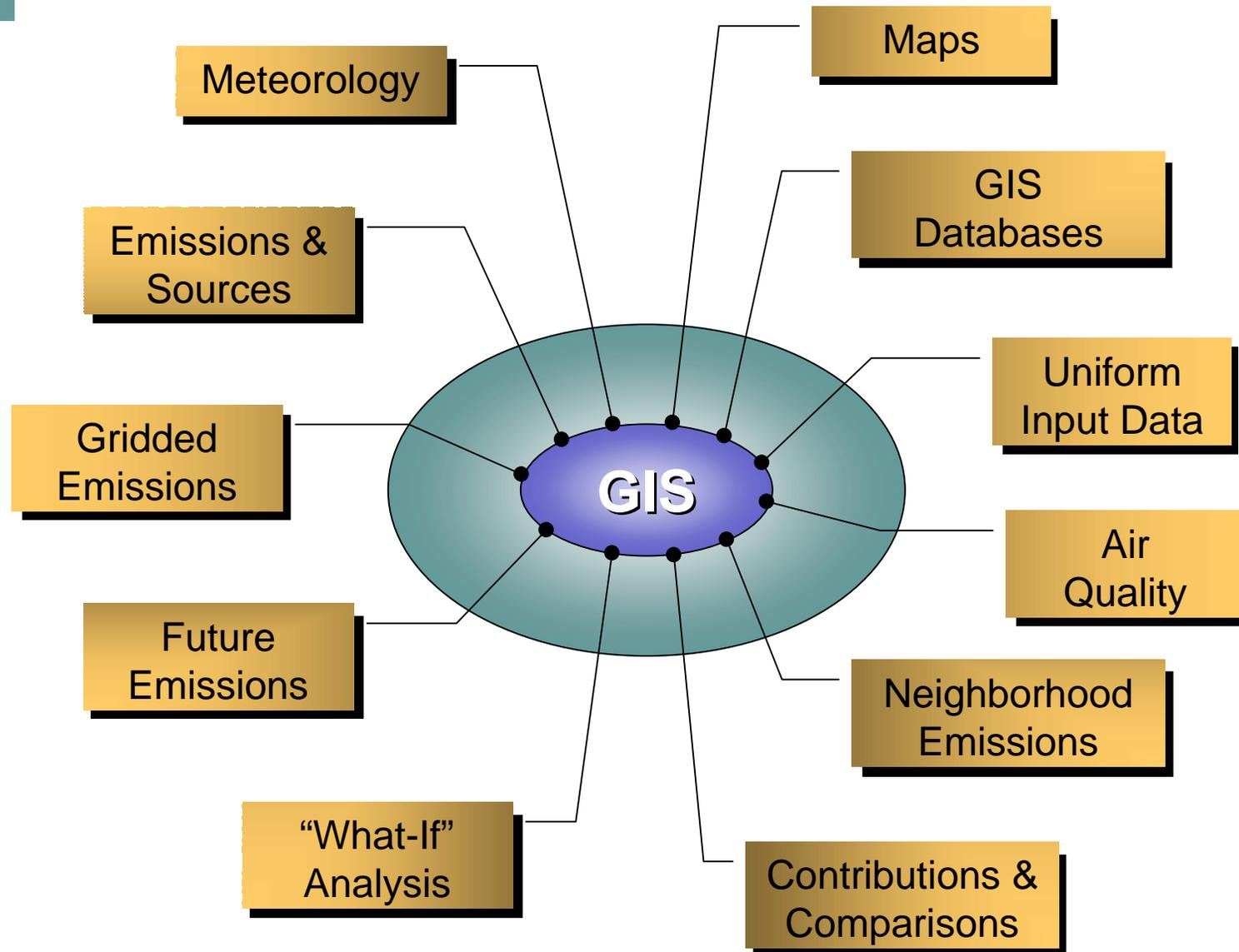


Prototype System Enhancements

- **Refined mobile source estimates**
 - Car and truck link-based emissions
 - Airport inventory
- **Validate point source locations & emissions**
- **Refine area source spatial and emissions refinements for study regions**
- **Develop prototype database**
 - All study sources integrated & spatially enabled
 - Use spatial database engine (SDE)



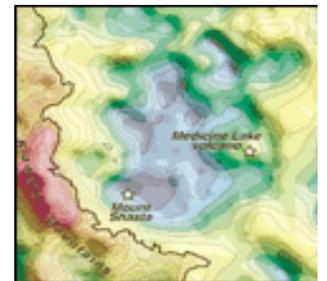
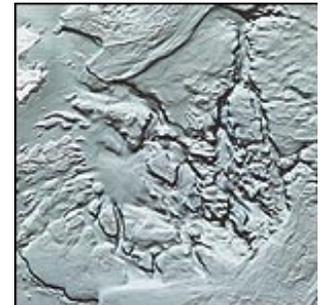
The Grandiose Future Vision



Conclusions



- **We have made substantial progress in bringing GIS technology to the ARB**
- **The exact path for creating a GIS-based inventory is not completely clear**
- **We are making measurable steps towards understanding what needs to be done and how to do it**
- **District staff assistance and interest are crucial to successful improvements**
- **Every day, our progress is helping to serve our clients more fully**



Contact Information

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