Bay Area Modeling Advisory Committee Meeting

Status of District's Modeling Work

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Status of District's Modeling

Ozone Episodes:

- July 30-August 2, 2000 (CCOS)
- July 8-12, 1999

Days over federal standard

Day	7/31/2000								8/1/2000							
Hr	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
SF Bay Area																
Livermore - Old 1st	**68**	**88**	**116**	**123**	**126**	**73**	**53**	**34**	**73**	**86**	**92**	**81**	**68**	**65**	**52**	**37**
Sacramento																
Sloughhouse		**100**	**92**	**87**	**78**	**74**	**66**	**80**	**88**	**112**	**133**	**126**	**119**	**112**	**95**	**82**
San Joaquin																
Edison	**115**	**110**	**106**	**94**	**81**	**74**	**38**	**19**	**113**	**109**	**93**	**102**	**102**	**96**	**83**	**73**
Turlock	**75**	**91**	**104**	**105**	**96**	**88**	**64**	**52**	**100**	**101**	**97**	**104**	**86**	**85**	**73**	**61**
Modesto - 14th	**74**	**87**	**94**	**90**	**84**	**81**	**60**	**41**	**80**	**84**	**99**	**87**	**94**	**91**	**70**	**53**

Day	8/2/2000							
Hr	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
SF Bay Area								
Livermore - Old 1st	**88**	**93**	**98**	**84**	**69**	**57**	**49**	**46**
Sacramento								
Sloughhouse	**98**	**102**	**101**	**103**	**98**	**66**	**77**	**69**
San Joaquin								
Edison	**129**	**151**	**139**	**121**	**76**	**51**	**45**	**39**
Turlock	**98**	**95**	**114**	**117**	**116**	**131**	**106**	**79**
Modesto - 14th	**90**	**94**	**95**	**113**	**131**	**128**	**85**	**64**

Days over federal standard

Day	7/11/1999								7/12/1999							
hour (pdt)	12	13	14	15	16	17	18	19	12	13	14	15	16	17	18	19
SF Bay Area																
Concord	113	115	126	120	126	99	102	81	134	156	149	129	104	93	99	91
Livermore	88	94	96	138	145	146	128	93	117	144	133	128	111	94	86	73
Fremont	79	111	133	117	101	66	43	14	93	98	90	88	80	73	59	53
San Martin	112	121	124	125	97	62	56	45	115	96	90	74	65	55	46	37
Sacramento																
Folsom	125	132	133	137	125	107	98	90	109	108	100	89	89	92	107	79
Vacaville	96	97	99	122	118	101	82	62	108	127	140	115	95	74	65	59
Auburn	85	90	91	93	111	133	118	112	89	93	90	89	99	95	82	71
Sloughhouse	125	131	116	109	105	103	100	83	108	106	110	103	96	105	91	72
Roseville	108	120	128	128	119	108	100	81	96	90	82	78	78	81	108	74
Rocklin	99	115	128	123	119	111	105	92	99	96	85	79	80	82	104	87
San Joaquin																
Clovis	124	140	142	125	105	110	81	58	112	124	108	102	98	96	90	66
Fresno - 1st St	128	130	132	135	124	114	99	63	114	115	108	95	88	87	75	60
Tracy	84	94	91	97	97	97	95	94	102	106	117	118	132	121	113	99
Stockton - Hazelton	107	122	130	122	108	113	91	62	100	96	95	90	86	102	95	75
Merced	111	115	118	116	112	110	110	100	121	125	117	115	102	108	118	116

Previous MM5/CAMx simulations:

- Temperature was underestimated
- Winds were stronger than observations at some locations in the Bay Area
- Sea breeze developed early, causing underestimation of ozone and moved simulated peak ozone too far east

Tested MM5 options:

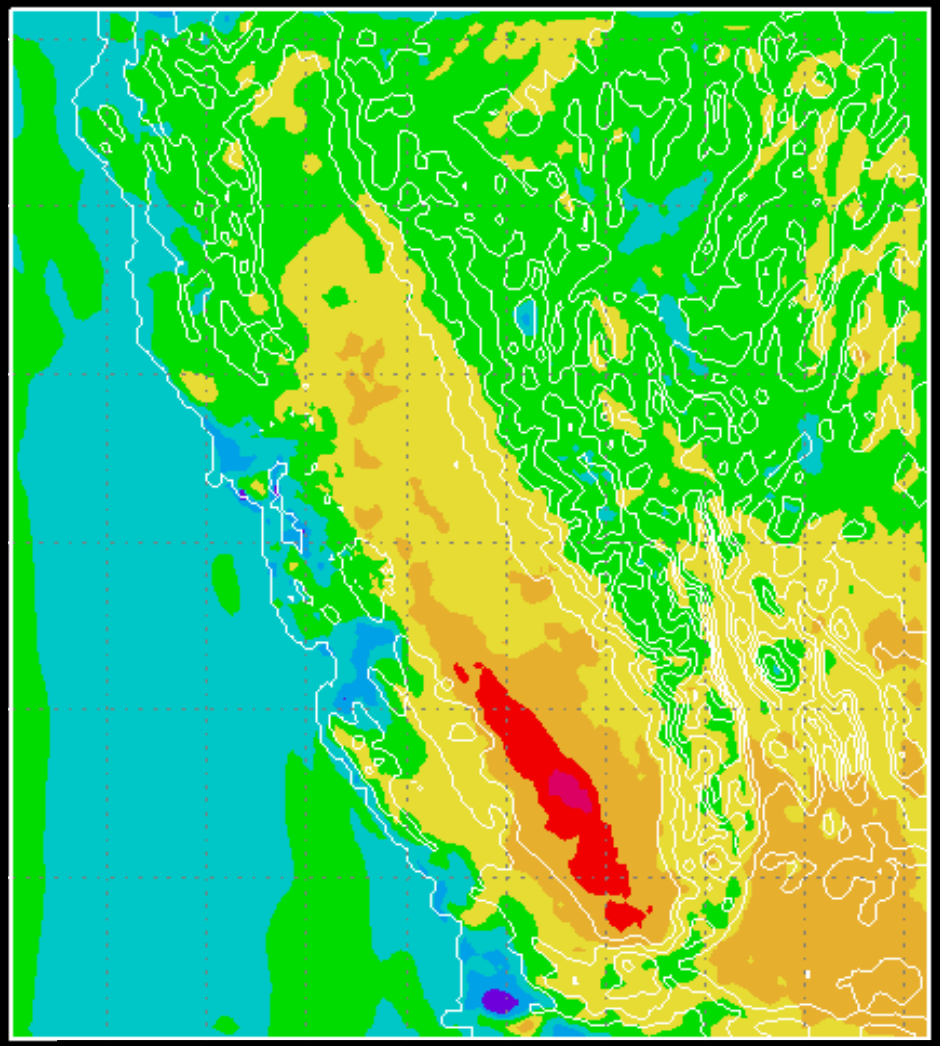
- Land-Surface Models: Noah vs. 5-layer slab
  - Improve temperatures
- Boundary-Layer Models: Eta vs. MRF
  - Improve winds and turbulent mixing

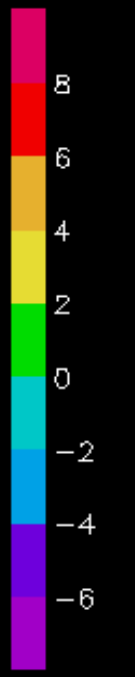
Tested MM5 options:

- Land-Surface Models: Noah vs. 5-layer slab
  - Eta with 5-layer slab land-surface module
  - Eta with Noah land-surface module

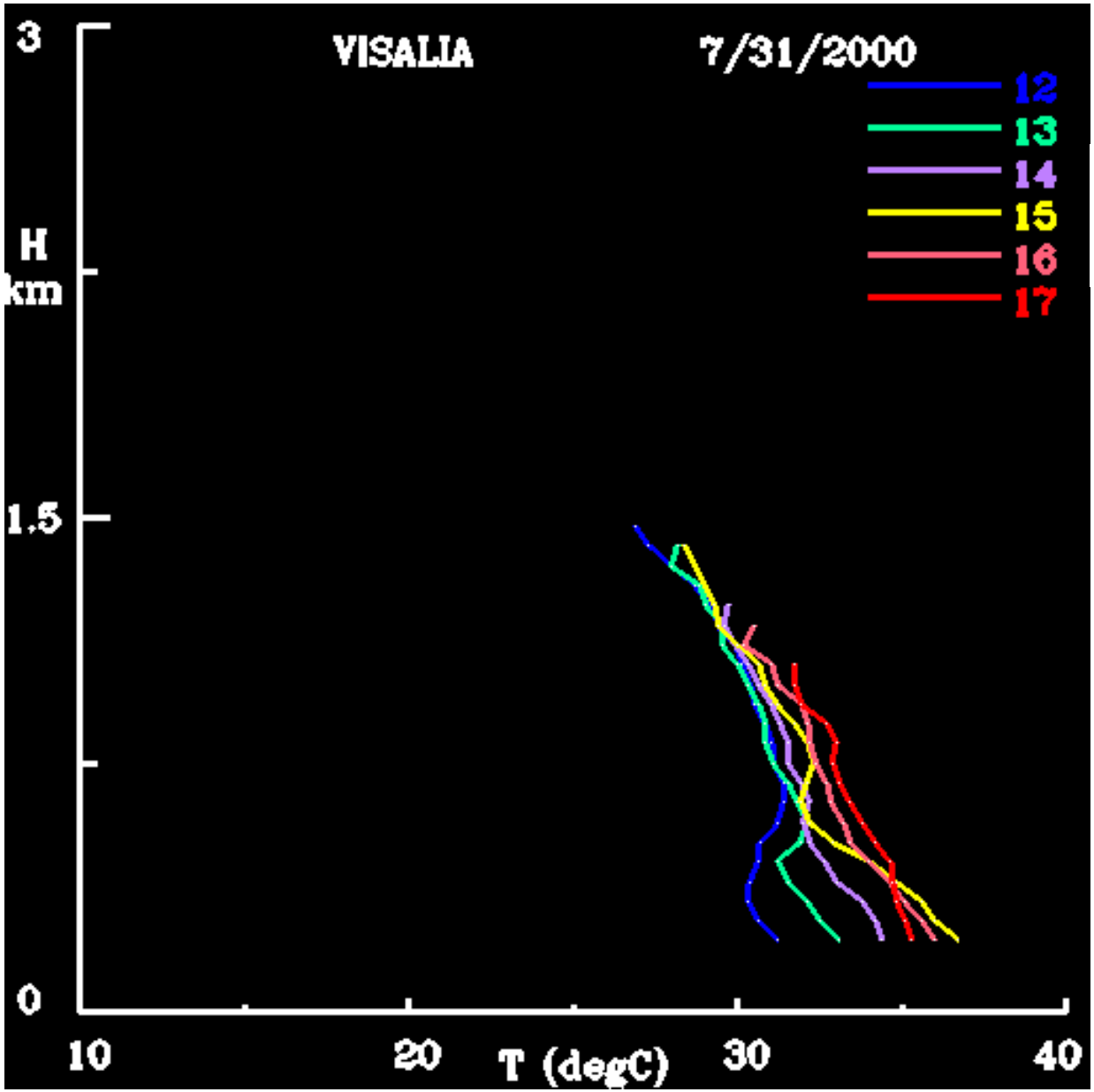
Surface temperature difference (Noah – 5 layer)

- July 31, 2000 1400 PST
- Max. difference in western SJV
- Small and negative differences in Bay Area

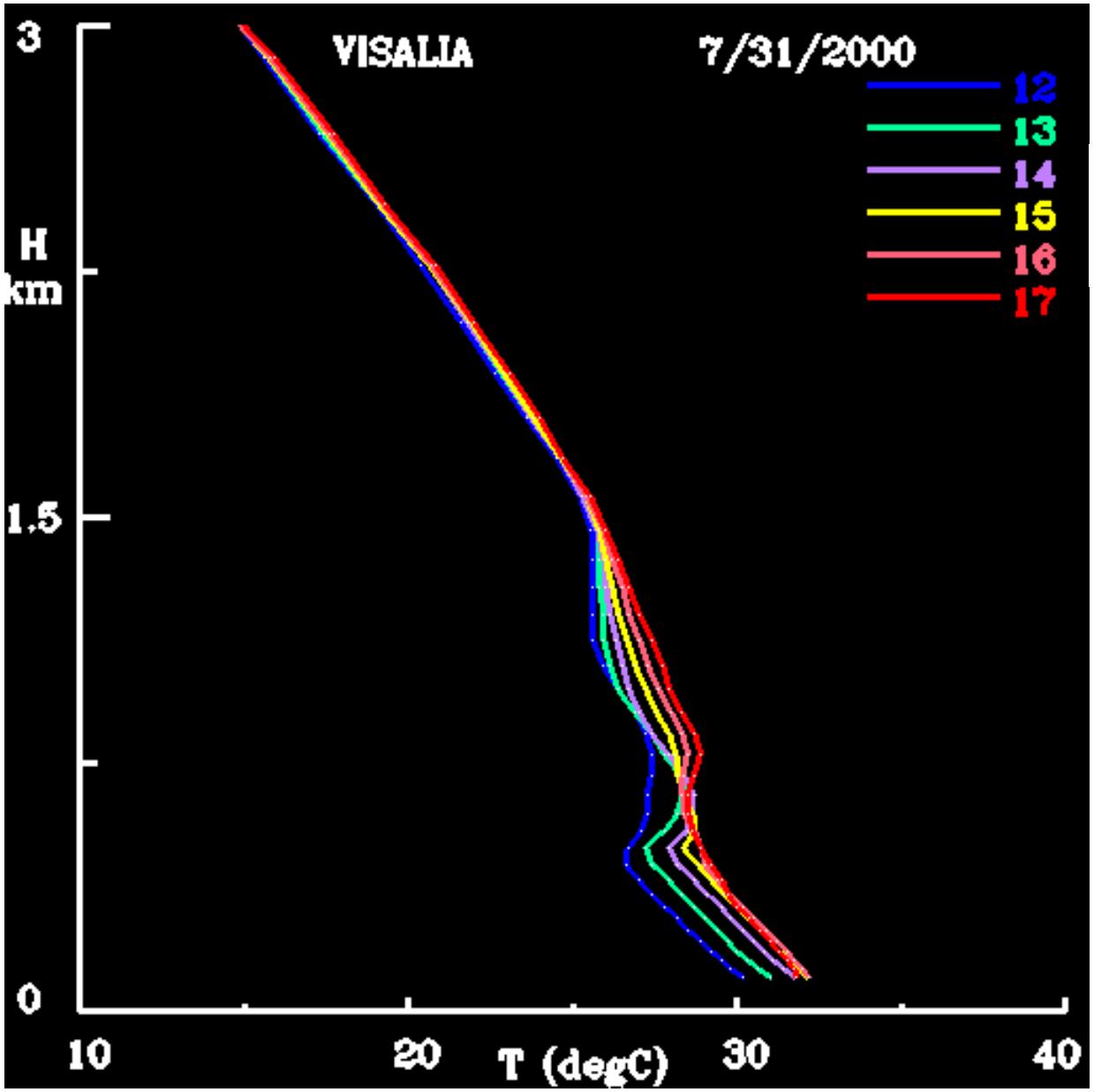




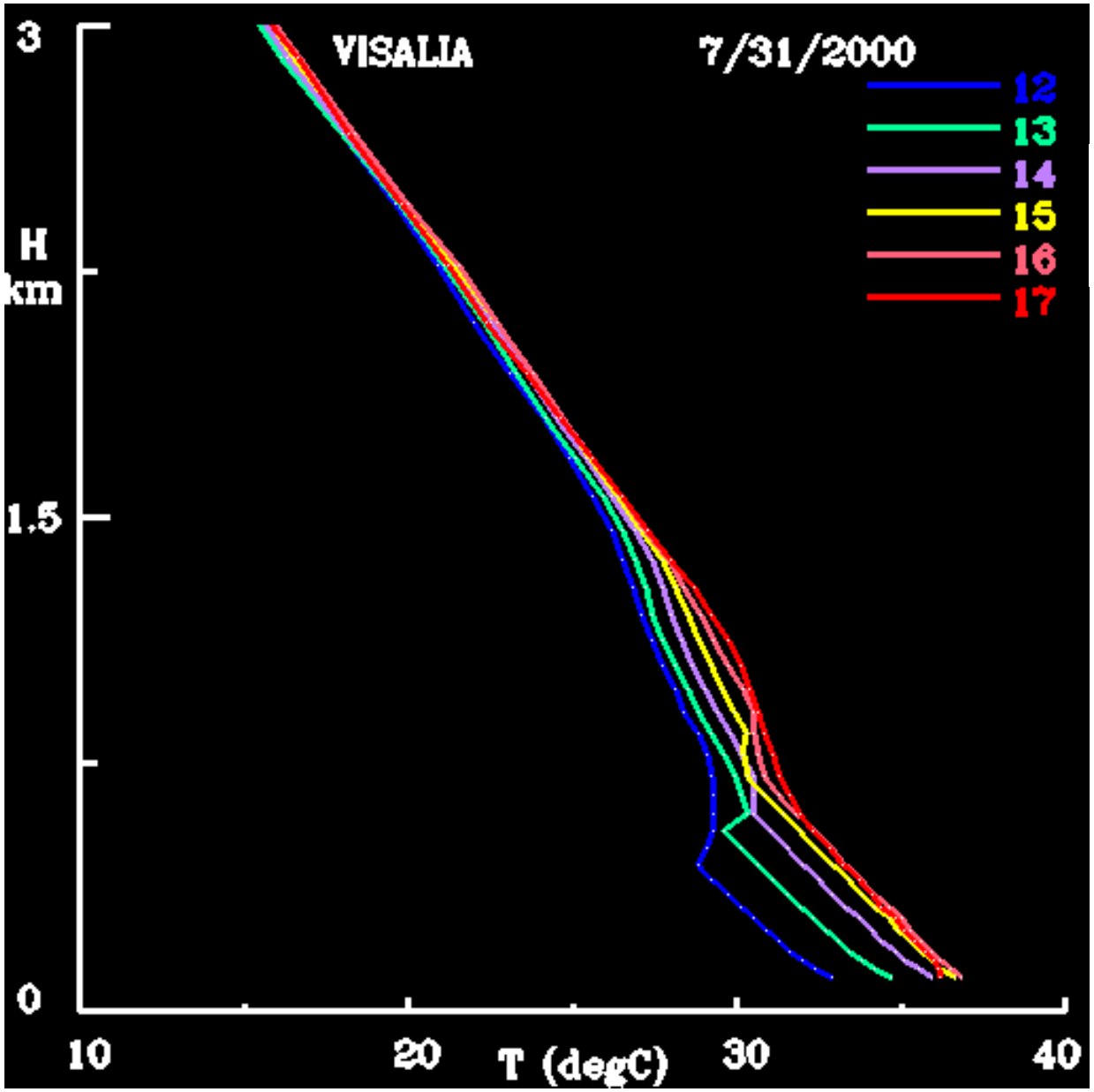
degC



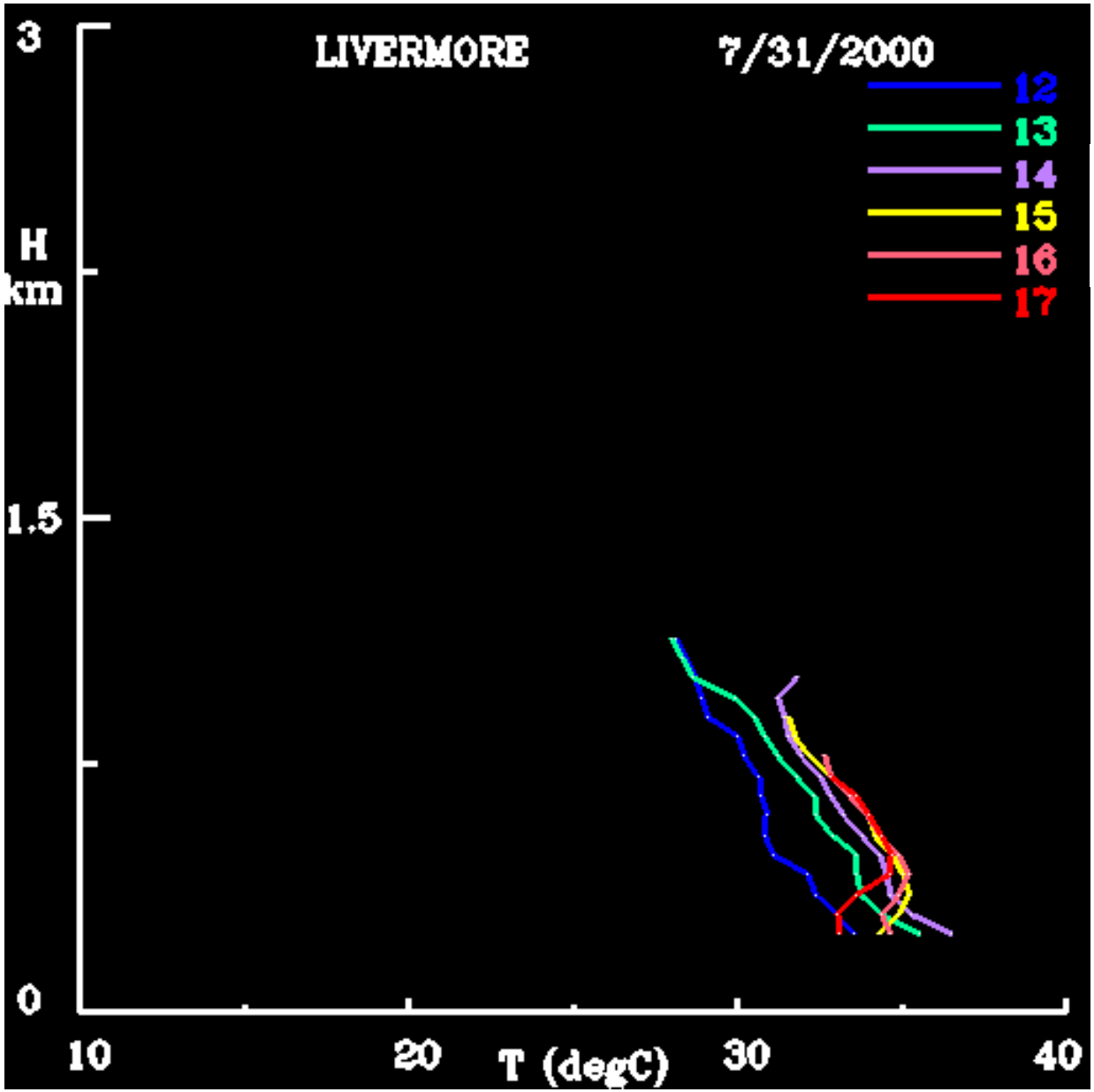
Observed Temperatures



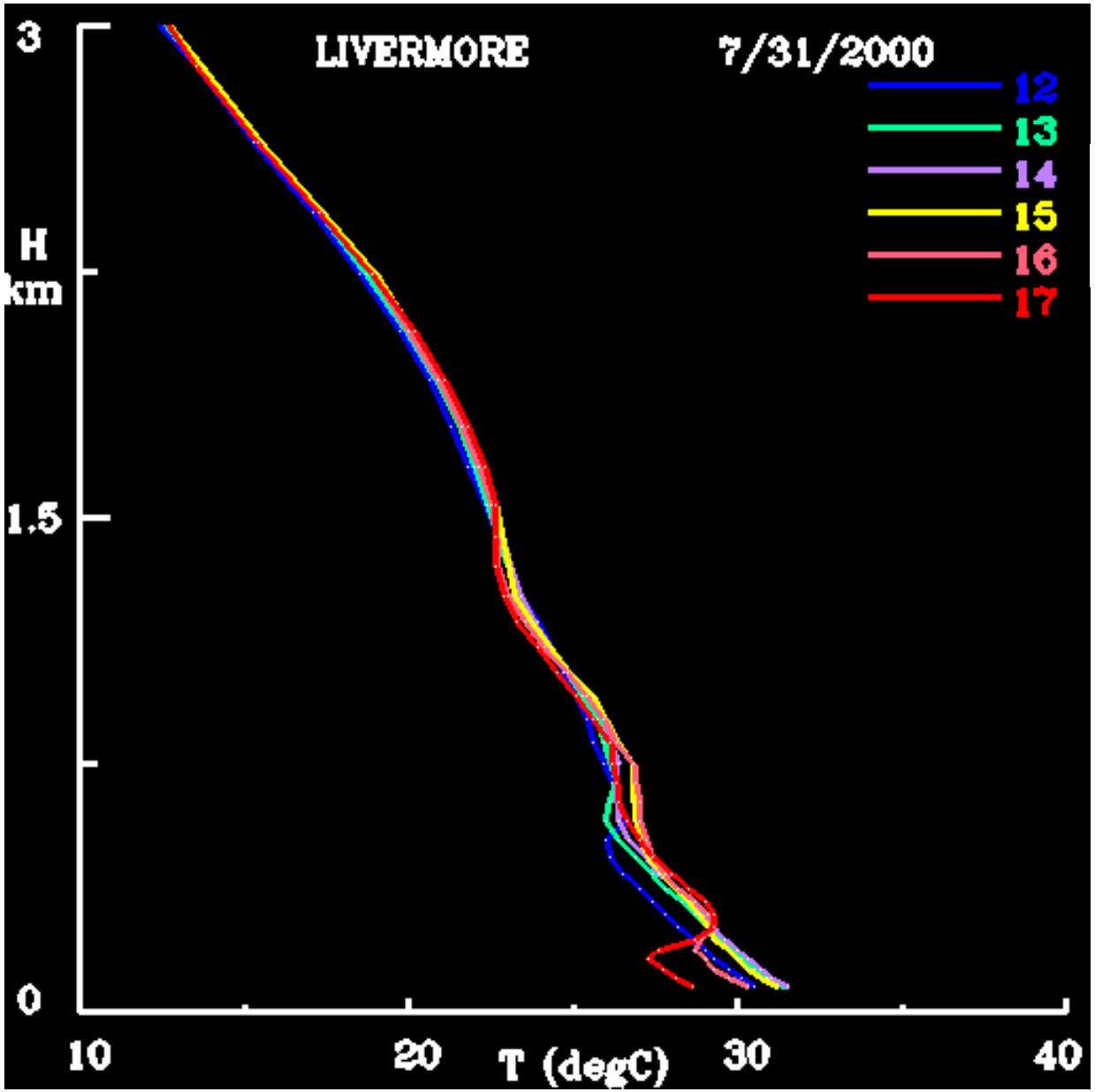
5-layer slab model



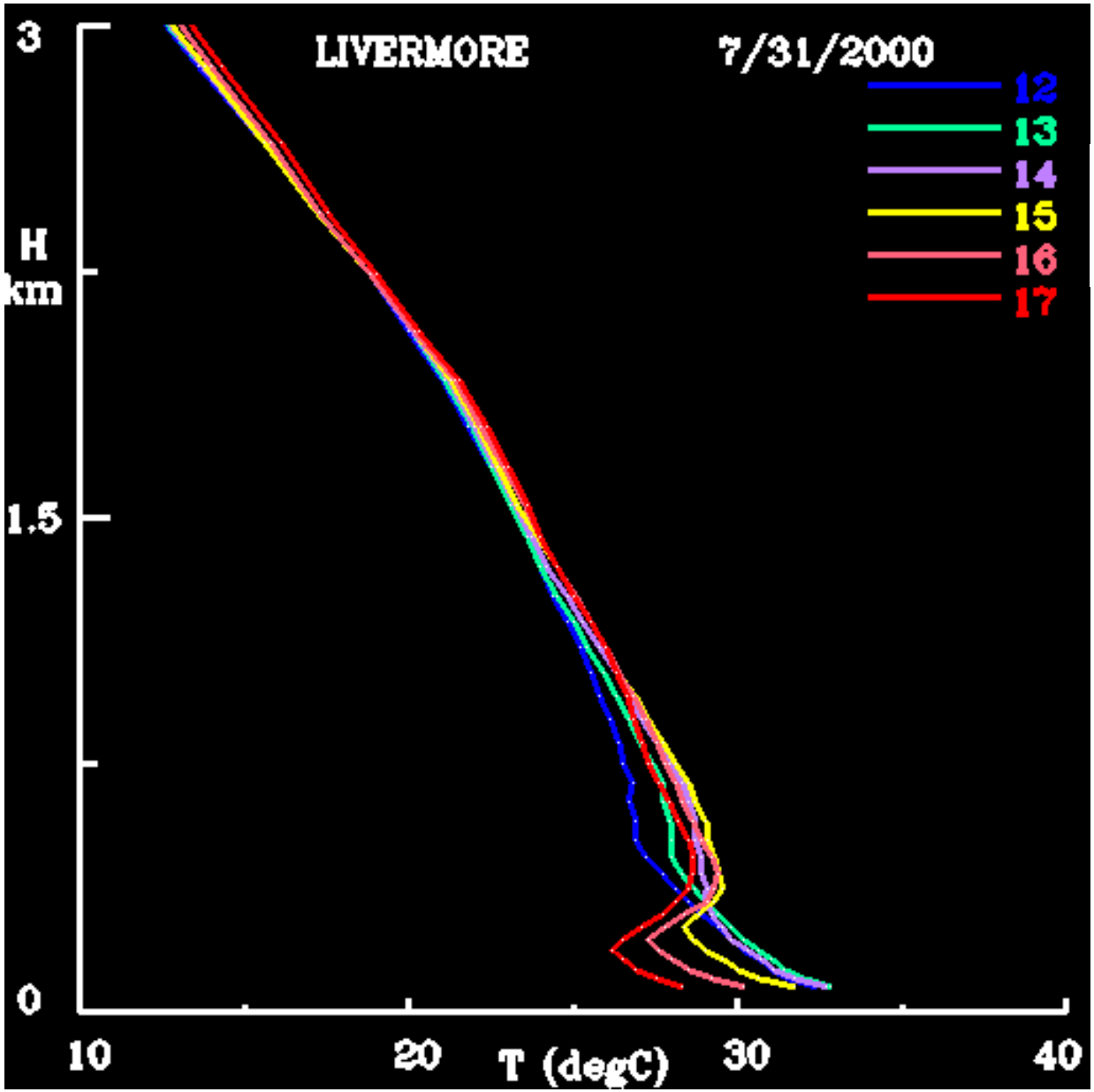
Noah model



Observed Temperatures



5-layer slab model

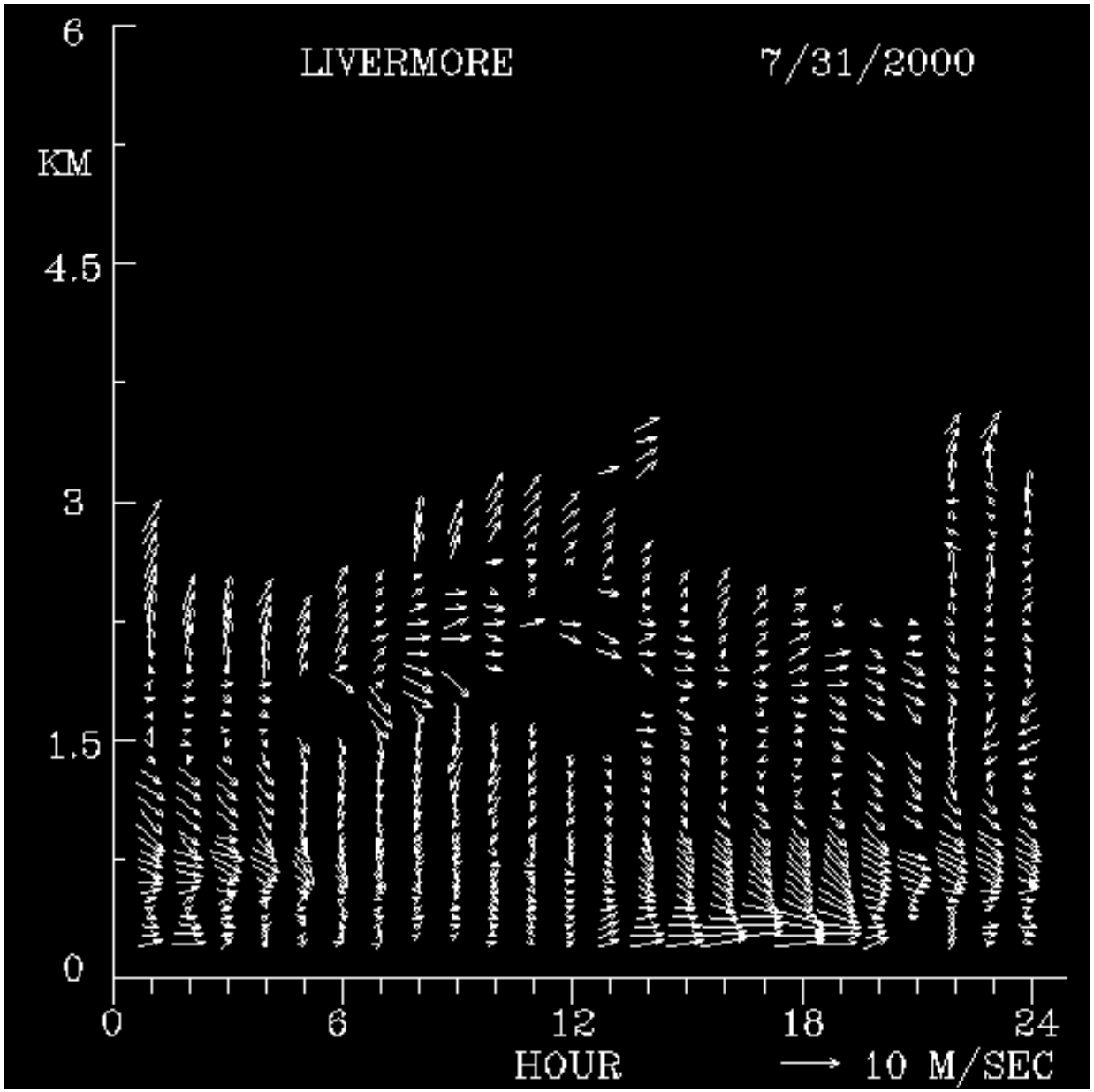


Noah model

Tested MM5 options:

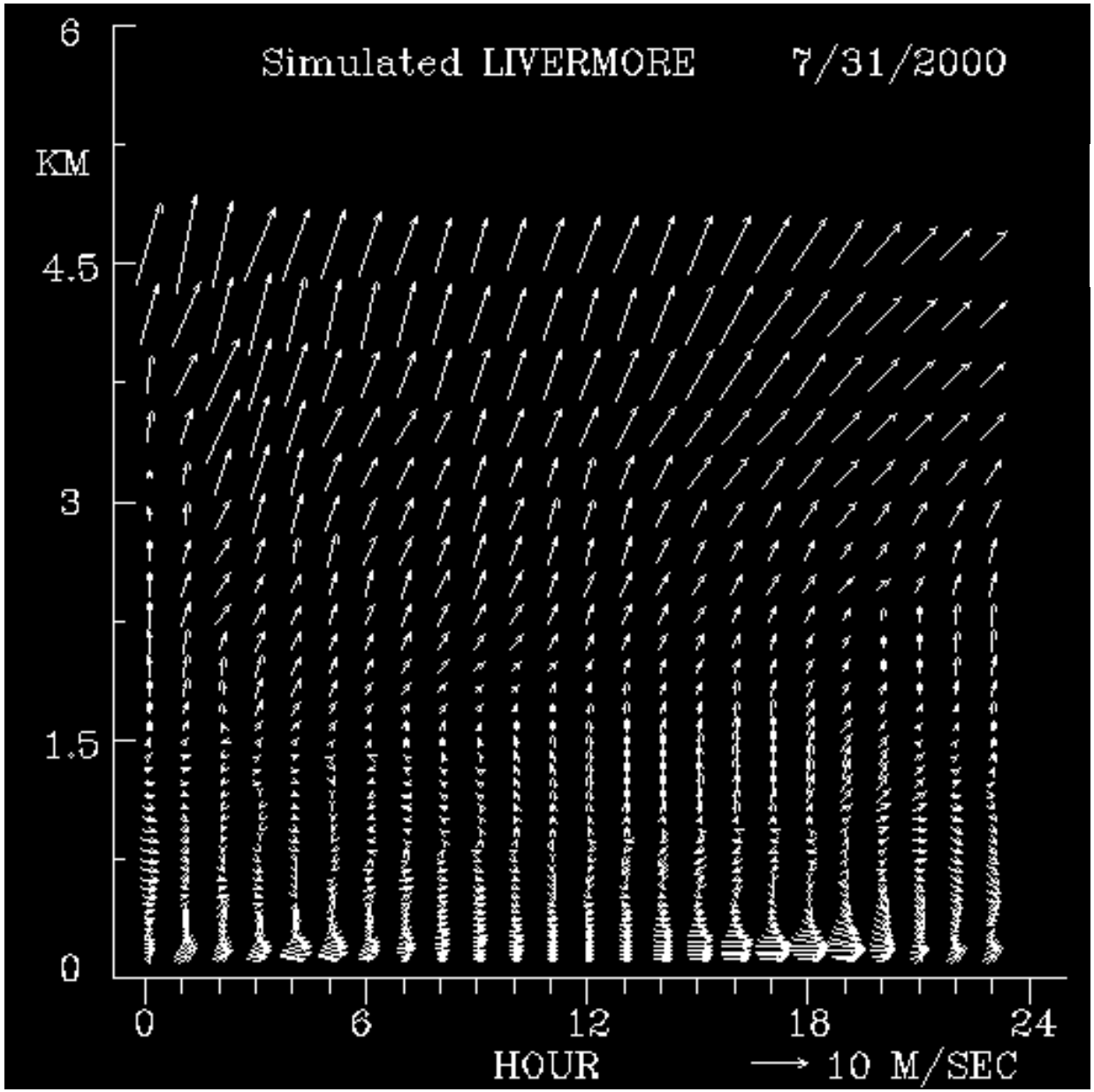
Boundary-Layer Models: Eta vs. MRF

- Eta with 5-layer slab land-surface module
- Eta with Noah land-surface module
- MRF with Noah land-surface module



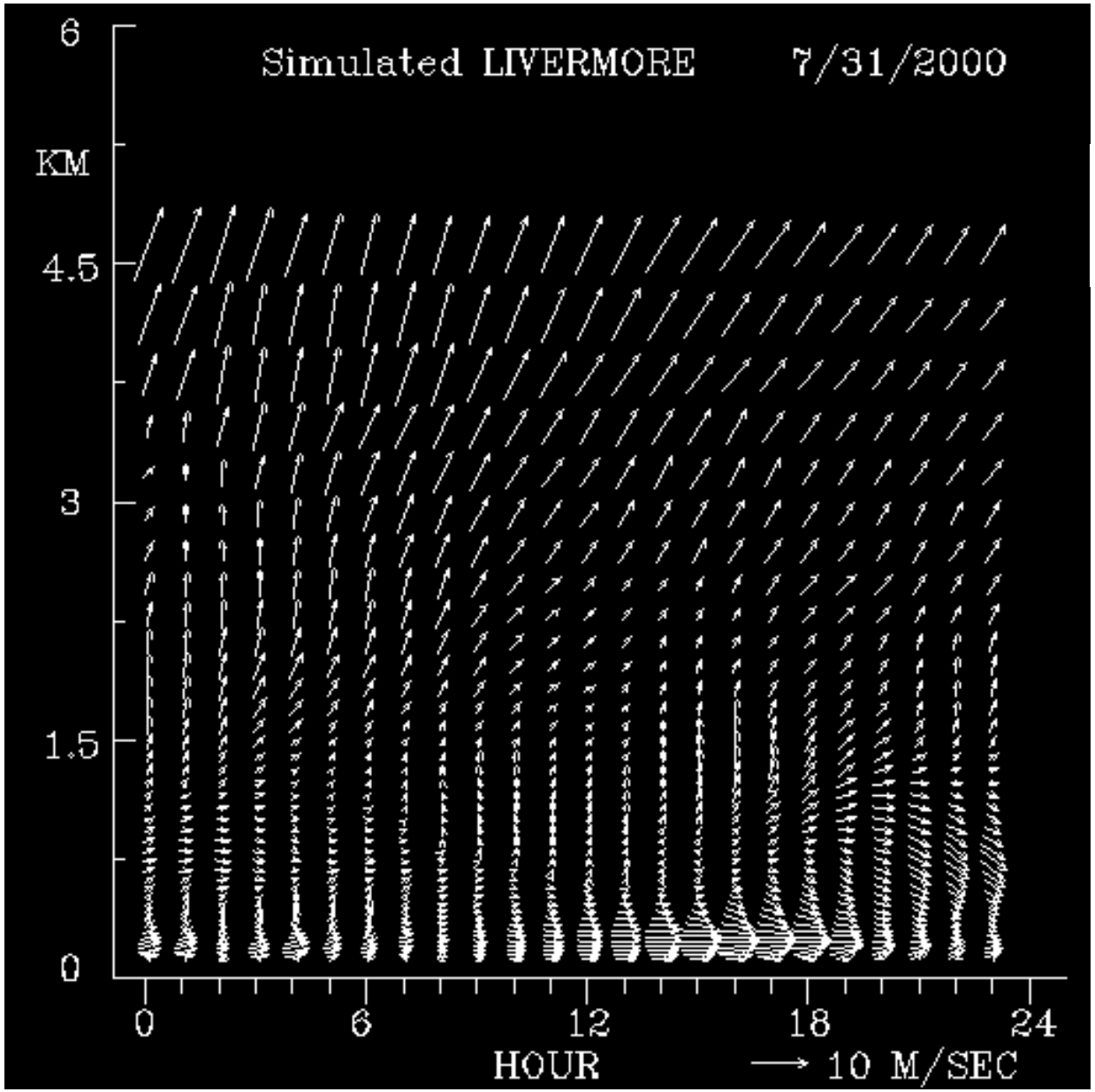
Observed Winds

- Sea breeze starts at ~1300 PST
- PBL depth ~800m
- Max. sea breeze strength ~10 m/s
- Westerly flow at ~2km



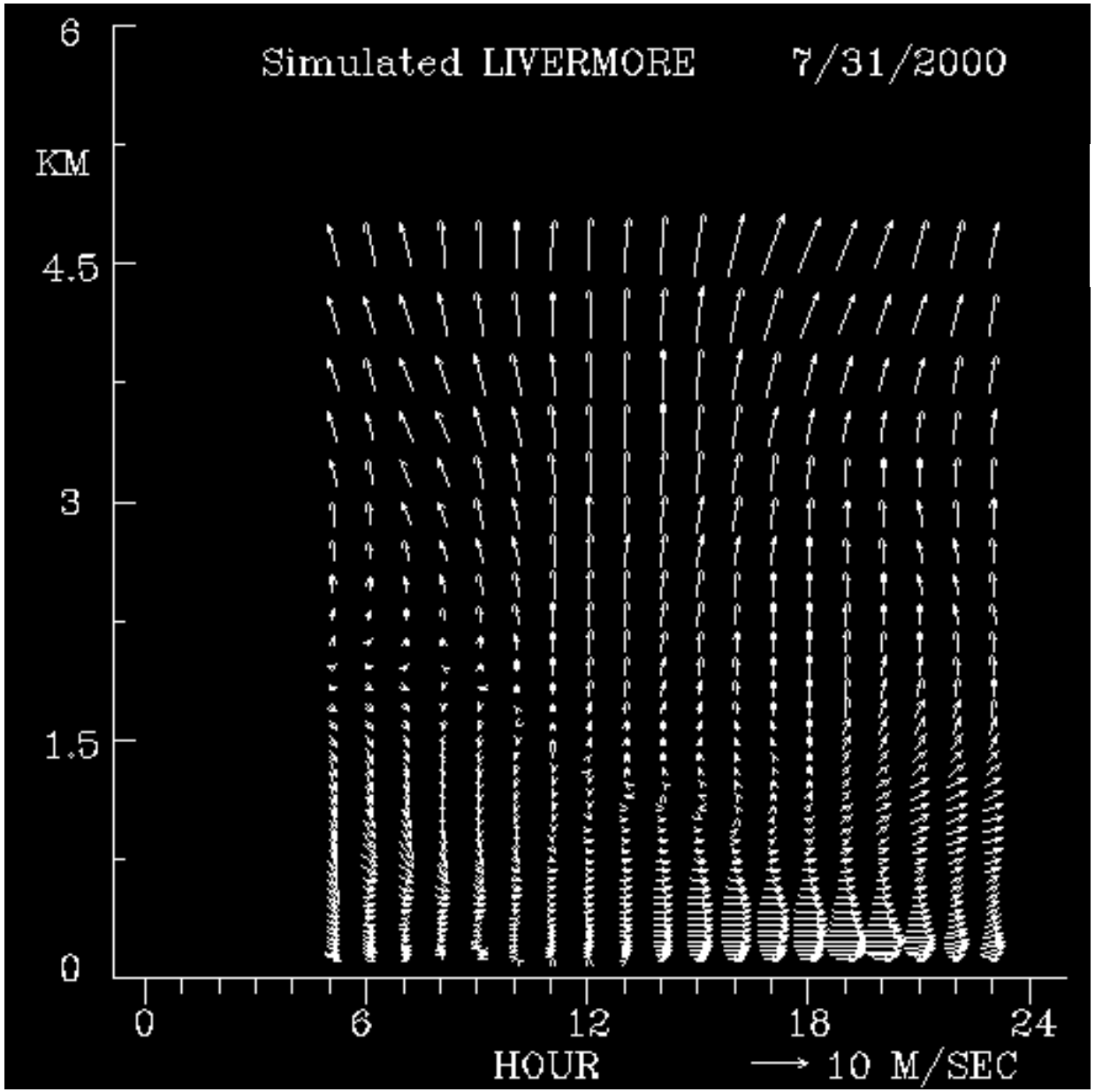
Eta with 5-layer slab model

- Sea breeze starts at ~1300 PST
- PBL depth ~300m
- Max. sea breeze strength ~8 m/s
- Southwesterly flow at ~2km



Eta with Noah model

- Sea breeze starts at ~1000 PST
- PBL depth ~300m
- Max. sea breeze strength ~10 m/s
- Southwesterly flow at ~2km



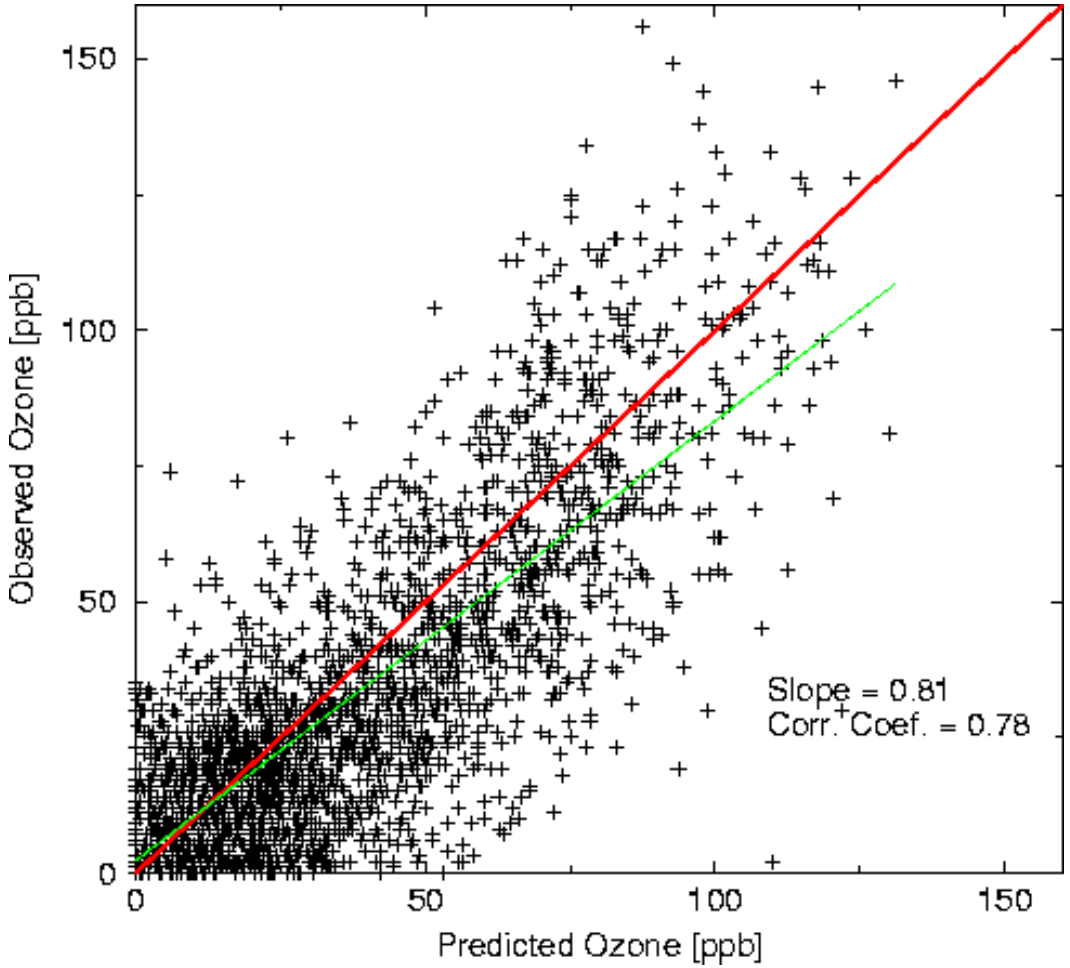
MRF with Noah model

- Sea breeze starts at ~1300 PST
- PBL depth ~700m
- Max. sea breeze strength ~10 m/s
- Southerly flow at ~2km

1999 Air-quality simulations

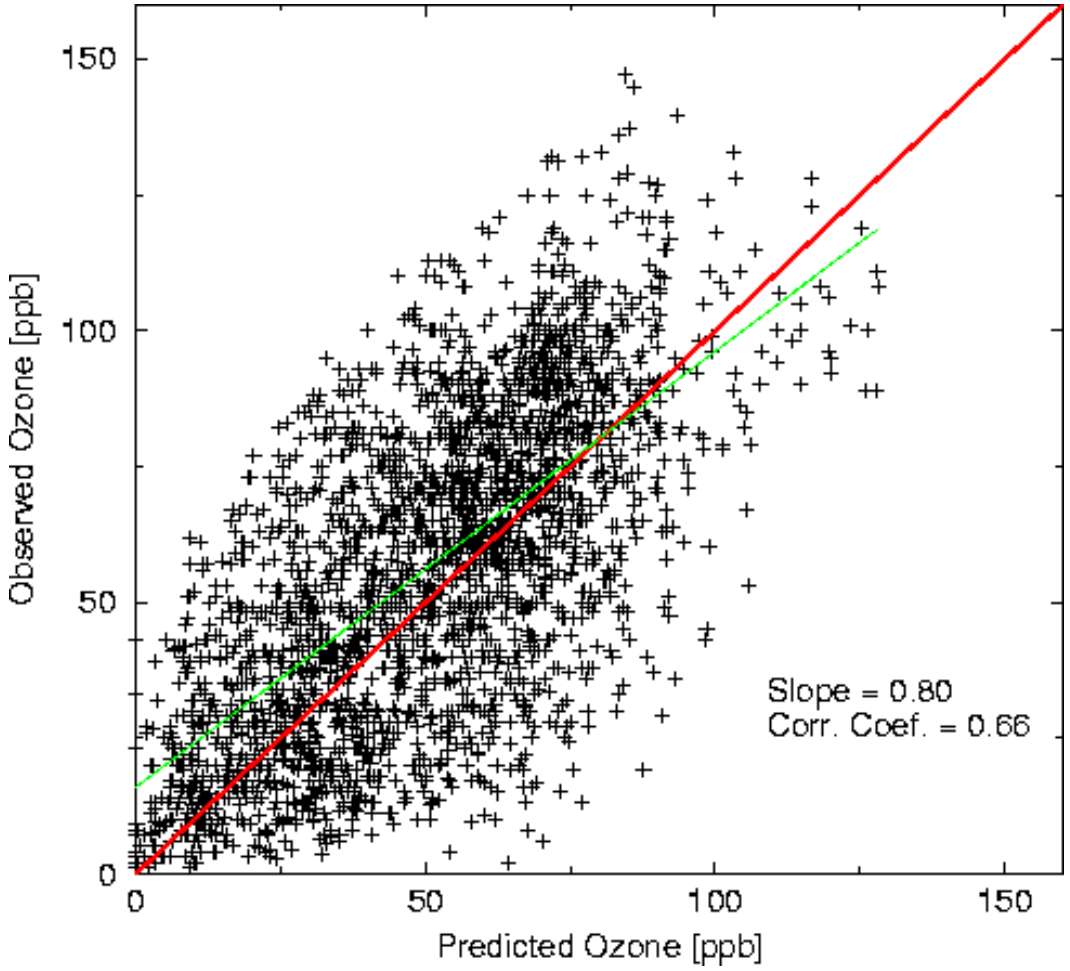
- As for 2000, we are underestimating ozone in our 1999 simulations to date.
- ARB's 1999 CAMx simulations with unmodified MM5 met. fields look promising.
- We are collaborating with ARB to
  - Examine and repeat their simulations,
  - Understand differences between our simulations and theirs.

ARB simulation 8-12 July 1999



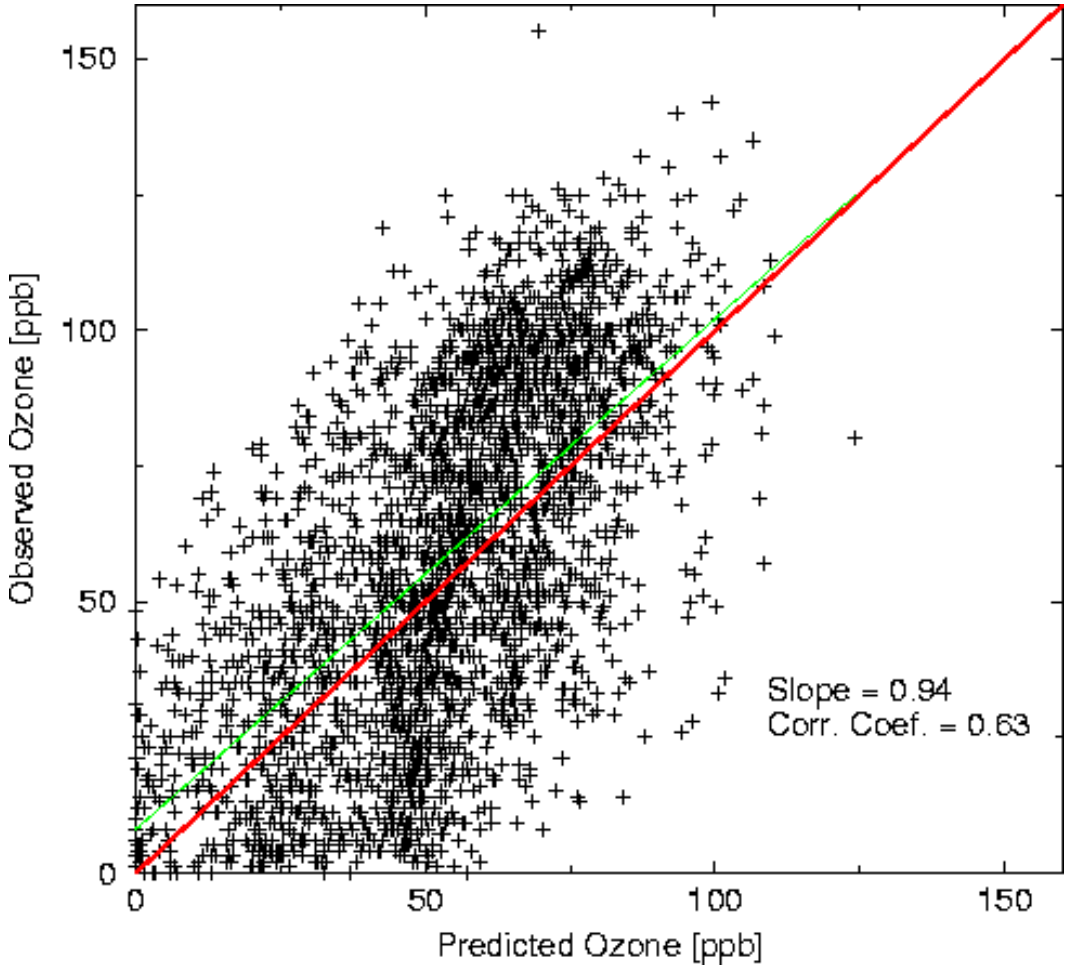
S.F. Bay Area Sites

ARB simulation 8-12 July 1999



Sacramento Valley Sites

ARB simulation 8-12 July 1999



San Joaquin Valley Sites

Future Work

- **July-Aug. 2000:**
  - Improve temperature performance in Bay Area
  - Investigate effects of analysis nudging in MM5
  - Examine and understand ARB CAMx simulations
  - Examine BAAQMD RAMS simulations
- **July 1999:**
  - Run MM5 with MRF and Noah modules
  - Compare with ARB simulations
  - Examine BAAQMD RAMS simulations