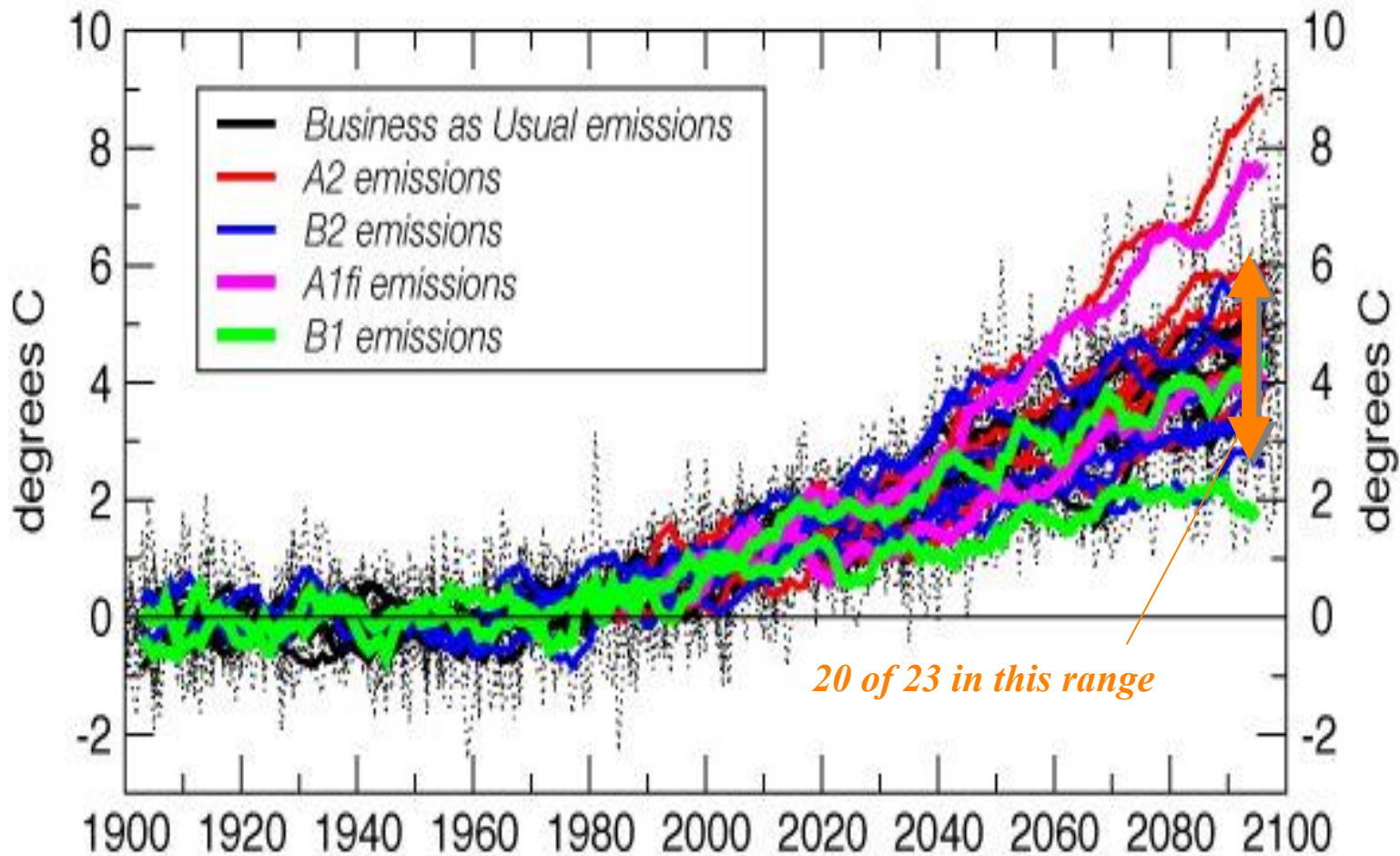


The Effects of Climate Change on Emissions and Ozone in Central California

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PROJECTED CHANGES IN ANNUAL TEMPERATURE, NORTHERN CALIFORNIA



M. D. Dettinger, 2005: "From climate-change spaghetti to climate-change distributions for 21st century California", March 2005.

Purpose

- What would be the effect of temperature increase on emissions?
- What would be the effect of temperature increase on ozone levels?

Study Methods

A combination of:

- Numerical modeling
- Observational data verification

Numerical Modeling

- Biogenic Volatile Organic Compound (BVOC) computed using BEIS2 (Biogenic Emission Inventory System 2).
- Ozone computed using CAMx (Comprehensive Air Quality Model with Extensions)

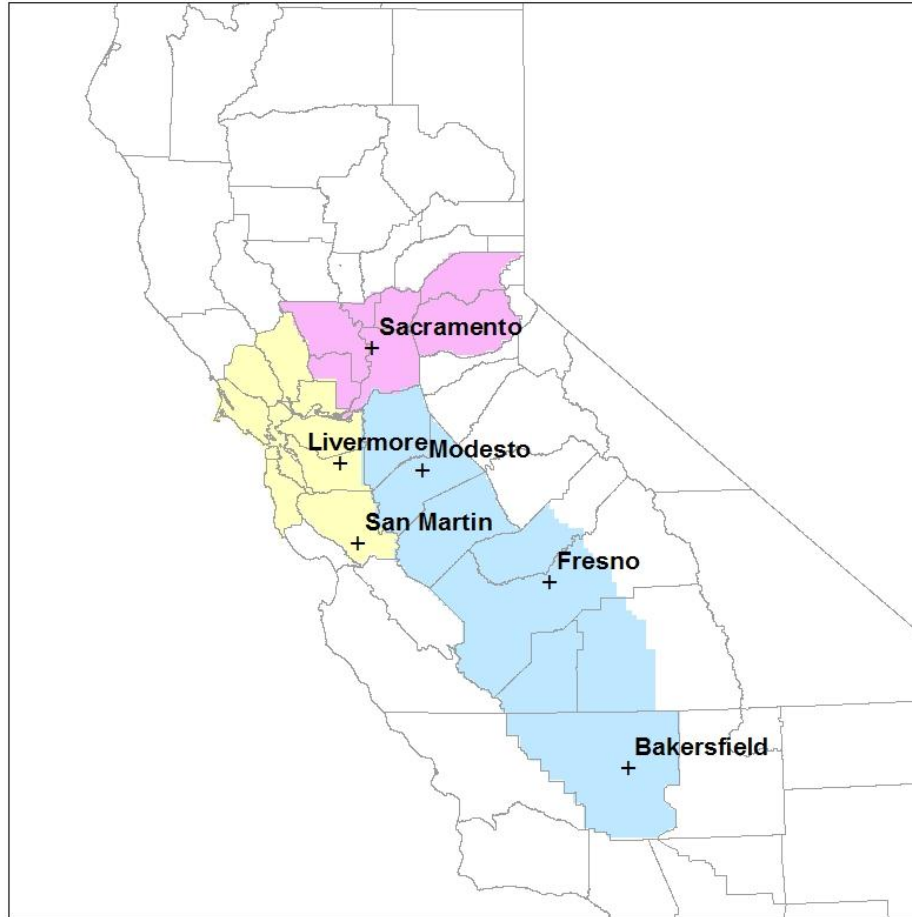
Episode Selection

Episode Selected: July 31 – August 2, 2000 (A multi-day ozone episode during the Central California Ozone Study)

During this episode, 1-hr ozone exceeded:

- in San Francisco Bay (SFB) Area on July 31
- in Sacramento (SAC) area on August 1
- in the San Joaquin Valley (SJV) on August 2

Modeling domain



Meteorological Inputs

Generated by: Wilczak et al. 2004 using MM5

- 36, 12, 4 km nested grids
- Analysis FDDA on the 36 and 12 km grids
- Observation FDDA on the 4 km grid
- NOAA land surface scheme
- Eta PBL scheme

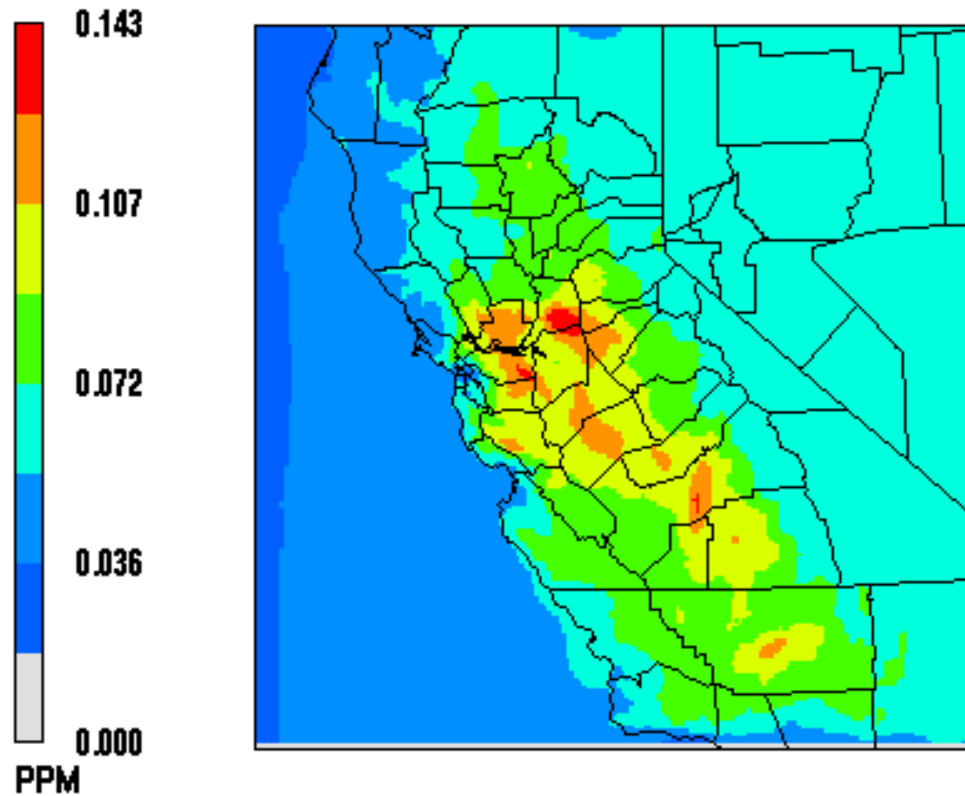
Effects of Temperature on BVOC Emissions

Scenario	SFB	SAC	SJV	CCOS Total
Base case (tons/day)	317	642	1080	9136
2C increase	378 (+19%)	737 (+15%)	1265 (+17%)	10425 (14%)
4C increase	445 (+40%)	828 (+29%)	1458 (+35%)	11738 (28%)

CAMx Simulations

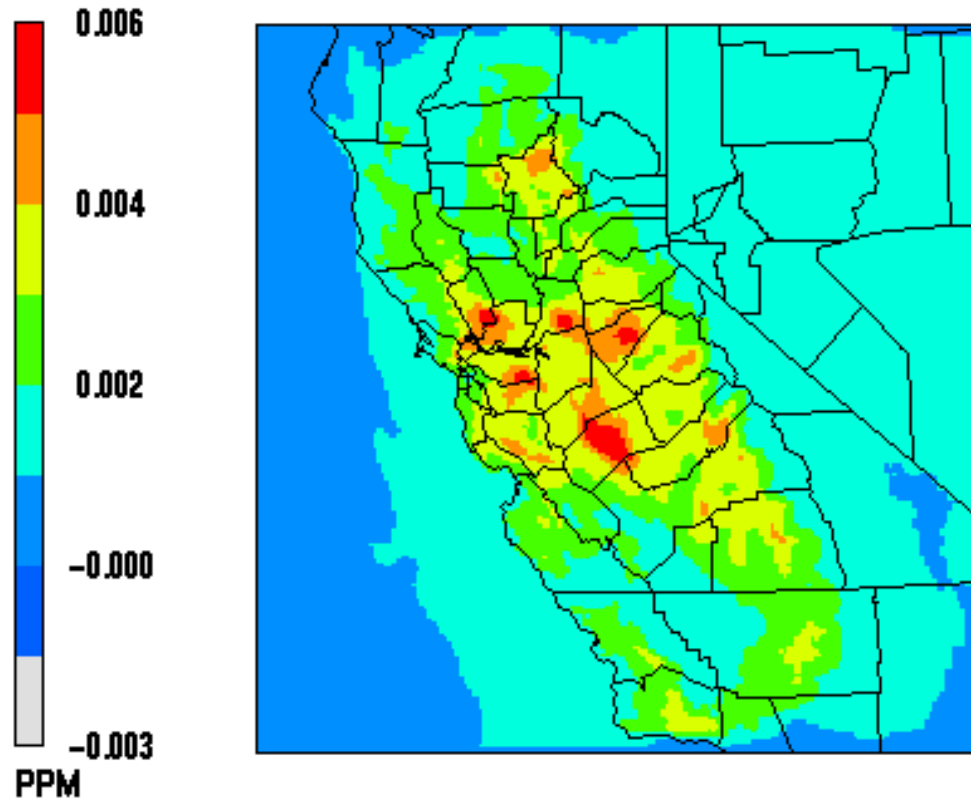
Runs	Temperature	BVOC
Run B	Base	Base
Run 2T	2C increase	Base
Run 2V	Base	2C increase
Run 2TV	2C increase	2C increase

Simulated Ozone (Run B)



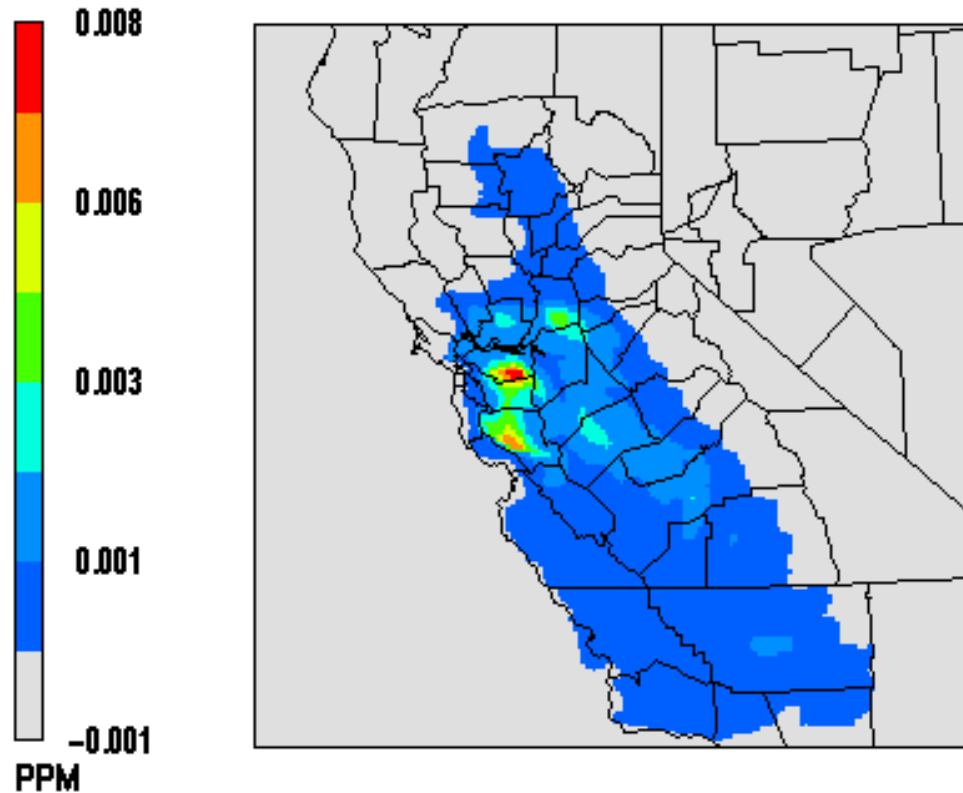
1500 PDT July 31, 2000

Change in Ozone (Run 2T – Run B)



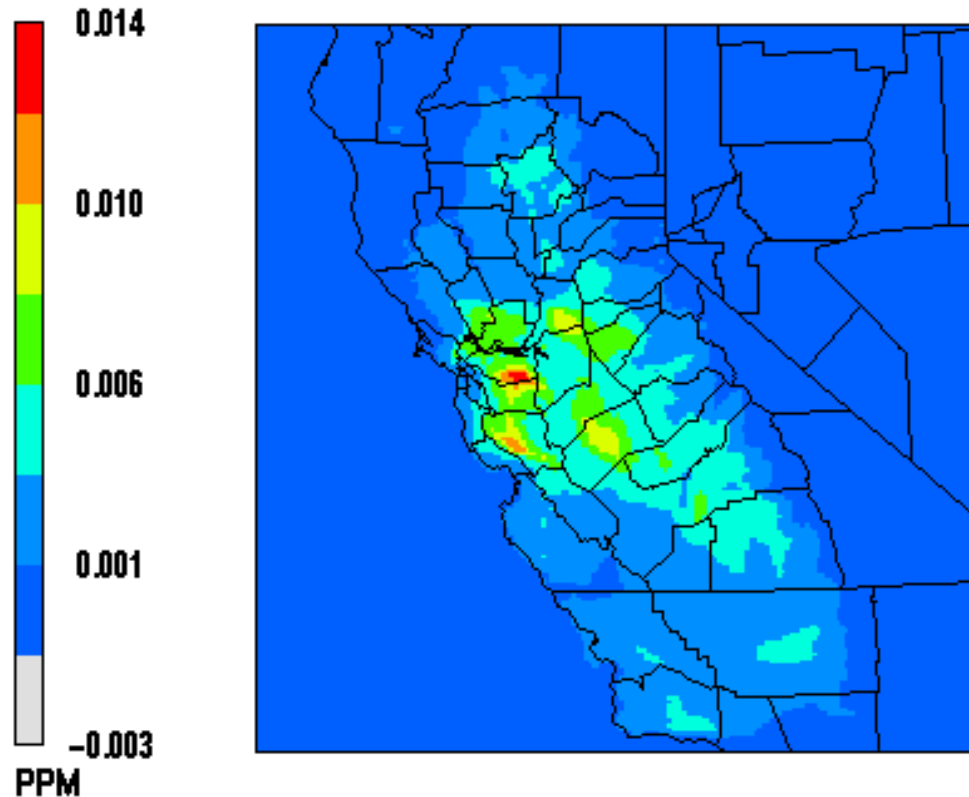
1500 PDT July 31, 2000

Change in Ozone (Run 2V – Run B)



1500 PDT July 31, 2000

Change in Ozone (Run 2TV – Run B)



1500 PDT July 31, 2000

Maximum 1-hr Ozone (ppb)

Runs	SFB (Jul 31)	SAC (Aug 1)	S SJV (Aug 2)
Run B	132	152	110
Run 2T	137	156	112
Run 2V	137	156	112
Run 2TV	143	160	114

Maximum 8-hr Ozone (ppb)

Runs	SFB (Jul 31)	SAC (Aug 1)	S SJV (Aug 2)
Run B	109	117	100
Run 2T	113	120	102
Run 2V	113	119	103
Run 2TV	117	123	104

Observed Ozone and Temperature

