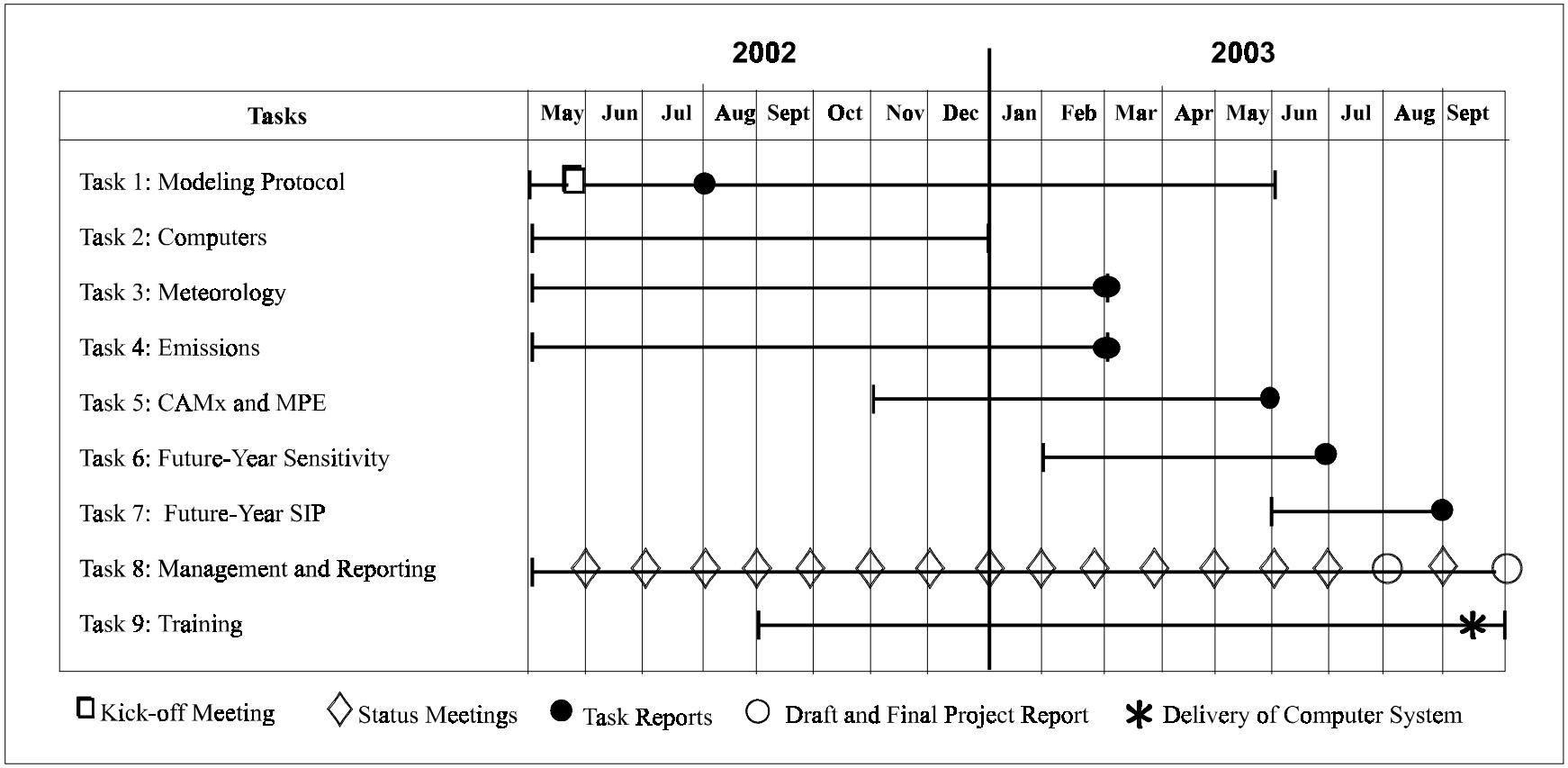
ENVIRON

Summary of Considerations for Episode Selection

	Episode			
	July 1999	**June 2000**	**July 2000**	**July 2002**
Observed Ozone Maxima and Number of Exceedances				
Ozone Maxima	156 ppb at Concord	152 ppb at Livermore	126 ppb at Livermore	160 ppb at Livermore
Number of Exceedances	6 over 2 days	1 on 1 day	1 on 1 day	2 over 2 days
Ozone Pattern				
Episode Category [1]	1	2	2	1
Suitability for the Study of Transport [2]				
Ranking	Best	Poor	Moderate	Moderate
Availability of Emissions Inputs				
CARB Day Specific Emissions	N/A	ARB delivery in January 2003	ARB delivery in December 2002	N/A
Suitable for Weekend-Weekday Analysis				
Episode Days	Sun-Mon	Thurs	Mon	Tue-Wed
Air Quality Database				
Routine Surface and PAMS data [3]	CARB California AQ Data 1980-2000 CD-ROM	CCAQS database	CCAQS database	in AIRS database after 2002
CCOS routine data [4]	N/A	few available	available	N/A
CCOS IOP data [5]	N/A	N/A	available	N/A
Meteorological Database				
RAOB	4 NWS sites (2 per day)	5 NWS sites (2 per day)	5 NWS sites (2 per day)	4 NWS sites (2 per day)
Profiler	5 ETL sites	16 ETL sites	23 ETL sites	13 in BAMI archive (incl. ETL sites)
Surface	Routine Obs	Routine + CCOS Obs	Routine + CCOS Obs	Routine Obs

ENVIRON



- **Schedule for 2 CCOS episodes: July/August 2000 and June 2000.**
- **Tasks 3 and 4 contingent upon meteorology and emissions data from CARB by mid-Jan.**
- **Task 5 contingent upon air quality measurements from CARB by end Jan.**
- **Addition of third episode (July 1999) contingent upon additional funding**
  - Would push Tasks 3-7 out an additional 2 months.

Meteorological Modeling Status for BAAQMD

ENVIRON
ATMET

18 December 2002

Summary

- Horizontal grid configuration finalized
- Steep topography issues encountered and handled by partial domain smoothing
- Preliminary run of complete first episode
- Data received from ARB
  - Problems reported by BAAQMD
  - 28 July not yet received
  - Only "standard" NWS data used for FDDA in first run

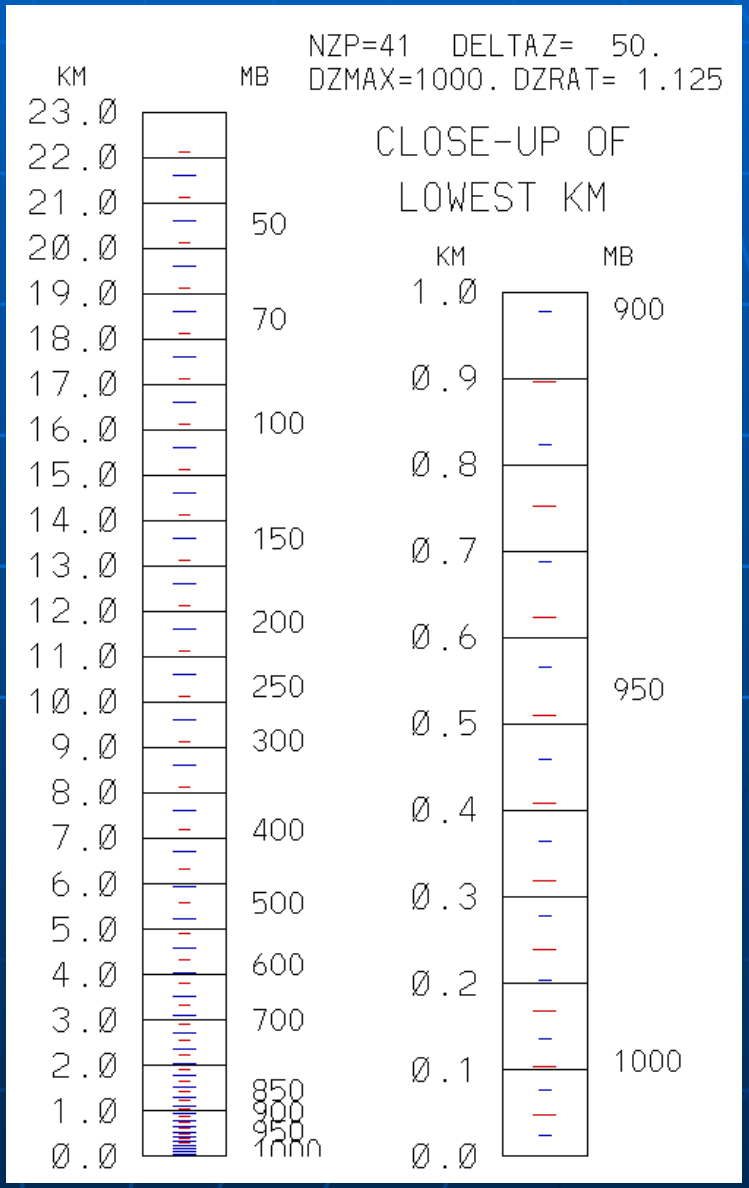
RAMS Horizontal Grid Structure

Grid	# of X Points	# of Y Points	Vertical Levels	Δx (km)	Δy (km)	Δz (m) (Lowest)
1	63	58	41	48	48	10
2	94	106	41	12	12	10
3	191	200	41	4	4	10
4	130	170	41	1	1	10

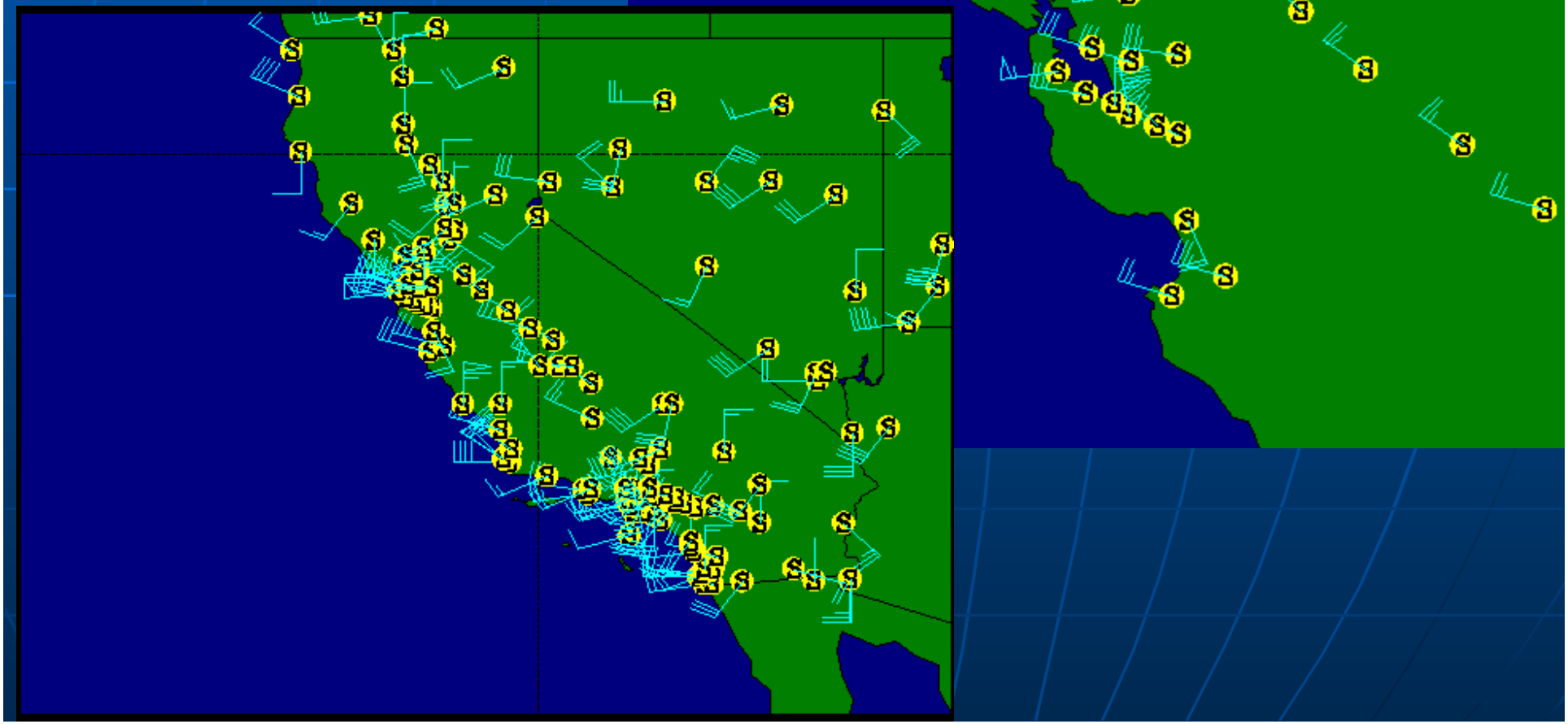
RAMS Vertical Levels

RAMS MODEL HEIGHTS (M)

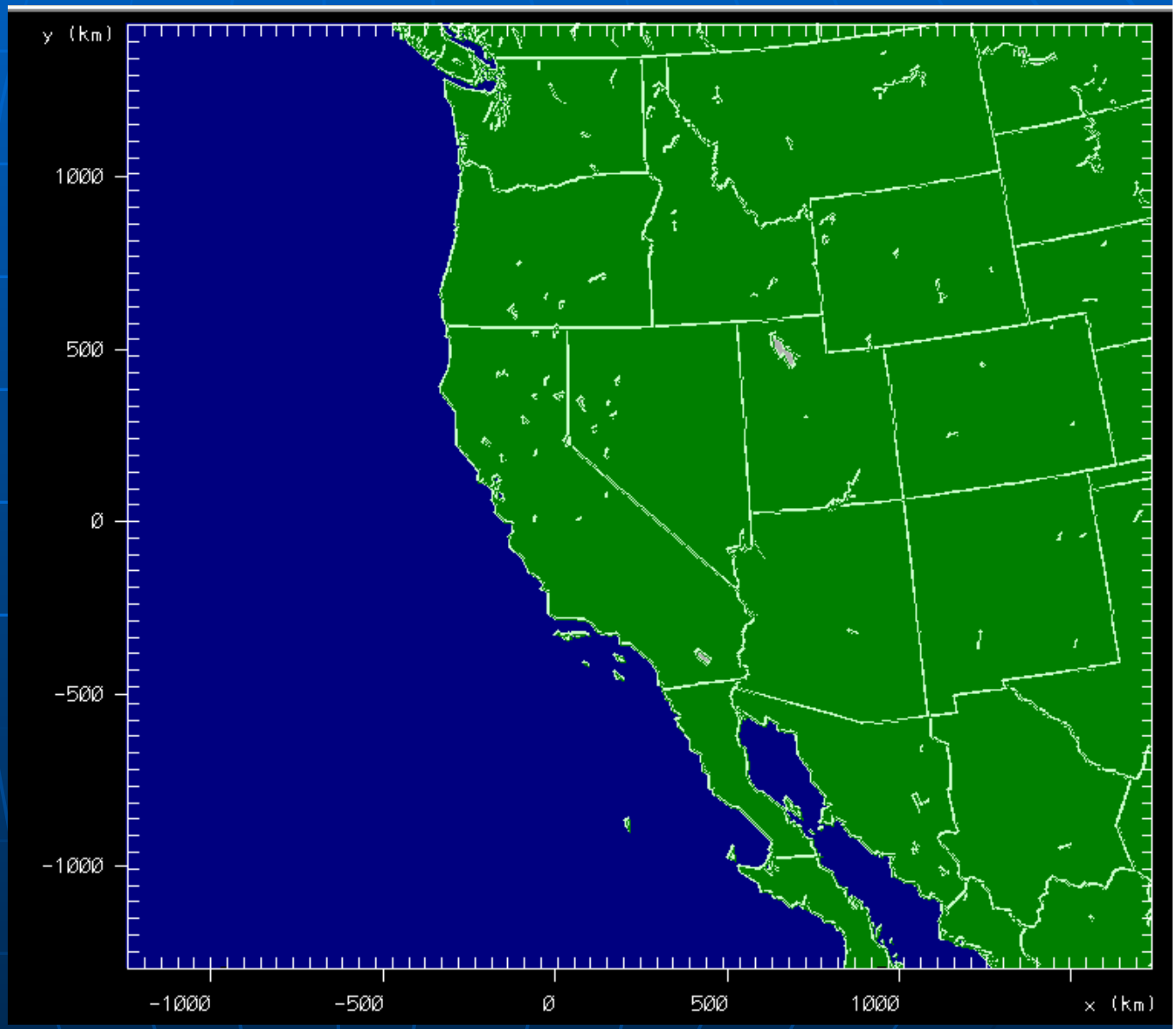
	W LEVELS	T LEVELS
41	22151.3	21651.3
40	21151.3	20651.3
39	20151.3	19651.3
38	19151.3	18651.3
37	18151.3	17651.3
36	17151.3	16651.3
35	16151.3	15651.3
34	15151.3	14651.3
33	14151.3	13651.3
32	13151.3	12651.3
31	12151.3	11651.3
30	11151.3	10651.3
29	10151.3	9651.3
28	9151.3	8648.1
27	8151.3	7666.2
26	7201.2	6766.5
25	6356.6	5970.2
24	5605.9	5262.4
23	4938.6	4633.3
22	4345.4	4074.0
21	3818.2	3576.9
20	3349.5	3135.1
19	2932.9	2742.3
18	2562.6	2393.2
17	2233.4	2082.8
16	1940.8	1807.0
15	1680.8	1561.8
14	1449.6	1343.8
13	1244.1	1150.1
12	1061.4	977.8
11	899.0	824.8
10	754.7	688.7
9	626.4	567.7
8	512.4	460.2
7	411.0	364.7
6	320.9	279.7
5	240.8	204.2
4	169.7	137.1
3	106.4	77.4
2	50.1	24.4
1	0.1	-22.8



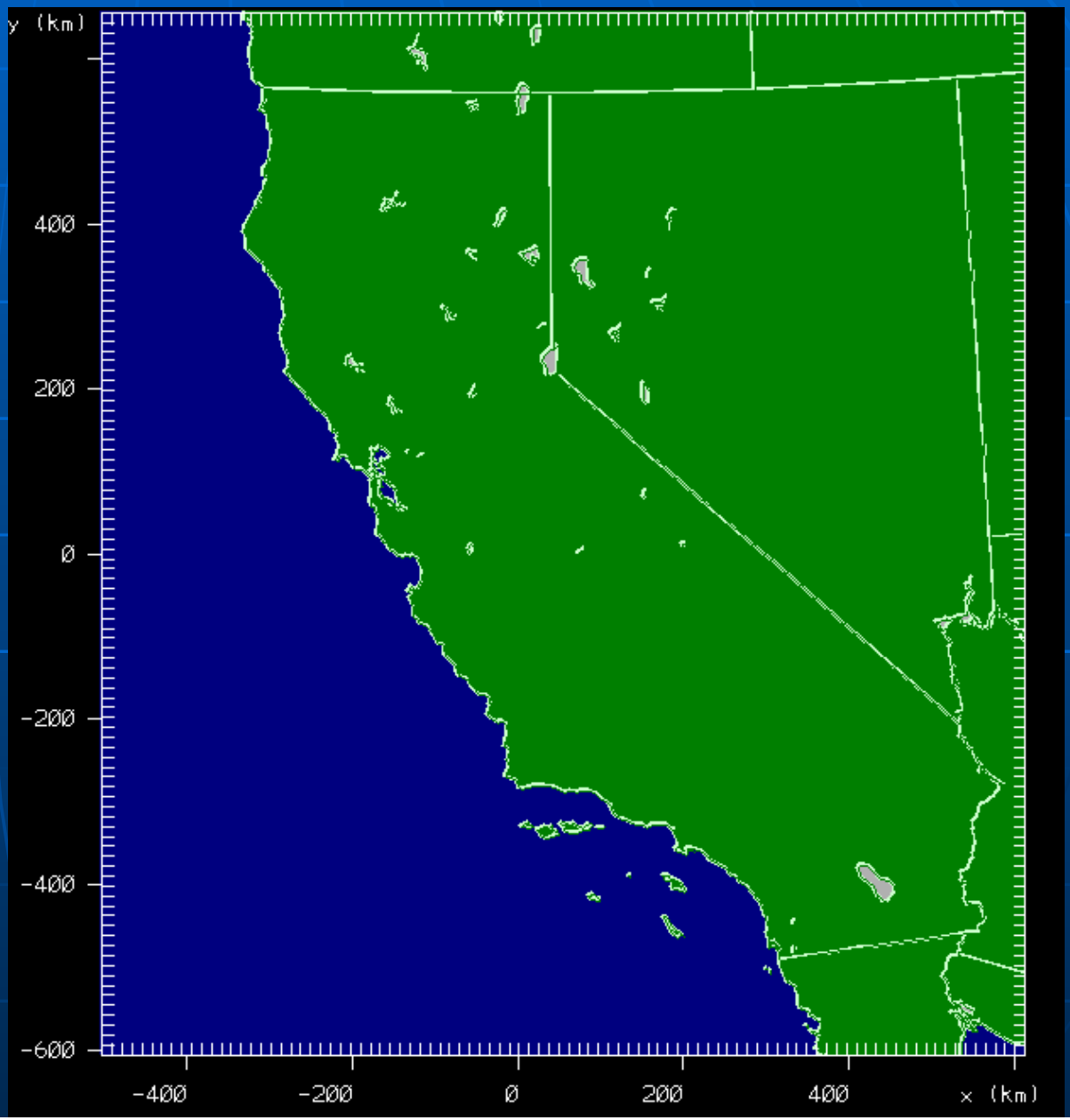
NCAR Surface Observations



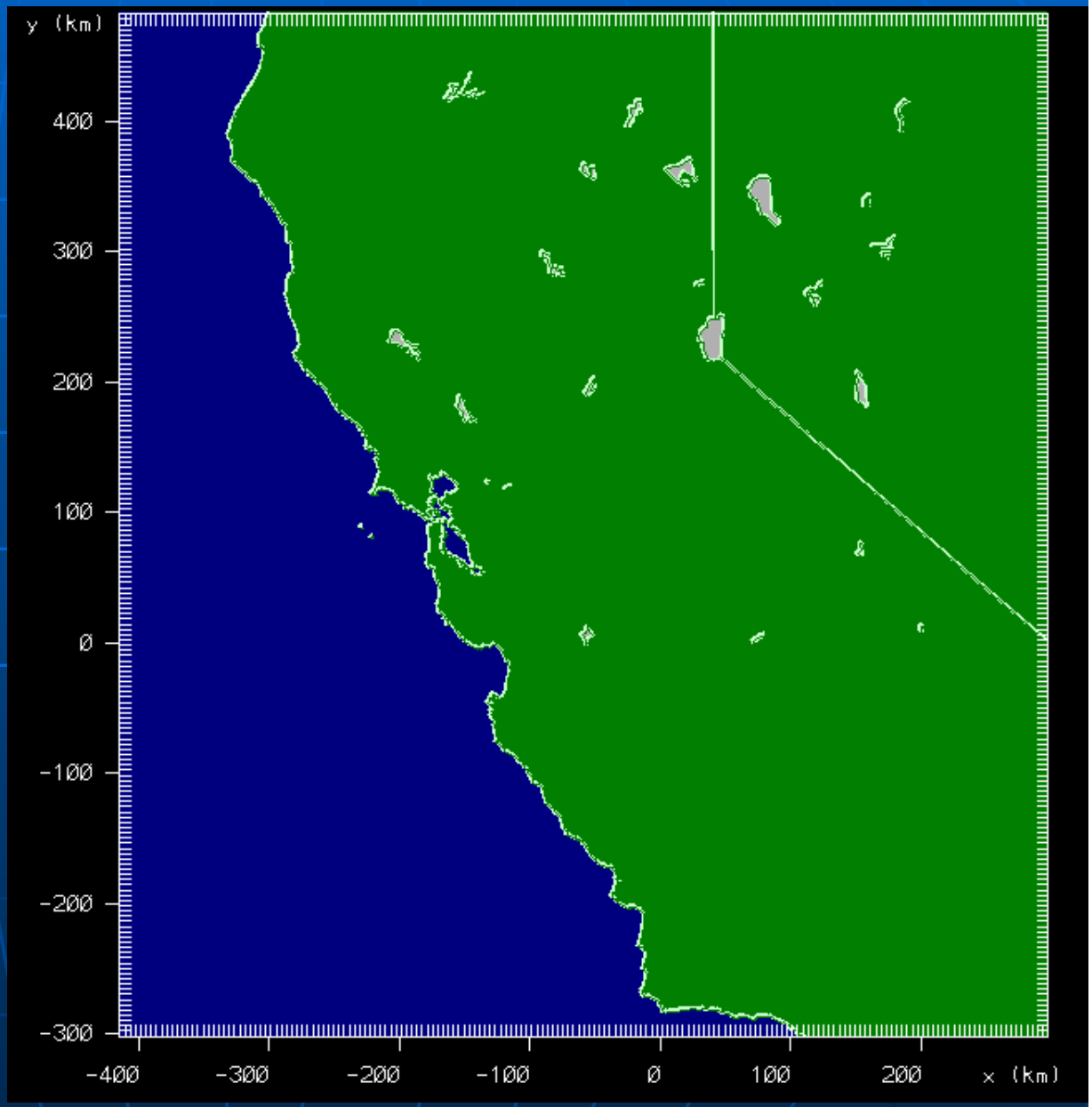
Grid 1
48 km



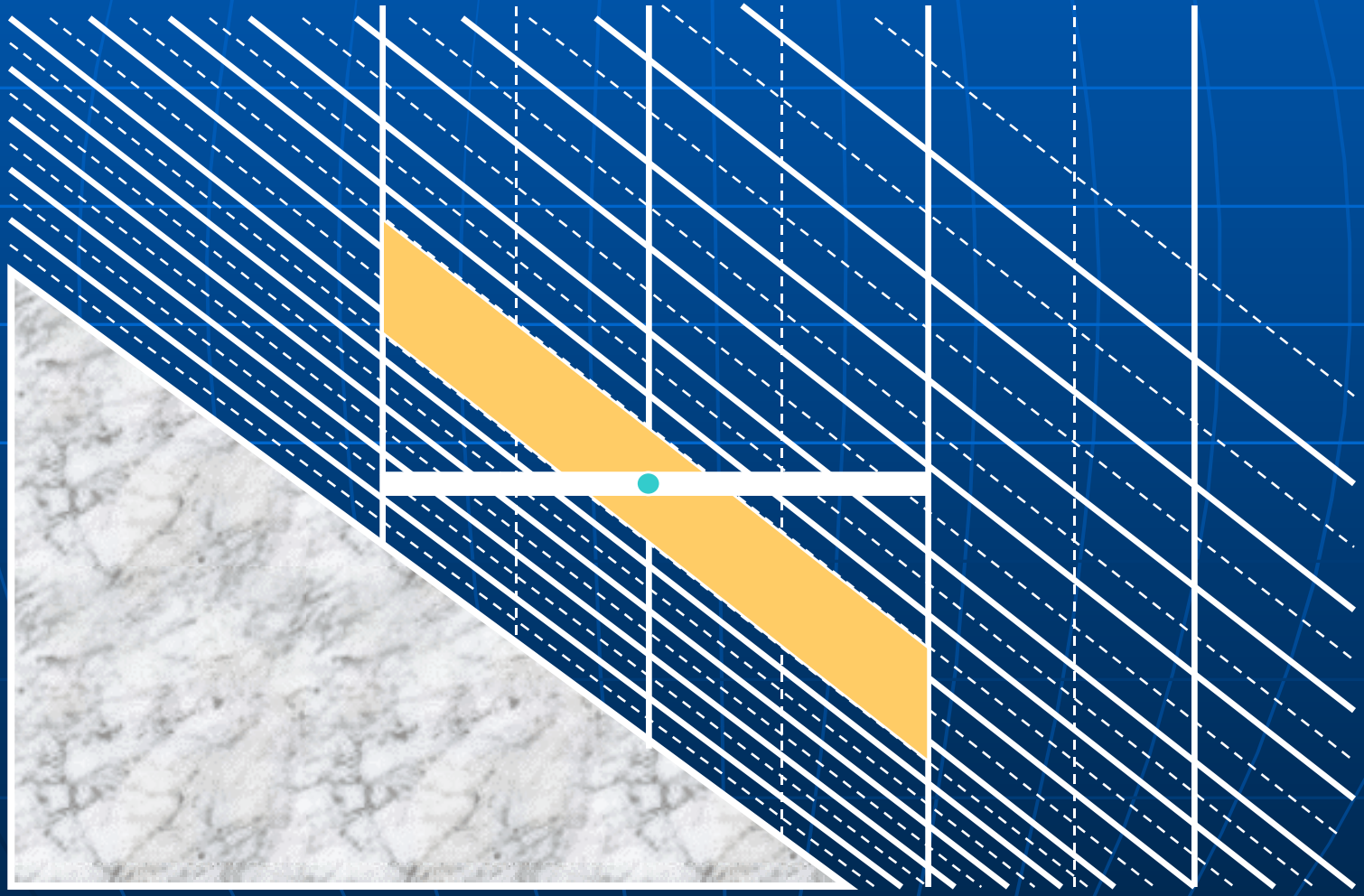
Grid 2
12 km



Grid 3
4 km



Terrain-following Horizontal Gradient Computation



σ_z Topography "Aspect Ratio"

$$R_t = \Delta z_{topo} / \Delta z_{\min}$$

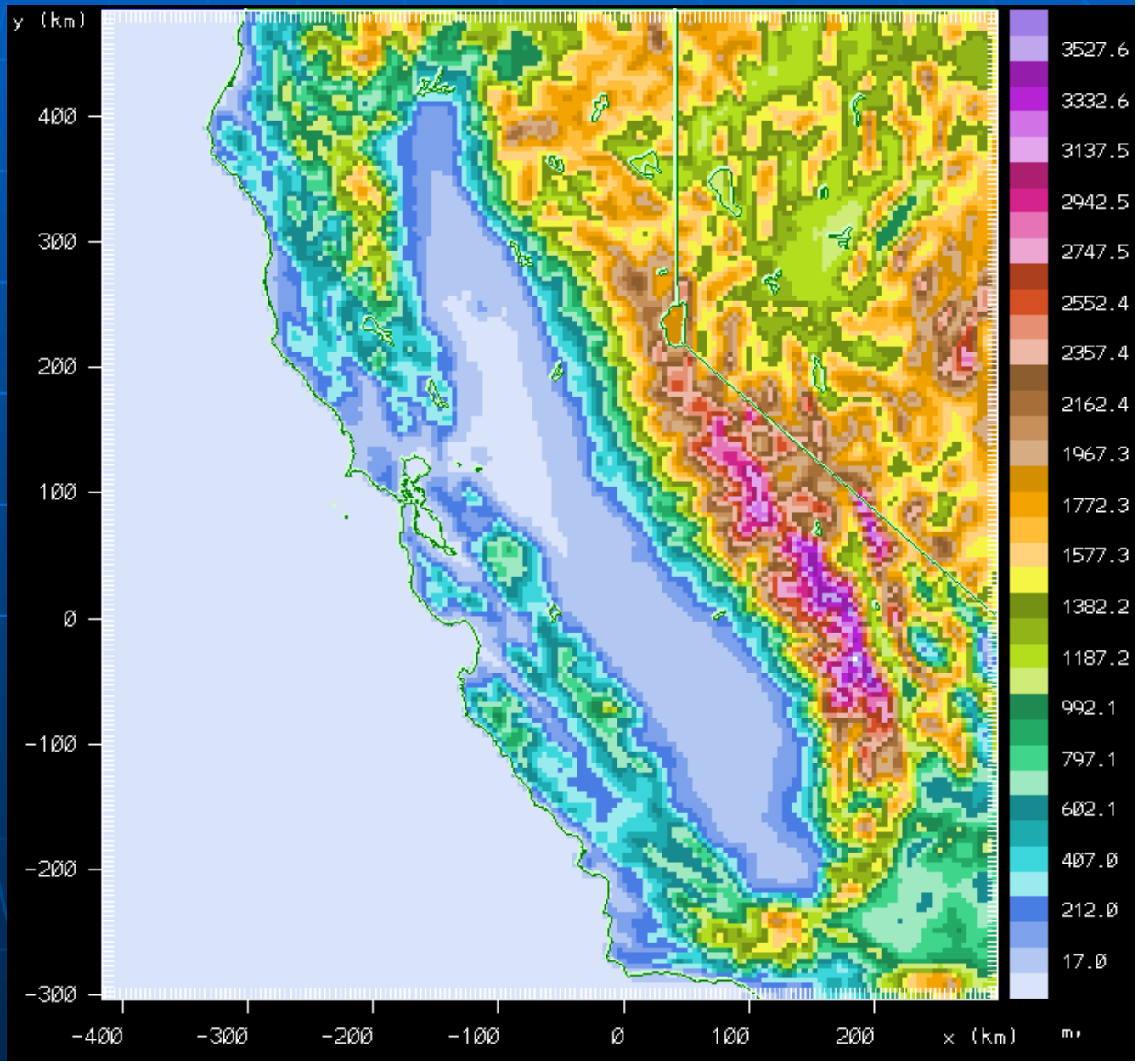
where:

Δz_{topo} maximum change of topo in one $\Delta x,y$

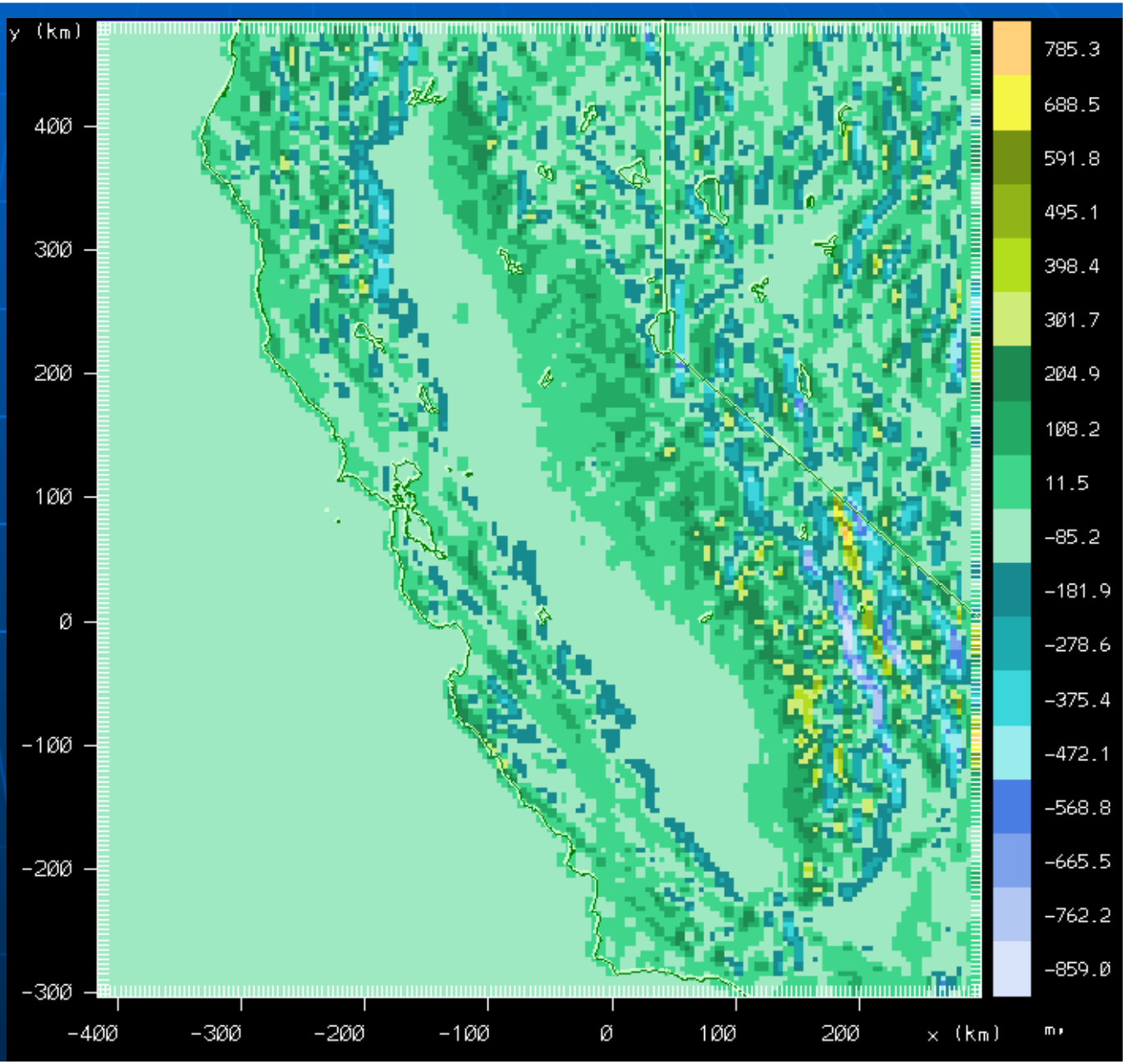
$\Delta z_{\min}$ minimum Δz

- Majority of bad effects are caused by horizontal diffusion
- With IHORGRAD=1, RAMS can run with Rt=3-5
- With IHORGRAD=2, Rt can be 10-20.

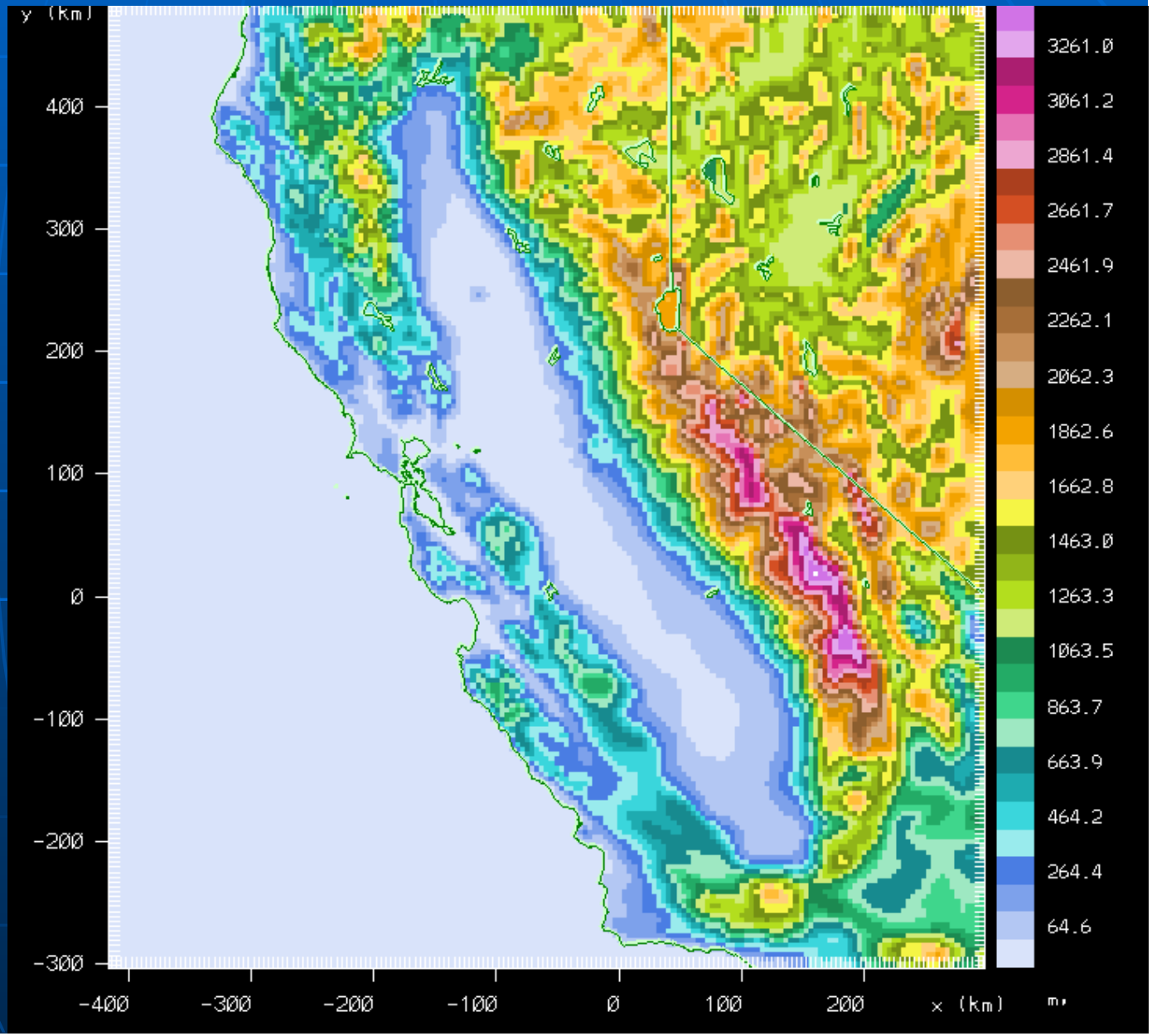
Grid 3 "unmodified" topo (m)



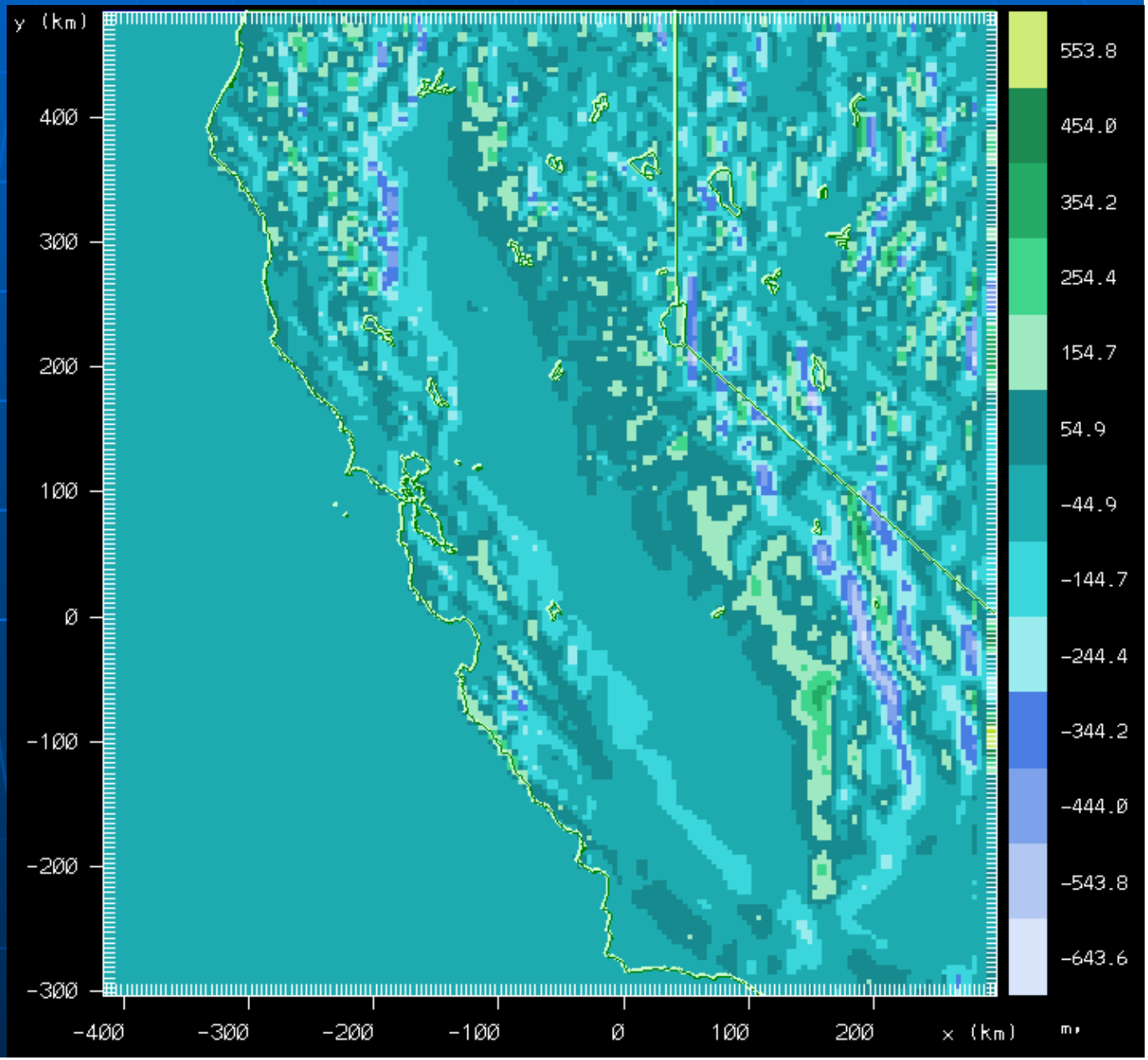
Grid 3
"unmodified"
Δ topo x (m)



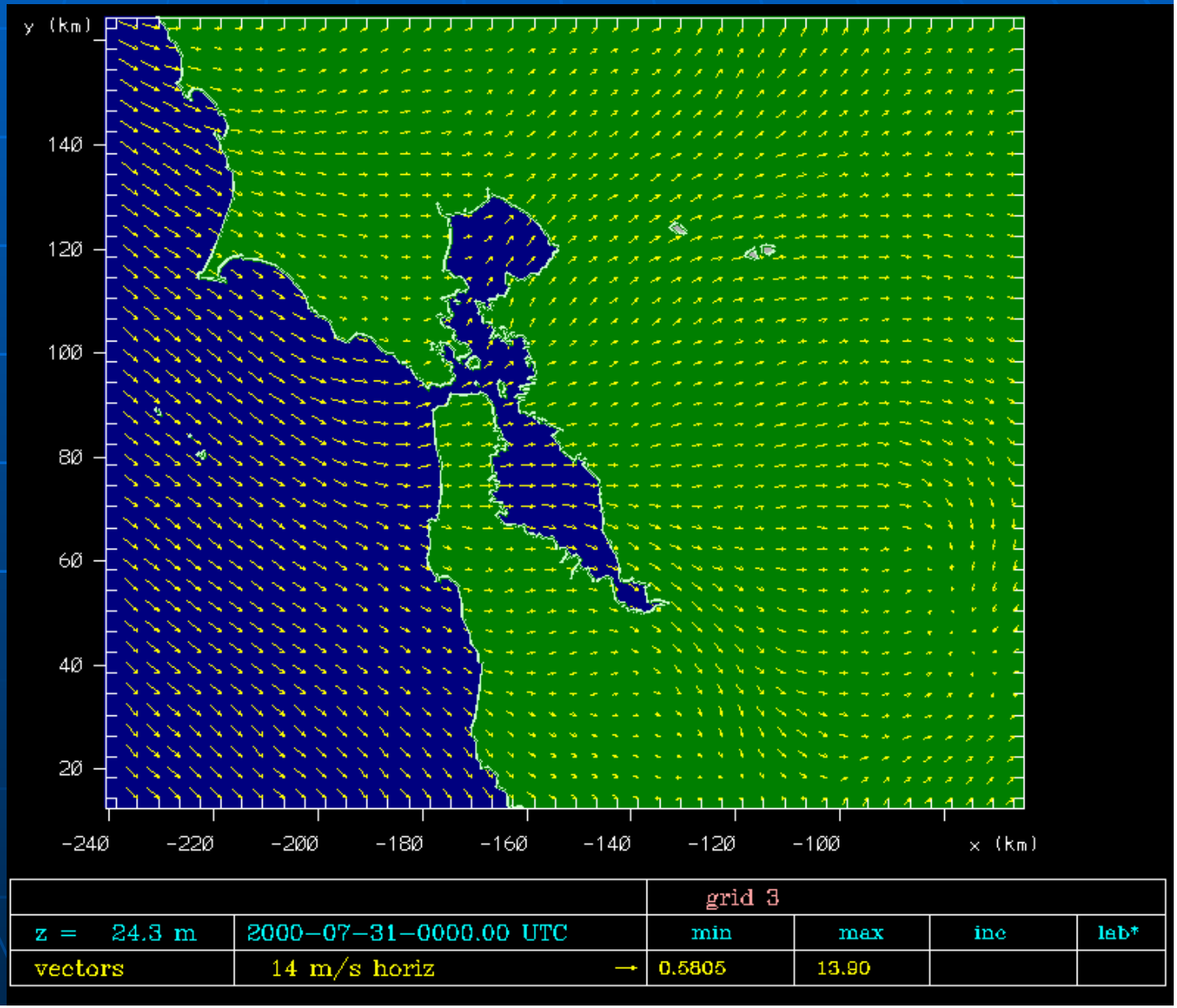
Grid 3 "smoothed" topo (m)



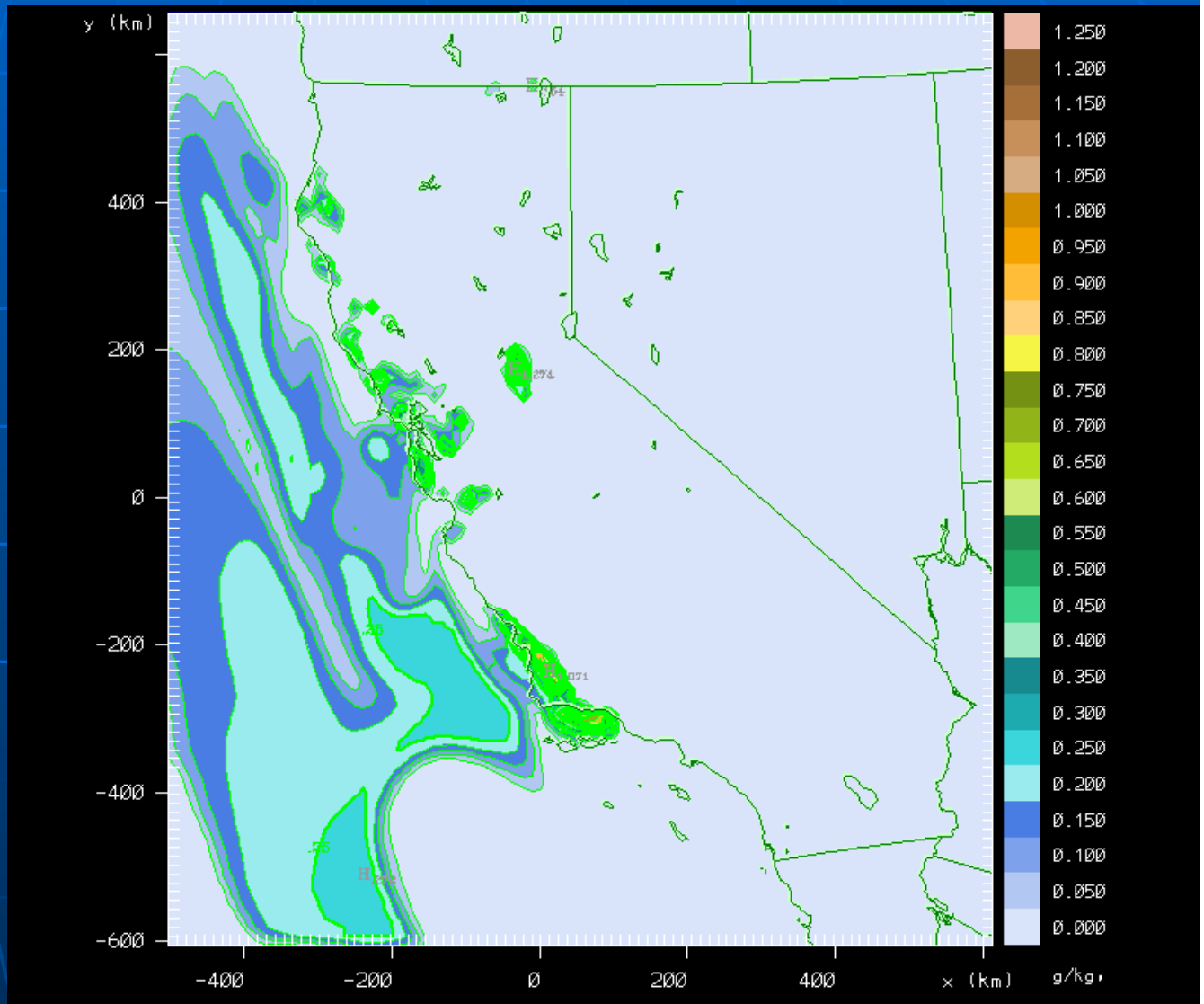
Grid 3 "smoothed" Δ topo x (m)



Example wind field

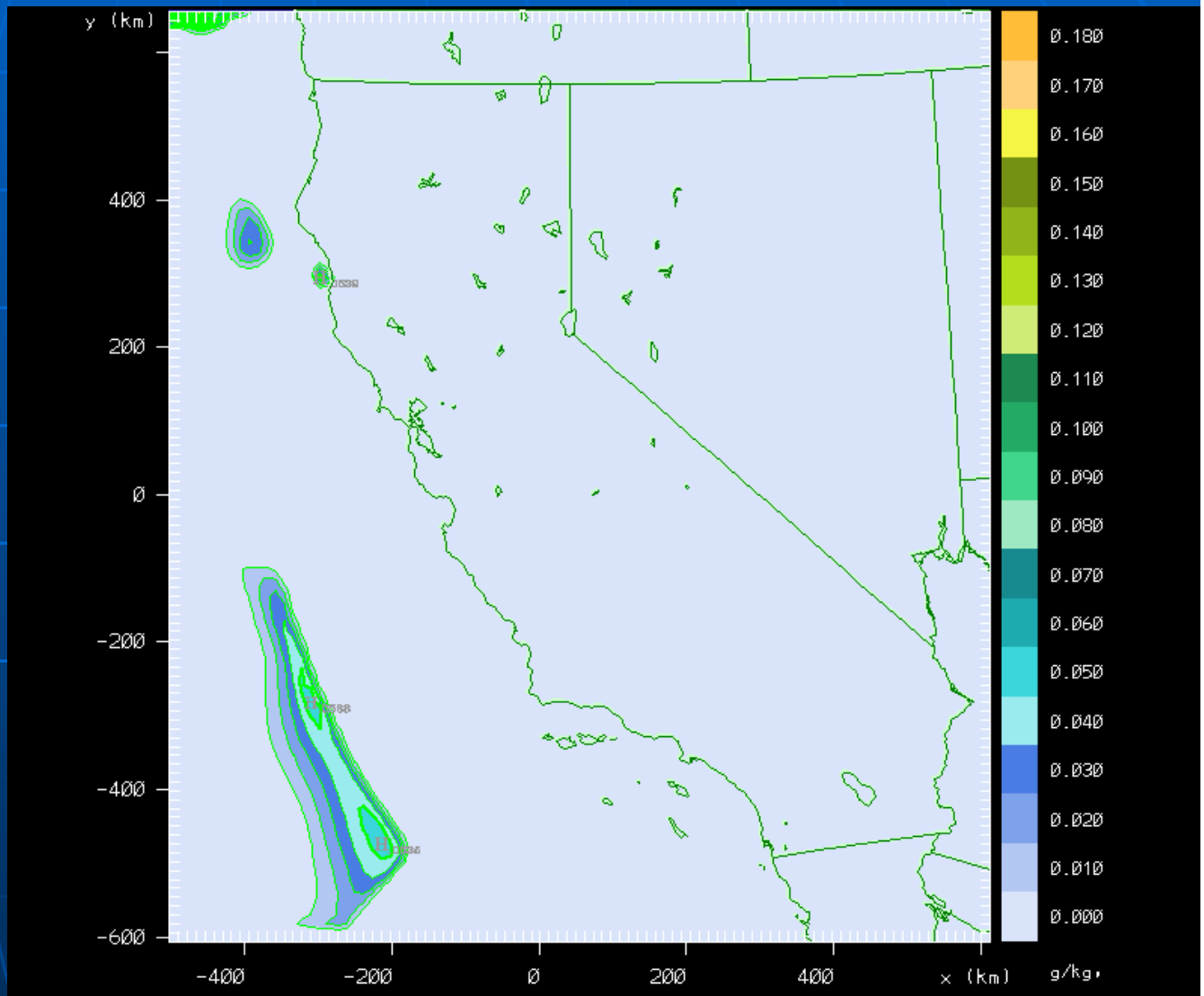


Cloud water lowest level 1200 UTC



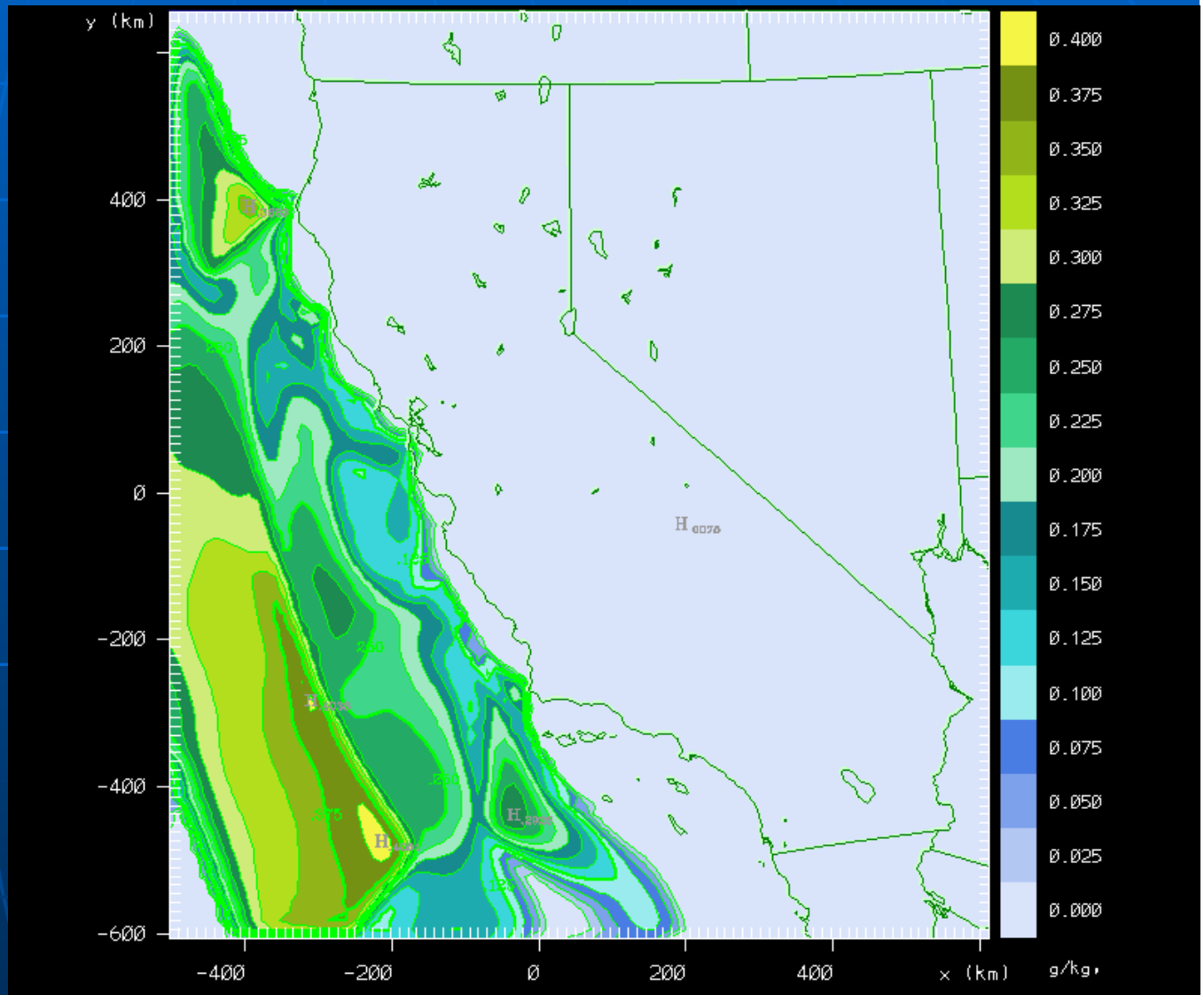
		grid 2			
z = 24.3 m	2000-07-30-1200.00 UTC	min	max	inc	lab*
contour	cloud mix ratio (g/kg)	0.000	1.274	0.5000E-01	1e 0

Cloud water lowest level 1800 UTC



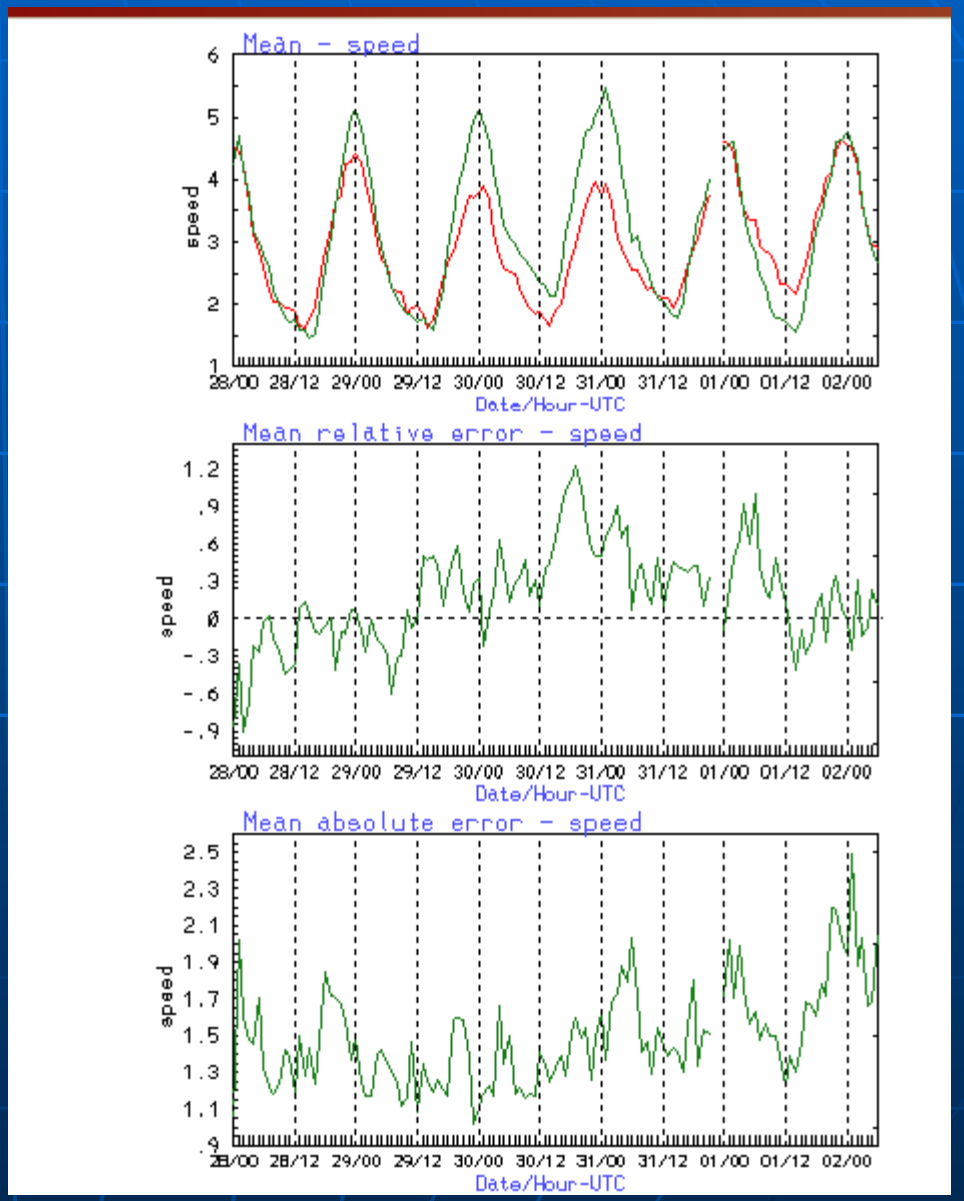
		grid 2			
z = 24.3 m	2000-07-30-1800.00 UTC	min	max	inc	lab*
contour	cloud mix ratio (g/kg)	0.000	0.1802	0.1000E-01	1e 0

Cloud water 200 m 1800 UTC

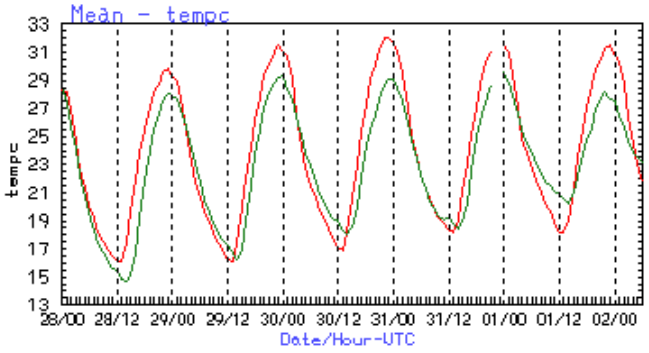


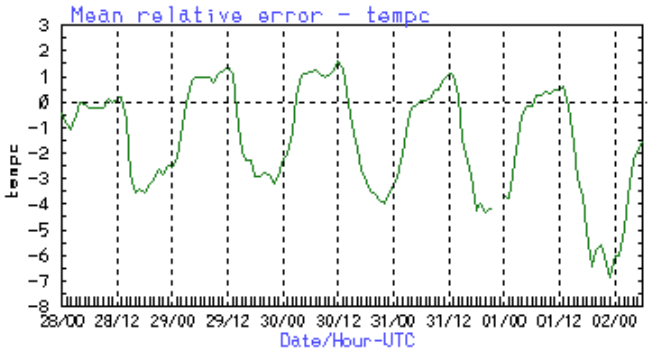
		grid 2			
z = 204.1 m	2000-07-30-1800.00 UTC	min	max	inc	lab*
contour	cloud mix ratio (g/kg)	0.000	0.4051	0.2500E-01	1e 0

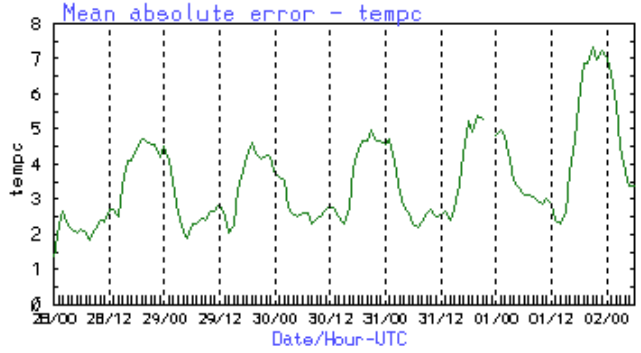
Verification stats - speed full grid 3

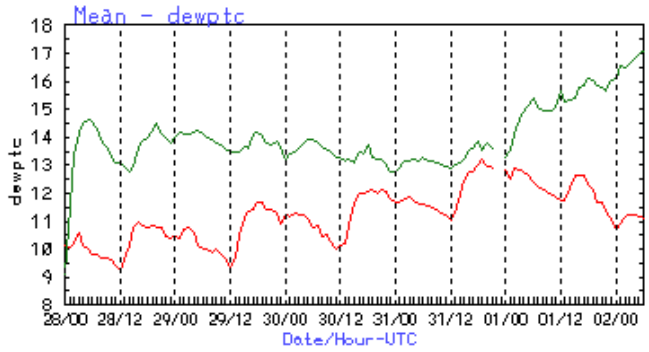


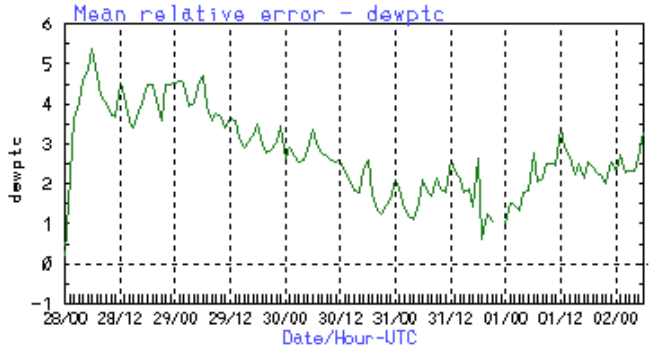
Verification stats - T, Td - full grid 3

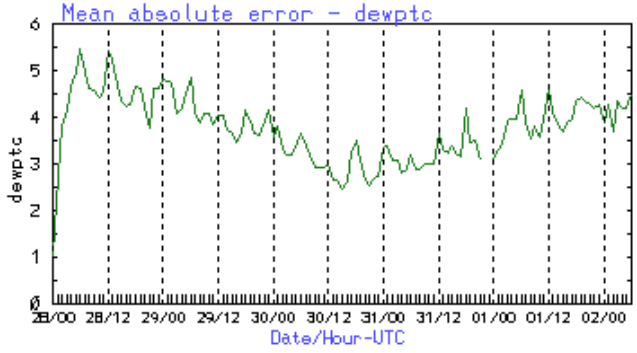








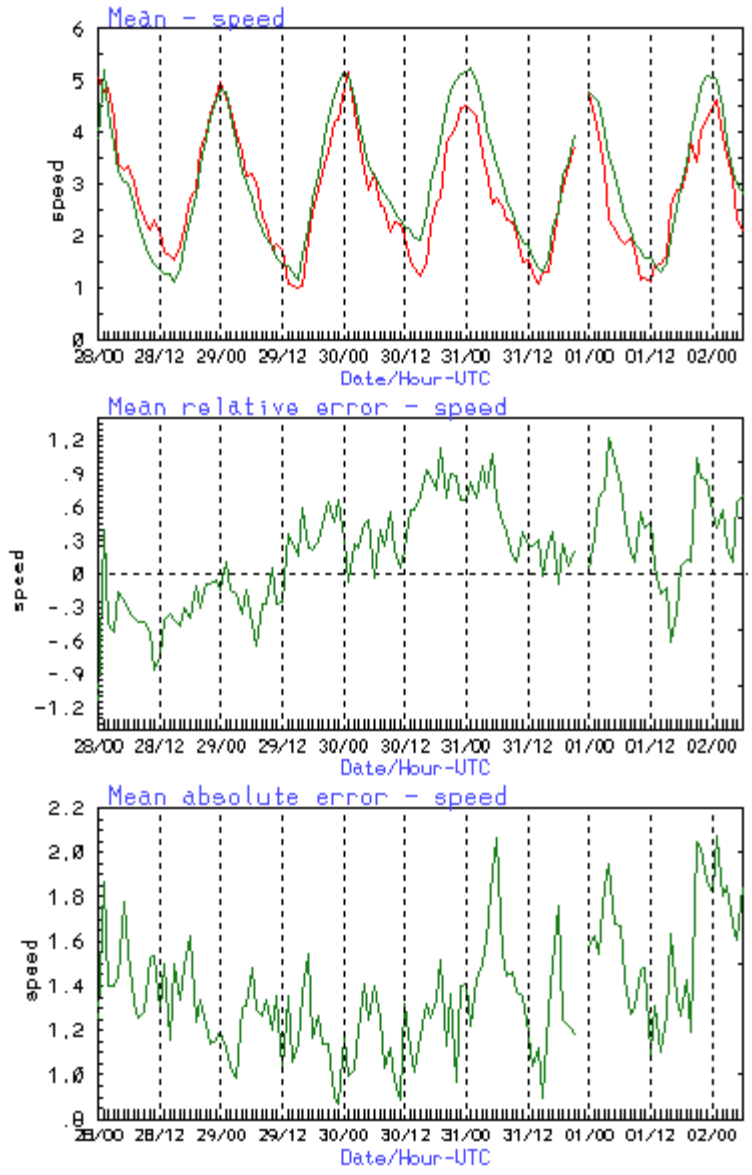




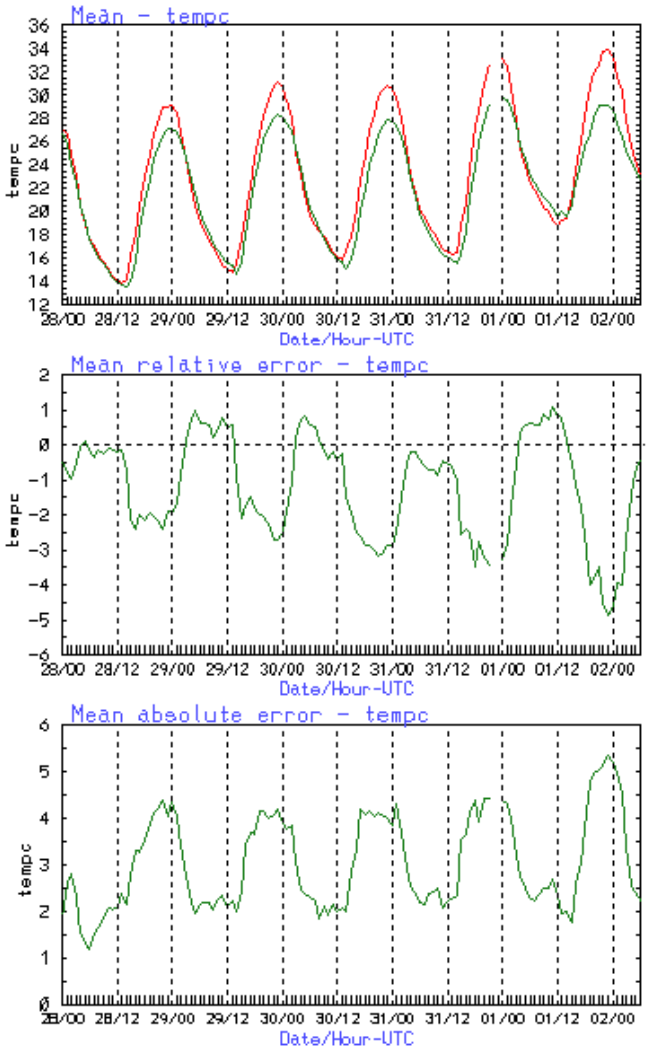
Verification stats - speed Bay Area

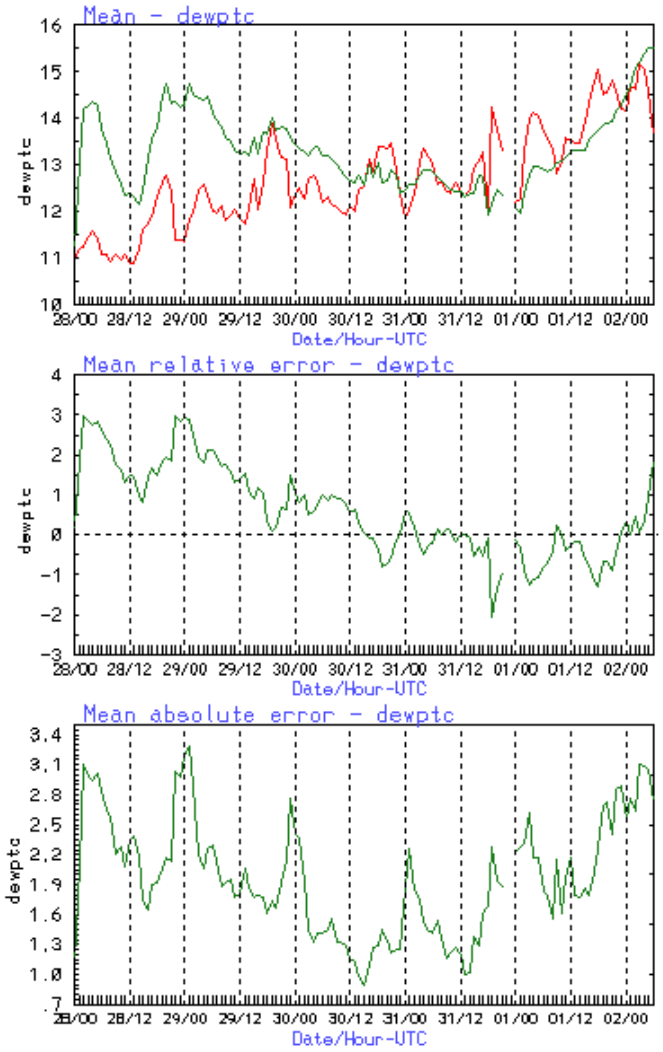
125 – 120 W

35 – 40 N



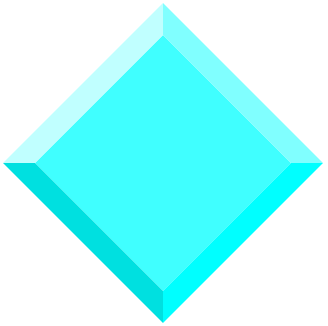
Verification stats - T, Td – Bay Area





Next Steps

- Further quantitative and qualitative verification
- Experiment with better vertical resolution in lowest layers
- Identify regions where soil moisture requires modification
- Proceed with other sensitivity tests
  - FDDA
  - API



BAAQMD 2004 SIP: Status Of Emissions Modeling

James G. Wilkinson

Cynthia F. Loomis

Alpine Geophysics

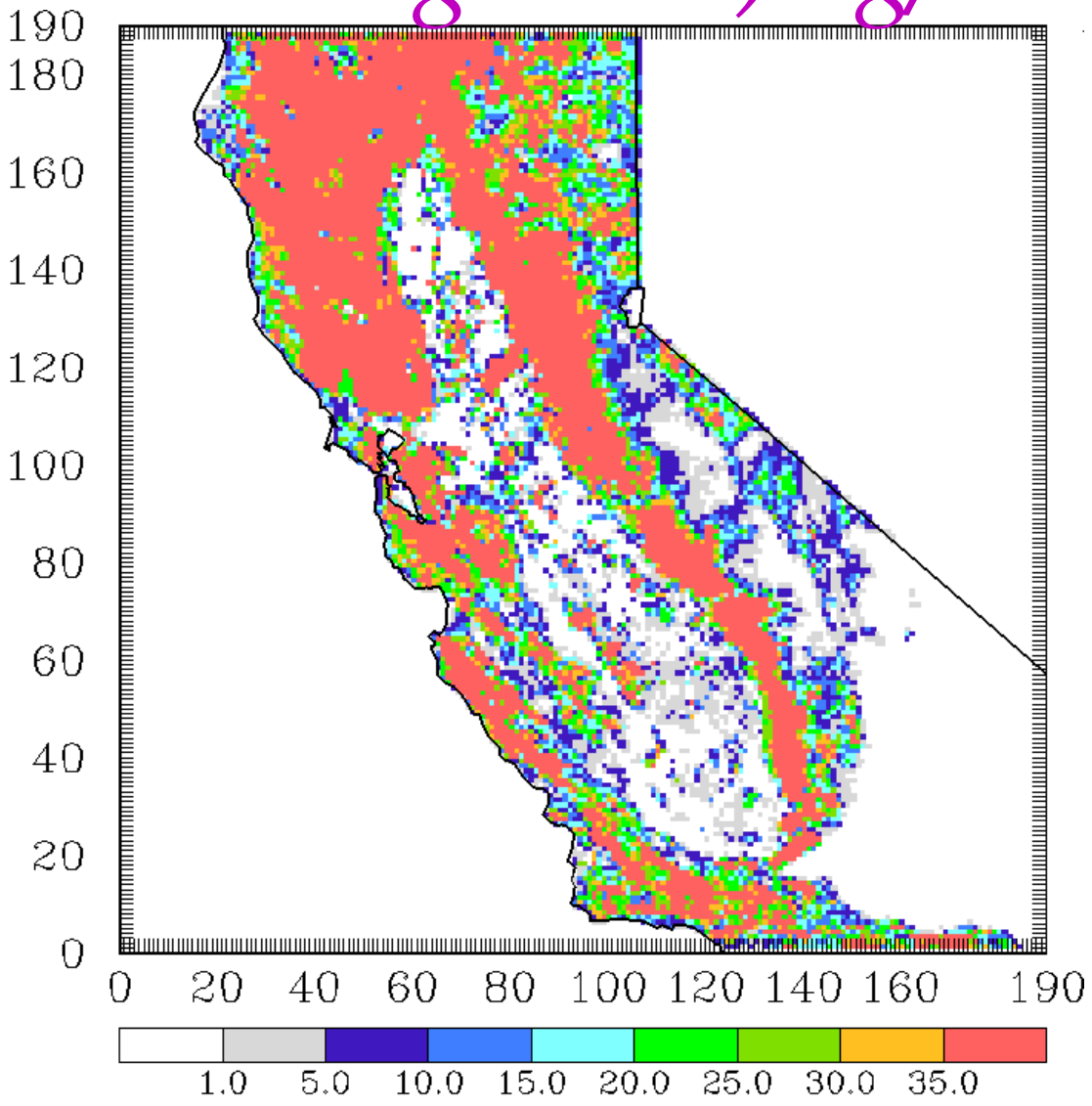
Overview

- Data that has been delivered
- Graphical summary of emissions
- Tabular summary of emissions
- Problems
- Current standing of overall emissions modeling effort

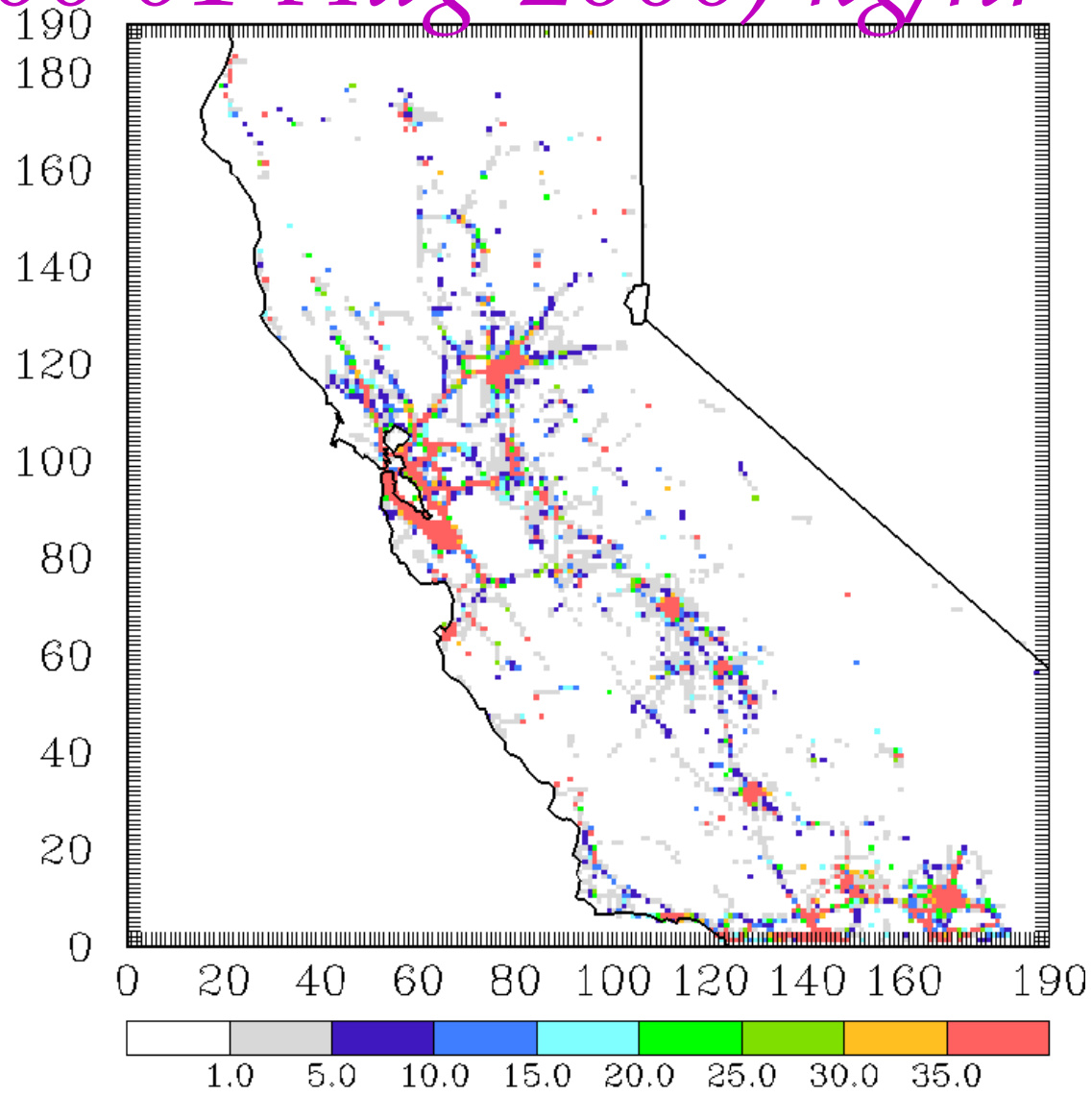
Emissions Data From ARB

- Working Version Of EMS-95
- July-August 2000 Episode
  - Point Sources
    - Gridded, Hourly
    - TOG, NOX, CO
  - Area Sources
    - Gridded, Hourly
    - TOG, NOX, CO
  - BEIGIS
    - Gridded Hourly
    - Isoprene, Monoterpenes, and OVOCs (no NO)
  - On-road Mobile Sources
    - Gridded, Hourly
    - TOG, NOX, CO

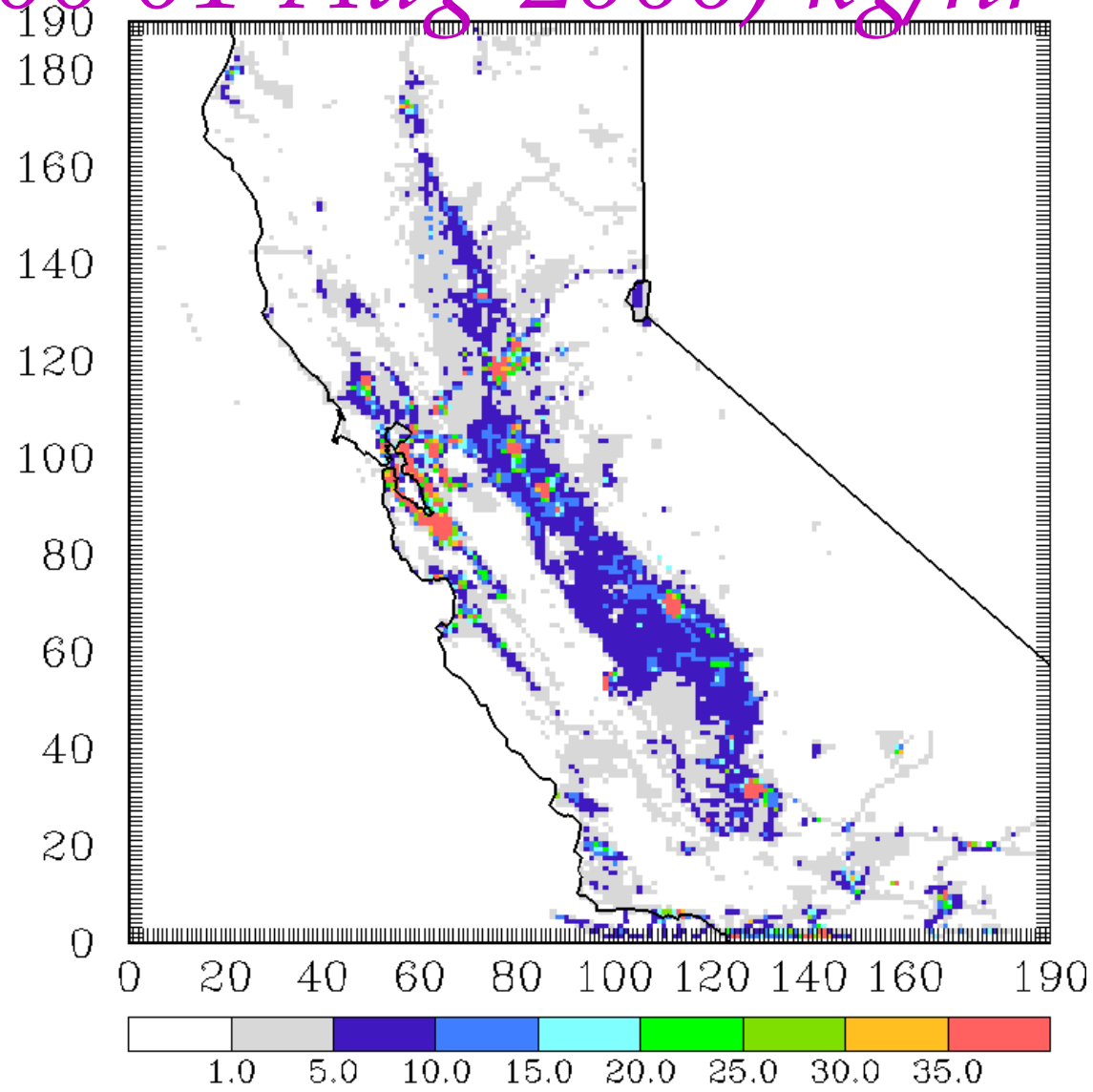
Biogenic RHC (1600 01-Aug-2000) kg/hr



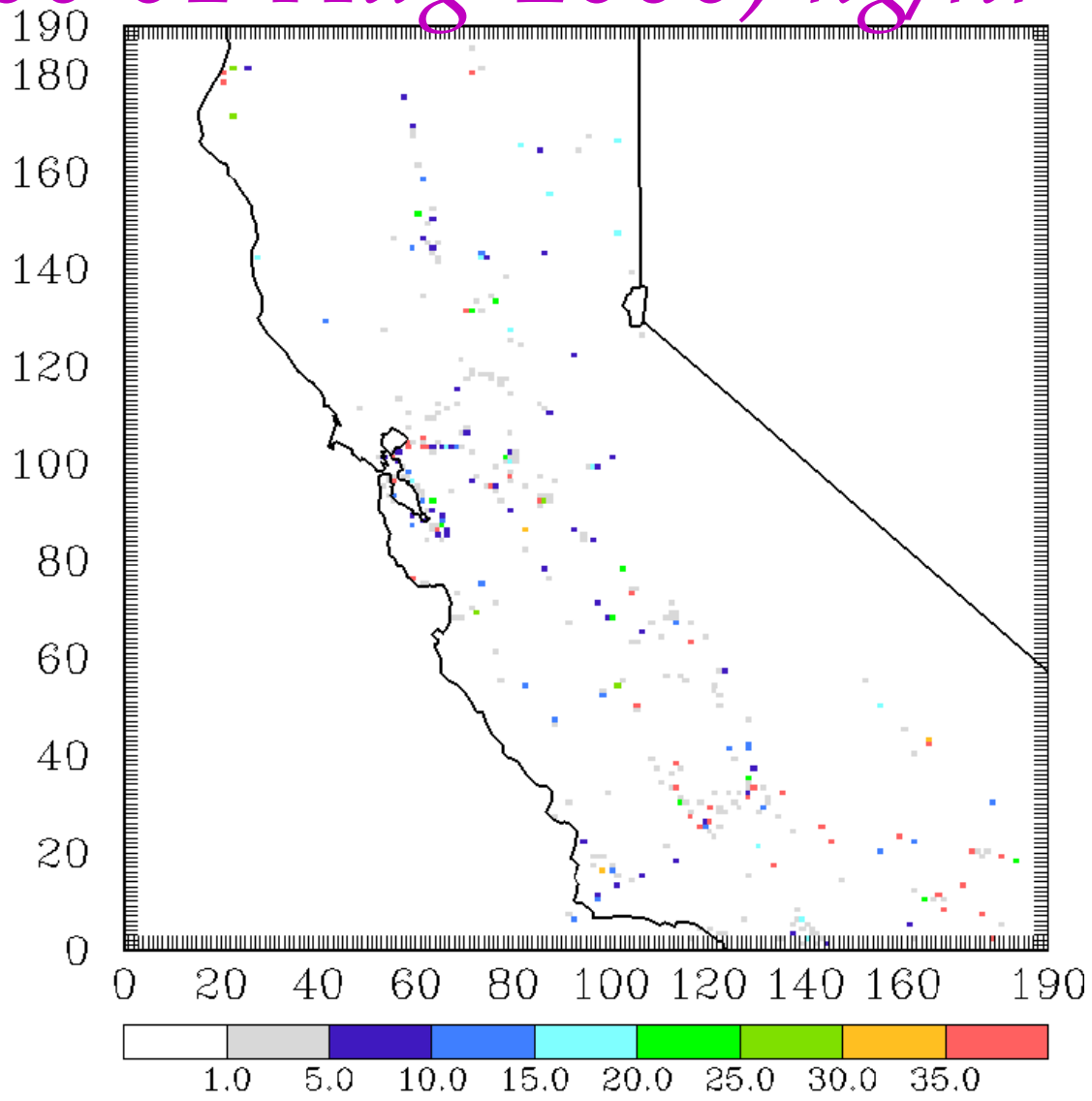
On-Road Mobile Source NO_X (1600 01-Aug-2000) kg/hr



Area Source NO_X (1600 01-Aug-2000) kg/hr



Point Source NO_X (1600 01-Aug-2000) kg/hr



Domain Emissions Totals (tons/day)

Source	CO	NOX	PM	SOX	TOG
EGU	17	16	3	3	26
Other Elevated Point	129	161	48	75	431
Area	633	267	2,527	26	2,352
Off-road	3,981	551	48	161	665
On-road	8,832	1,413		10	764
Total	13,592	2,408	2,626	275	4,238

EMS-95 vs. CEFS Emissions Comparison For BAAQMD (tons/day)

	CO		NOX		PM		SOX		TOG	
Source	**EMS**	**CEFS**	**EMS**	**CEFS**	**EMS**	**CEFS**	**EMS**	**CEFS**	**EMS**	**CEFS**
EGU	3	7	2	14	2	1	0	1	15	0
Other	15	130	38	79	9	27	43	54	331	615
Area	175	168	41	23	265	272	3	1	448	162
Off-road	1,071		162		15		23		179	
On-road	2,059	2,669	338	512		24	3	29	228	340
Total	3,323	2,874	581	628	291	324	72	85	1,201	1,117

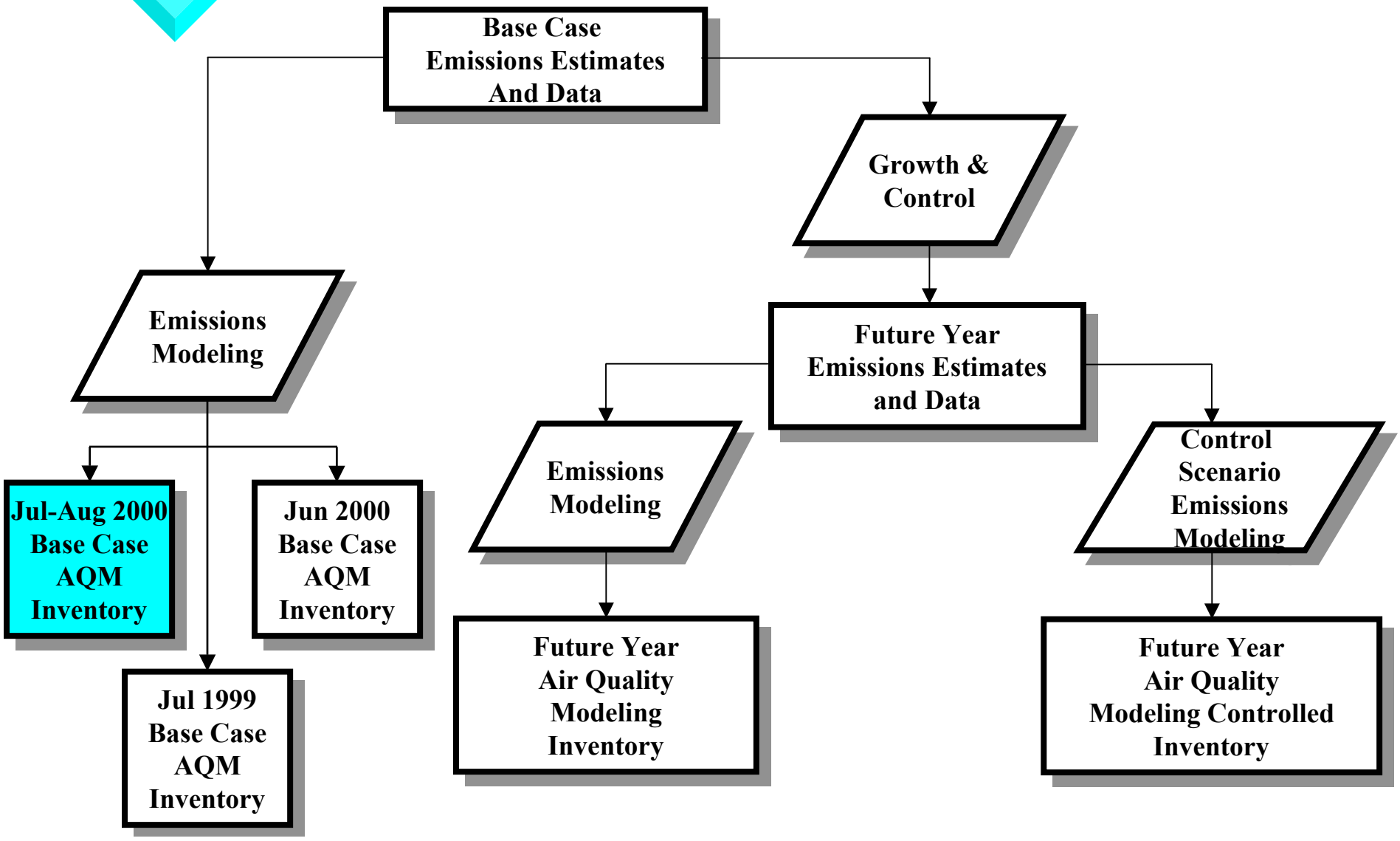
Shipping Emissions (tons/day)

Domain	CO	NOX	PM	SOX	TOG
CCOS	7	34	3	21	3
BAAQMD	3	16	2	11	2

Problems

- Nighttime area source emissions are low/nonexistent
- Mobile source emissions for counties that border the air quality modeling domain appear to be biased high
- Mobile source emissions on freeways are significantly lower than past mobile source estimates in the SJV
- Day-specific emissions estimates appear to be missing from the inventory
- Comparison of the stationary source emissions inventory, which ARB delivered, to the CEFS stationary source inventory indicate that stationary source emissions may be underestimated in the ARB inventory

Current Standing



Next ARB Updates

- New stationary and area source emissions data by Friday
- New on-road mobile source emissions estimates possibly by first of the new year