WRF-MM5 Comparison
A First Look at Summer 2002

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Denver, CO

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Methodology

Setup WRF for Summer 2002

Why 2002?

MM5 databases available from RPO's

Evaluate WRF using same methodology as MM5.

A "simple" application to test out model.

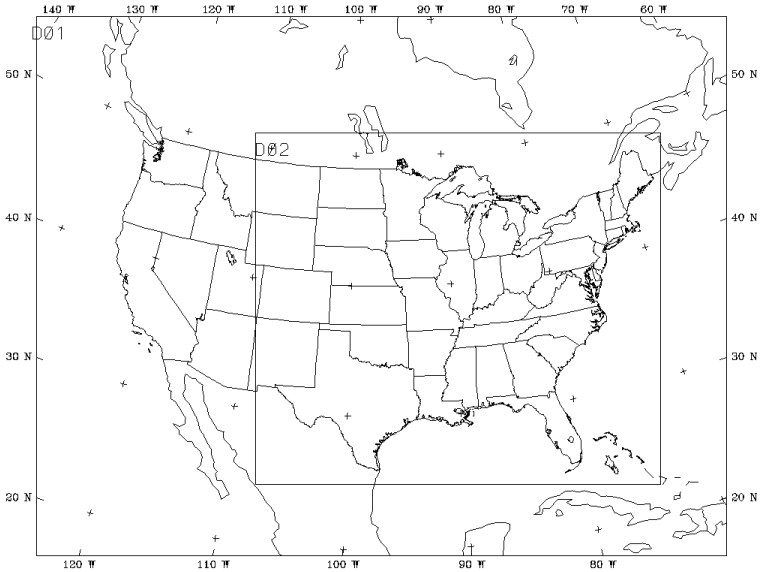
Certainly NOT an exhaustive inter comparison….

Application Methodology

WRF 2.0.3.1 (Dec 3, 2004)

1 June 2002 – 4 October 2002

36km (165x120) 12km (289x250)



Application Methodology

Model Reinitialized every 5 days at 12Z

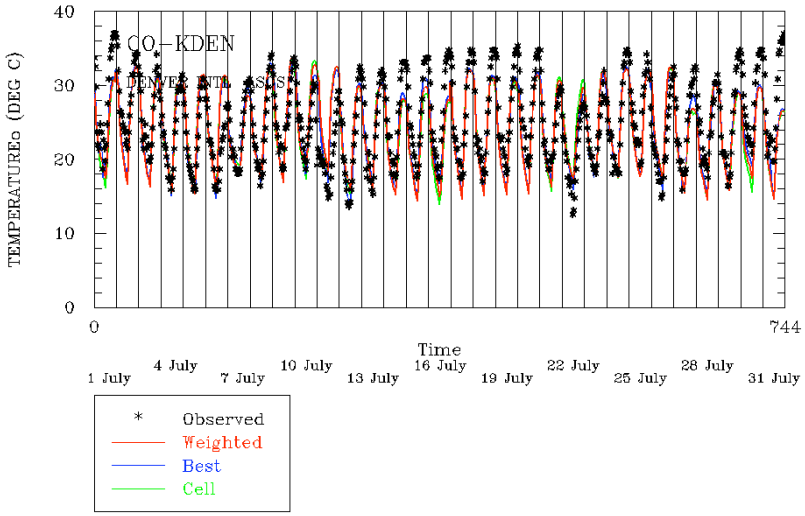
Model Runs each 5.5 days long

Physics Options

- WSM 5-class scheme (mp_physics = 5)
- RRTM long wave
- Dudhia short wave
- Monin-Obukhov Surface Layer
- Surface Diffusion (no LSM)
- YSU PBL Scheme
- No Cumulus Parameterization

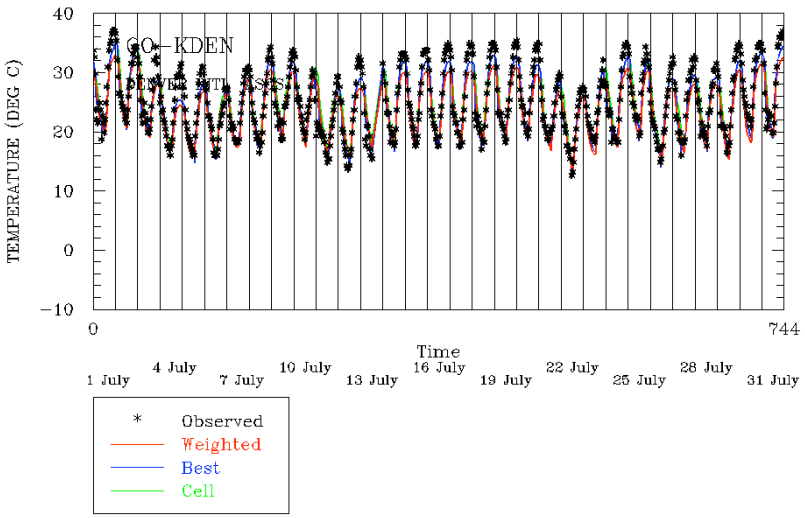
Temperature Results

WRF



Spatial Time Series Comparison 36km in the CO

WRAP MM5



Spatial Time Series Comparison 36km in the CO

Temperature Results (July Bias)

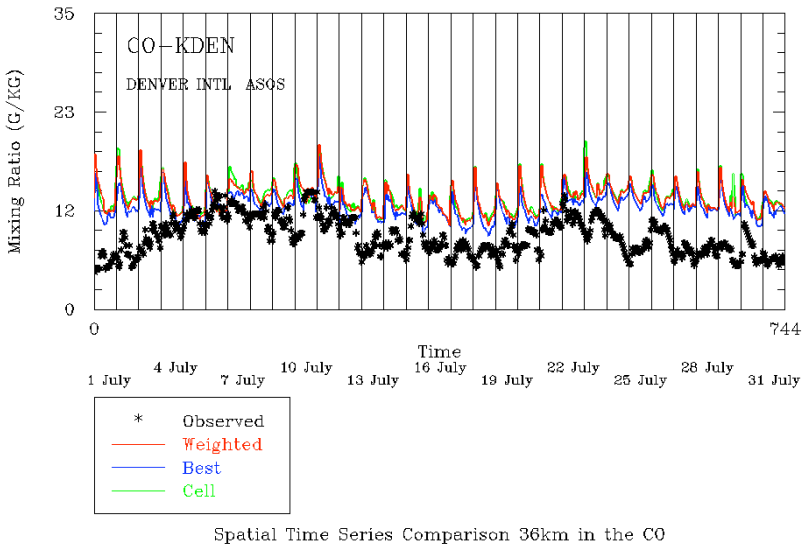
	ALL	CENRAP	MANE_VU	MW	VISTAS	WRAP
WRF 2002	0.68	1.89	-0.58	0.64	0.92	-0.18
WRAP 2002	-0.09	0.54	0.12	0.20	-0.05	-1.02
VISTAS 2002	-0.29	0.04	0.16	0.37	0.05	-1.44

Temperature Results (July Error)

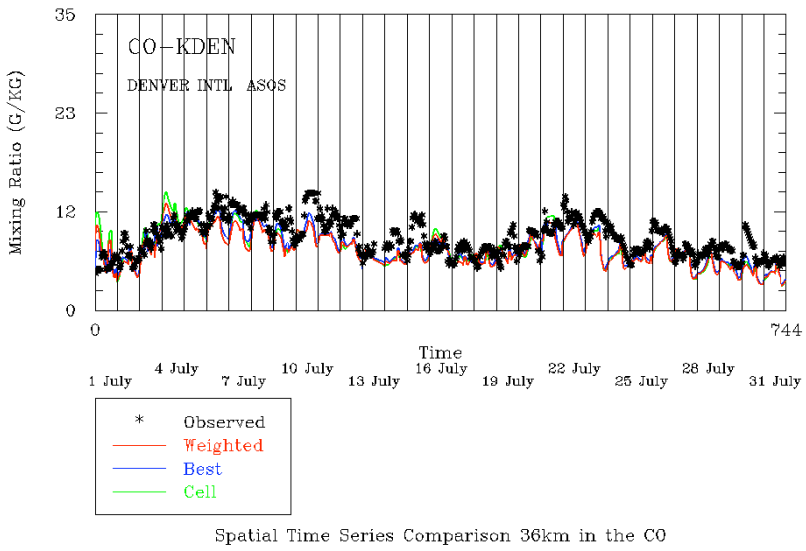
	ALL	CENRAP	MANE_VU	MW	VISTAS	WRAP
WRF 2002	3.24	3.36	3.60	3.35	2.46	3.47
WRAP 2002	2.10	1.80	1.78	1.88	1.83	2.87
VISTAS 2002	2.03	1.64	1.76	1.89	1.71	2.88

Mixing Ratio Results

WRF



WRAP MM5



Mixing Ratio Results (July Bias)

	ALL	CENRAP	MANE_VU	MW	VISTAS	WRAP
WRF 2002	-0.59	-1.01	-1.12	-0.48	-1.08	0.41
WRAP 2002	-0.57	-1.58	-0.30	-0.22	-0.21	-0.09
VISTAS 2002	0.08	-0.14	0.13	0.30	0.06	0.18

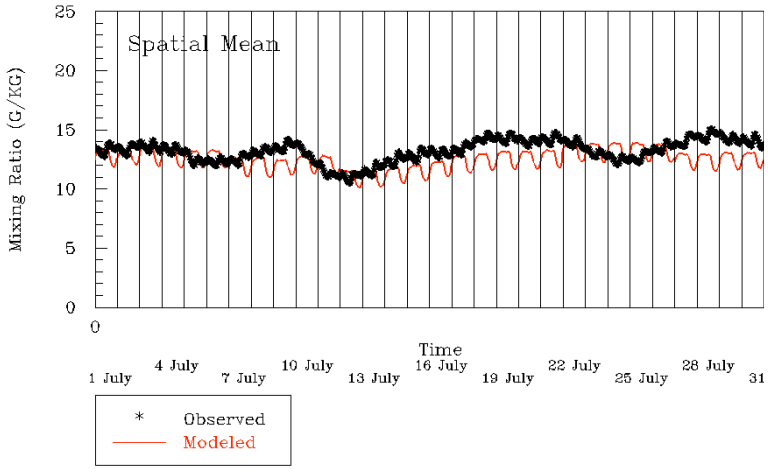
Mixing Ratio Results (July Error)

	ALL	CENRAP	MANE_VU	MW	VISTAS	WRAP
WRF 2002	2.37	2.56	2.79	2.98	2.05	1.87
WRAP 2002	1.75	2.38	1.31	1.46	1.49	1.64
VISTAS 2002	1.55	1.68	1.22	1.40	1.63	1.57

Open "Issues"

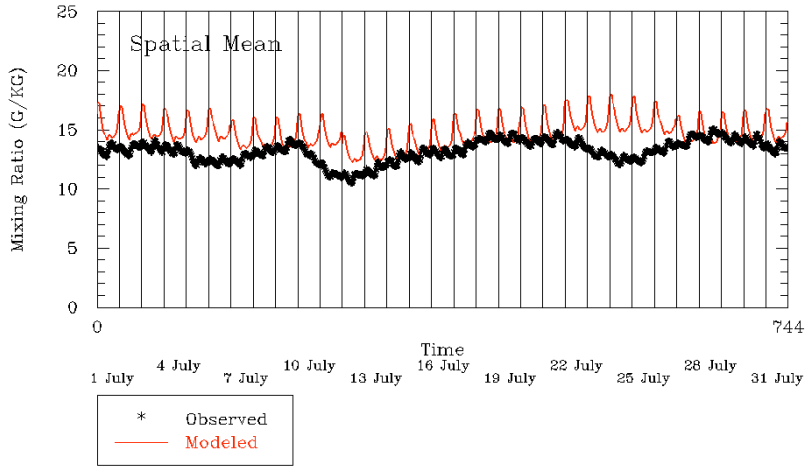
Zero Z Moisture Spike

Q2



Neighborhood Spatial Mean 36km in the ALL

Layer 1



Neighborhood Spatial Mean 36km in the ALL

Open "Issues"

Lack of support for nesting in "REAL" preprocessor makes simulation cumbersome

Model application guidance would be useful

WRF Runtimes

Difficult to Compare to MM5

- Different Options (MM5 more complex)
- MM5 Uniprocessor/WRF MPI

MM5: 12 Days/5.5 Day Simulation on 1 Processor

WRF: 2.25 Days/5.5 Day Simulation on 8 Processors

(~13 Days/5.5 Day Simulation on 1 Processor)

Potentially Useful Tools

Converter from WRF NCF into I/O API

Converter input WRF NCF file and outputs I/O API Compliant File.

Converter Run script selects variables of interest to extract and can perform unit conversions.

Available upon Request.

Further Work

MUCH still to do…

- Extend evaluation to wind and precipitation
- Examine choice of Physics options
- WRF in flux, repeat with newer model