Recent Met. Modeling Activities Within Alpine Geophysics

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Dennis McNally
Alpine Geophysics, LLC
Arvada, CO 80007
dem@alpinegeophysics.com
www.alpinegeophysics.com

Recent Projects

- EPA OAQPS Annual and Episodic Modeling
- Houston/Galveston Support
- Denver EAC
- San Juan New Mexico EAC
- 1994 Annual MM5 in Dakotas
- Lower Lake Michigan Impacts

EPA/OAQPS Project

EPA/OAQPS Project Overview

- Task A. Recommend Model Evaluation Methodologies
- Task B. Investigate the Utility of Alternative Meteorological Data Sets
- Task C. Perform Episodic MM5 Simulations
- Task D. Perform Annual MM5 Modeling

Project Deliverables

PROJECT REPORTS

Project Workplan (Completed 4 April 2002)

Alternative Dataset Investigation (Completed 11 August 2002)

Model Evaluation Protocol (Completed 14 July 2002)

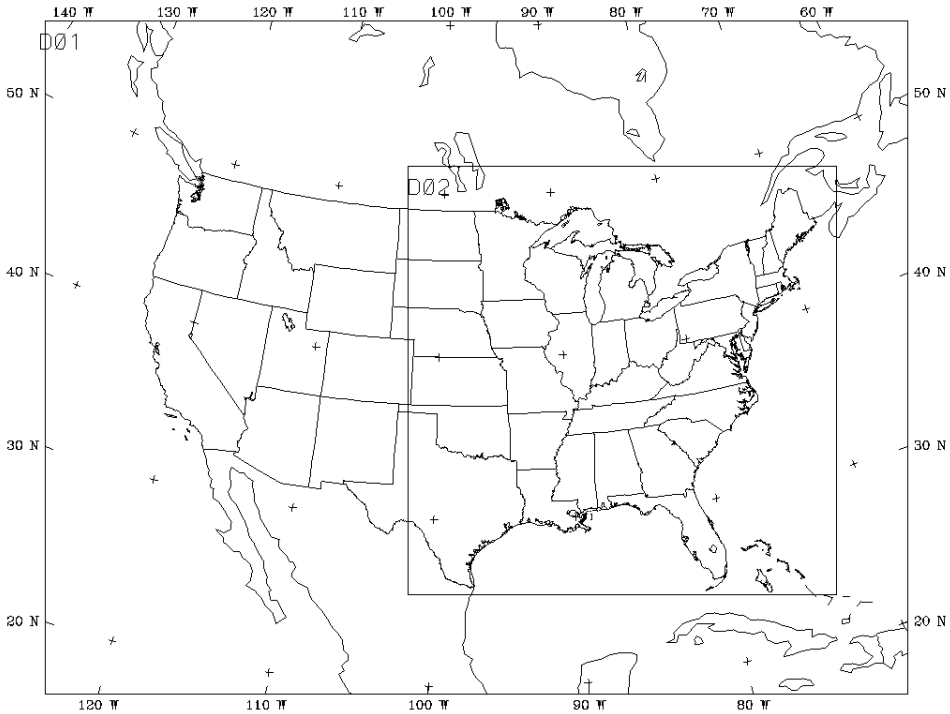
Annual Model Application Protocol (Completed 28 May 2002)

Annual Modeling Final Report (Completed First Simulation, Second Simulation End of August)

Episodic Modeling Final Report (To be completed by End of August)

Episodic Modeling Approach

Episode from 12 July 2001 through 13 August 2001

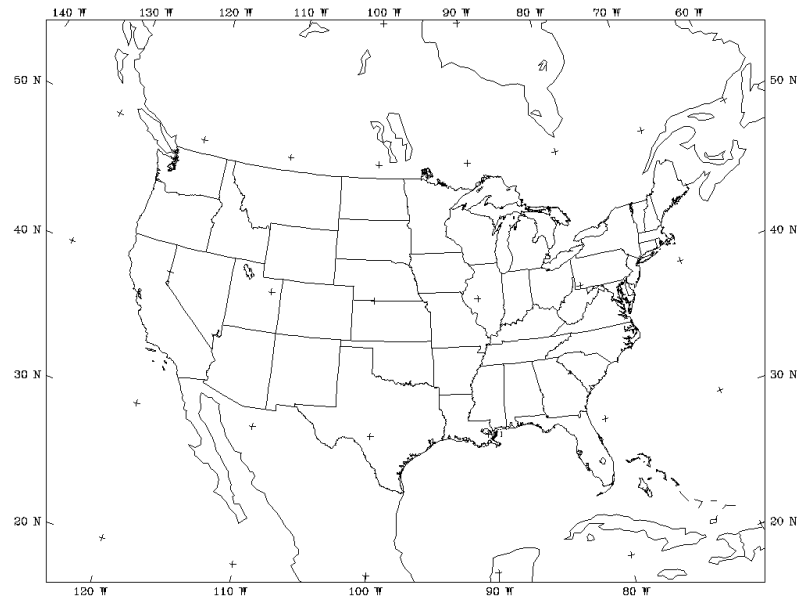


Annual Modeling Approach

2001 Selected as Target Year

Modeling Domain (RPO Grid)

165 x 129 : pole of 40^0, -97^0 :true lat. of 33^0 and 45^0



Vertical Grid Structure

k(MM5)	sigma	press.(mb)	height(m)	depth(m)
34	0.000	10000	15674	2004
33	0.050	14500	13670	1585
32	0.100	19000	12085	1321
31	0.150	23500	10764	1139
30	0.200	28000	9625	1004
29	0.250	32500	8621	900
28	0.300	37000	7720	817
27	0.350	41500	6903	750
26	0.400	46000	6153	693
25	0.450	50500	5461	645
24	0.500	55000	4816	604
23	0.550	59500	4212	568
22	0.600	64000	3644	536
21	0.650	68500	3108	508
20	0.700	73000	2600	388
19	0.740	76600	2212	282
18	0.770	79300	1930	274
17	0.800	82000	1657	178
16	0.820	83800	1478	175
15	0.840	85600	1303	172
14	0.860	87400	1130	169
13	0.880	89200	961	167
12	0.900	91000	794	82
11	0.910	91900	712	82
10	0.920	92800	631	81
9	0.930	93700	550	80
8	0.940	94600	469	80
7	0.950	95500	389	79
6	0.960	96400	310	78
5	0.970	97300	232	78
4	0.980	98200	154	39
3	0.985	98650	115	39
2	0.990	99100	77	38
1	0.995	99550	38	38
0	1.000	100000	0	0

Physics Options

Kain-Fritsch Cumulus

Pleim-Xiu LSM/PBL Scheme

Dudhia Simple Ice (Current rerun using Reisner 2)

RRTM

"Baseline" FDDA Options

Analysis Nudging

Excluding Nudging in Boundary Layer

2.5×10^{-4} sec^{-1} for winds and temperature

1×10^{-5} sec^{-1} for mixing ratio

Evaluation Methodology

Evaluating Wind, Temperature, Mixing Ratio, Precipitation

Statistics Based on National, State and RPO Basis

Qualitative Comparison with SLP and Radar Reflectivity

Houston/Galveston Support

Review Modeling of TexAQS 2000 Episode

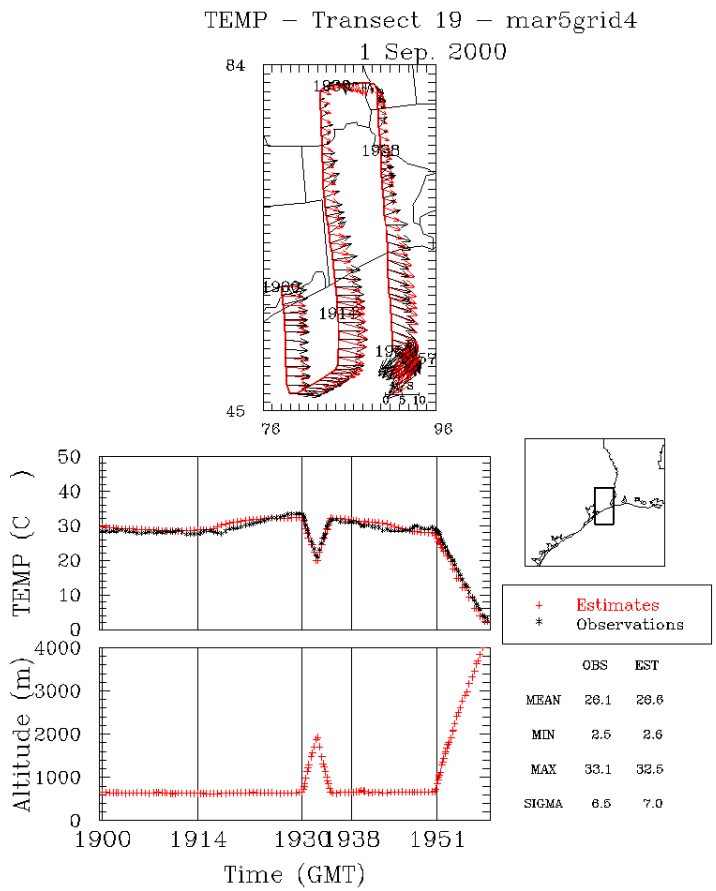
MM5 Modeling Performed by TAMU

RAMS Modeling Performed by PNL

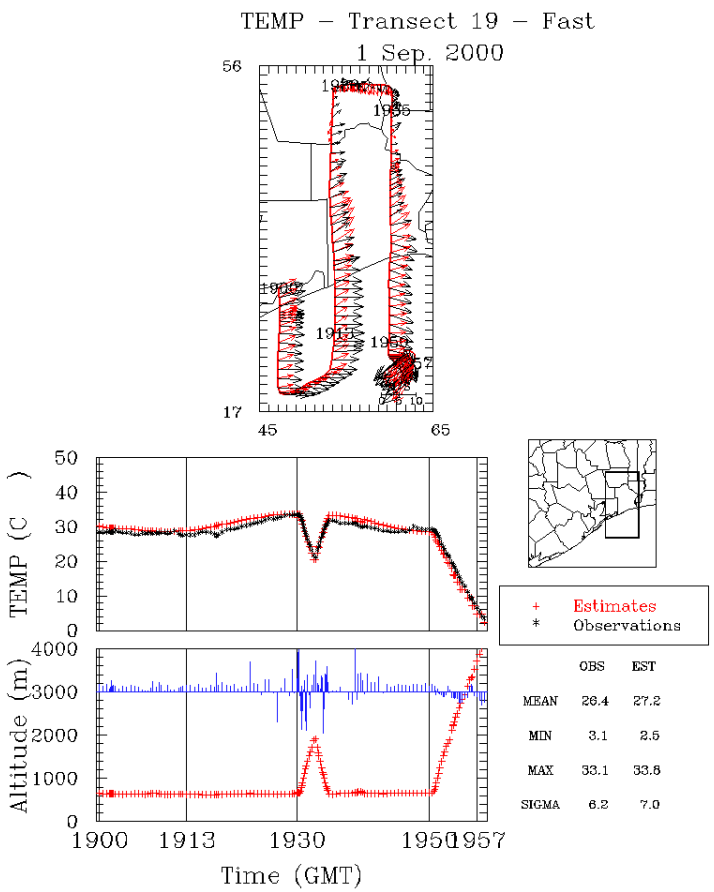
Extremely Challenging Modeling Application

Allowed Evaluation Against Rich Aircraft Database

Sample MM5 Aircraft Analysis

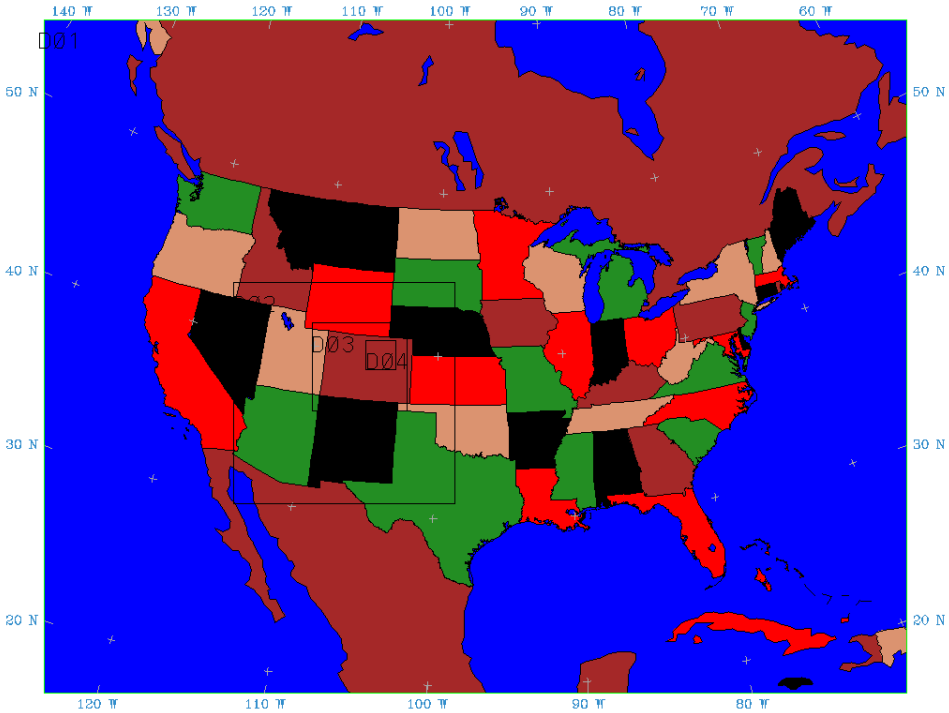


Sample RAMS Aircraft Analysis



Denver Early Action Compact (EAC)

Modeling Domains



36/12/4/1.33 km

National RPO Projection

36km Same as EPA/OAQPS

Modeling Period and Configuration

36/12 km Domains: 5 June 2002 to 25 July 2002

4/1.3 km Domains: 5 June 2002 to 15 June 2002

23 June 2002 to 2 July 2002

16 July 2002 to 22 July 2002

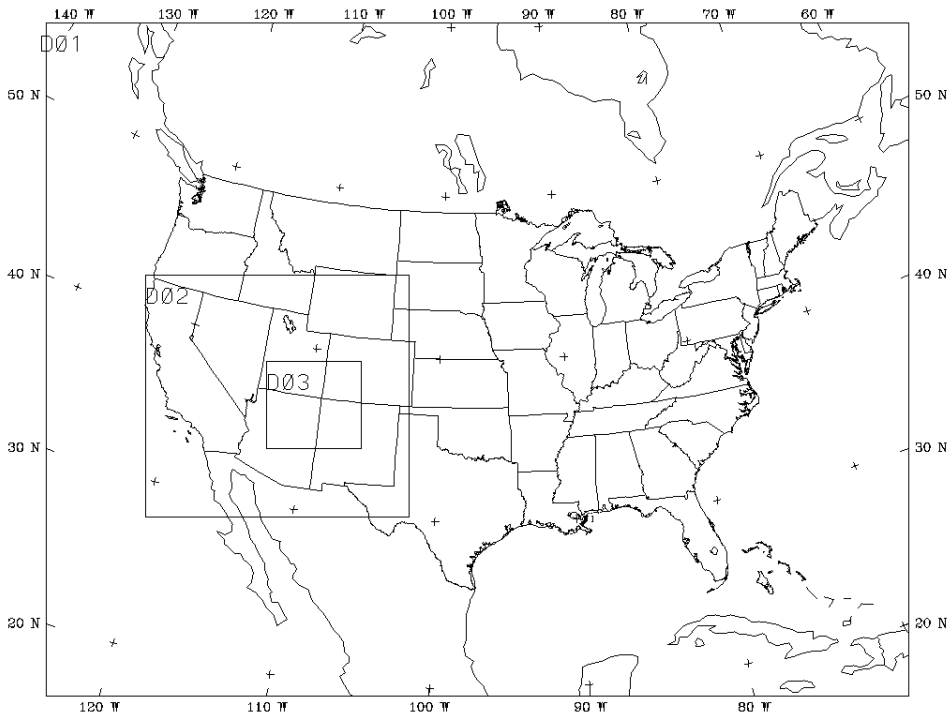
36/12 Domains Used Pleim-Xui

4/1.3 Domains Used Blackadar

Initial simulations 5-7 K too cool. Required reduction in soil moisture availability to match extreme drought conditions.

San Juan NM EAC

Modeling Domains



36/12/4 km

National RPO Projection

36km Same as EPA/OAQPS

Modeling Period and Configuration

36/12 km Domains: 3 June 2002 to 23 July 2002

4/1.3 km Domains: 4 June 2002 to 9 June 2002

16 June 2002 to 20 June 2002

30 June 2002 to 3 July 2002

16 July 2002 to 19 July 2002

36/12 Domains Used Blackadar

4/1.3 Domains Used Blackadar

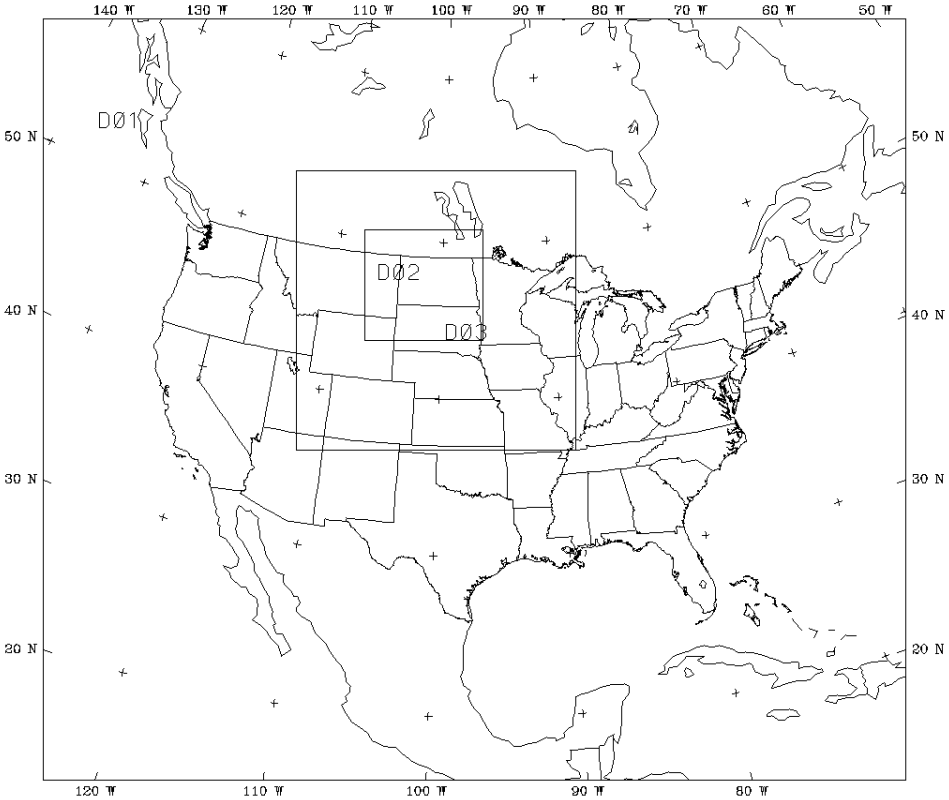
Required reduction in soil moisture availability to match extreme drought conditions.

EPA Region 8 1994 Annual MM5

To support CALPUFF Modeling

Very Quick Turn-around (6 week) project

Modeling Domains



180/60/20 km Domains

National RPO Projection

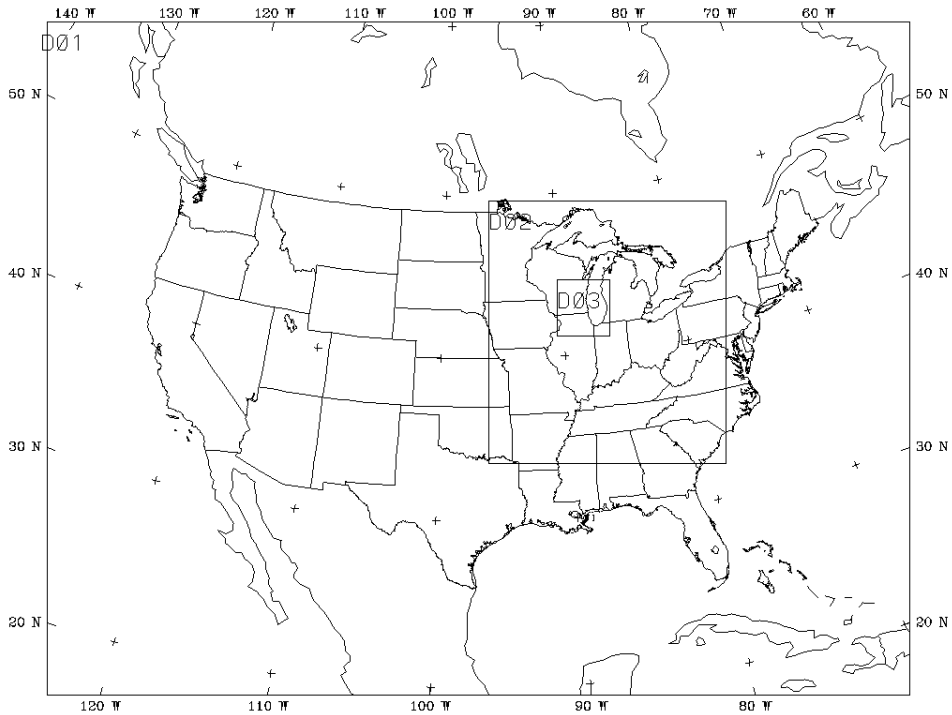
Modeling Period and Configuration

15 December 1993 to 15 January 1995

Used NNRP First-Guess Fields (ETA not available)

Lower Lake Michigan Impacts

Modeling Domains



36/12/4 km

National RPO Projection

36km Same as EPA/OAQPS

Modeling Period and Configuration

36/12/4 km Domains: 15 June 2001 to 19 August 2001

Used P-X Scheme in 5 Day Discrete Periods (no INTERPX)

Temperature Biases somewhat larger than normal.