A Real-time Air Quality Forecasting System for AIRPACT

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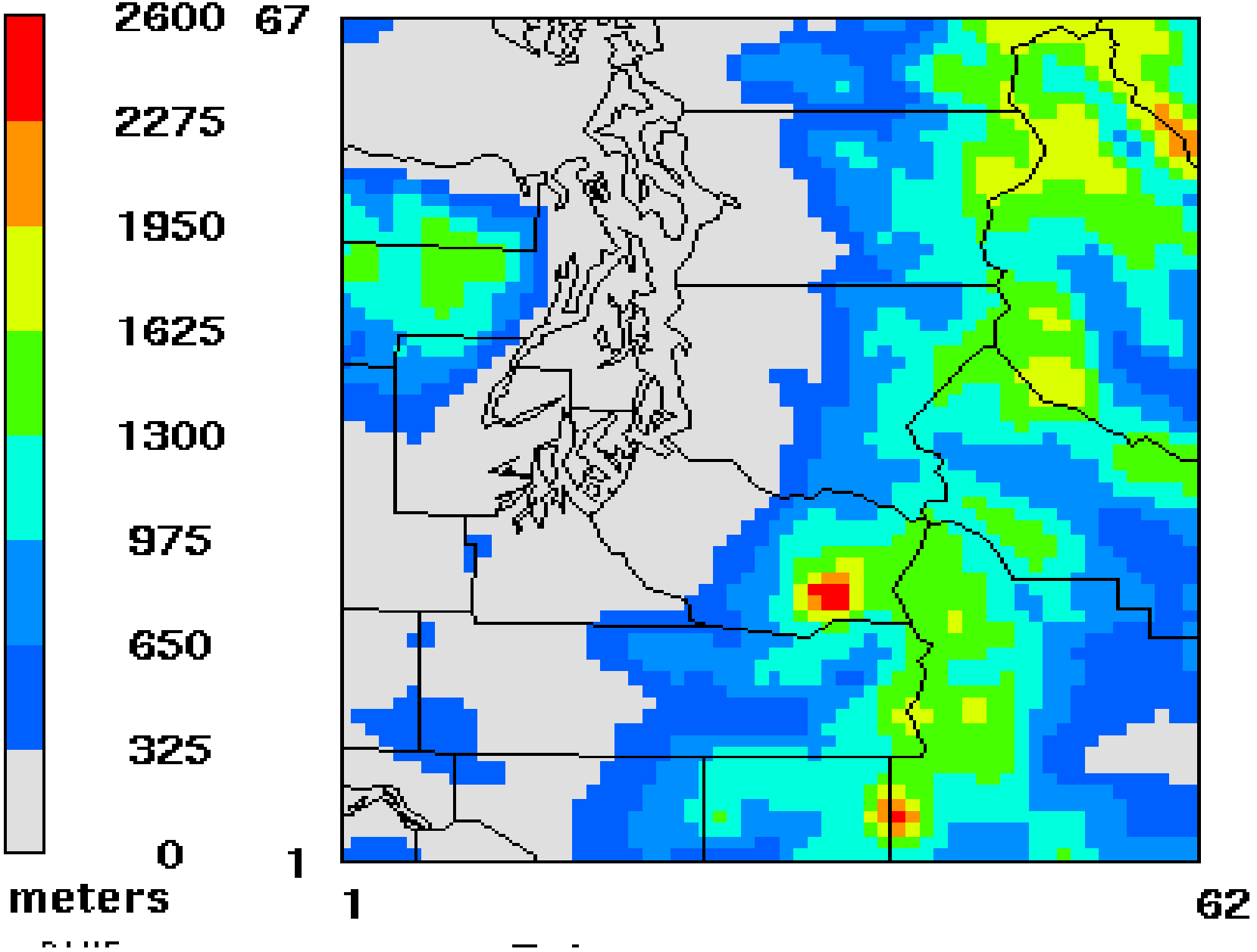
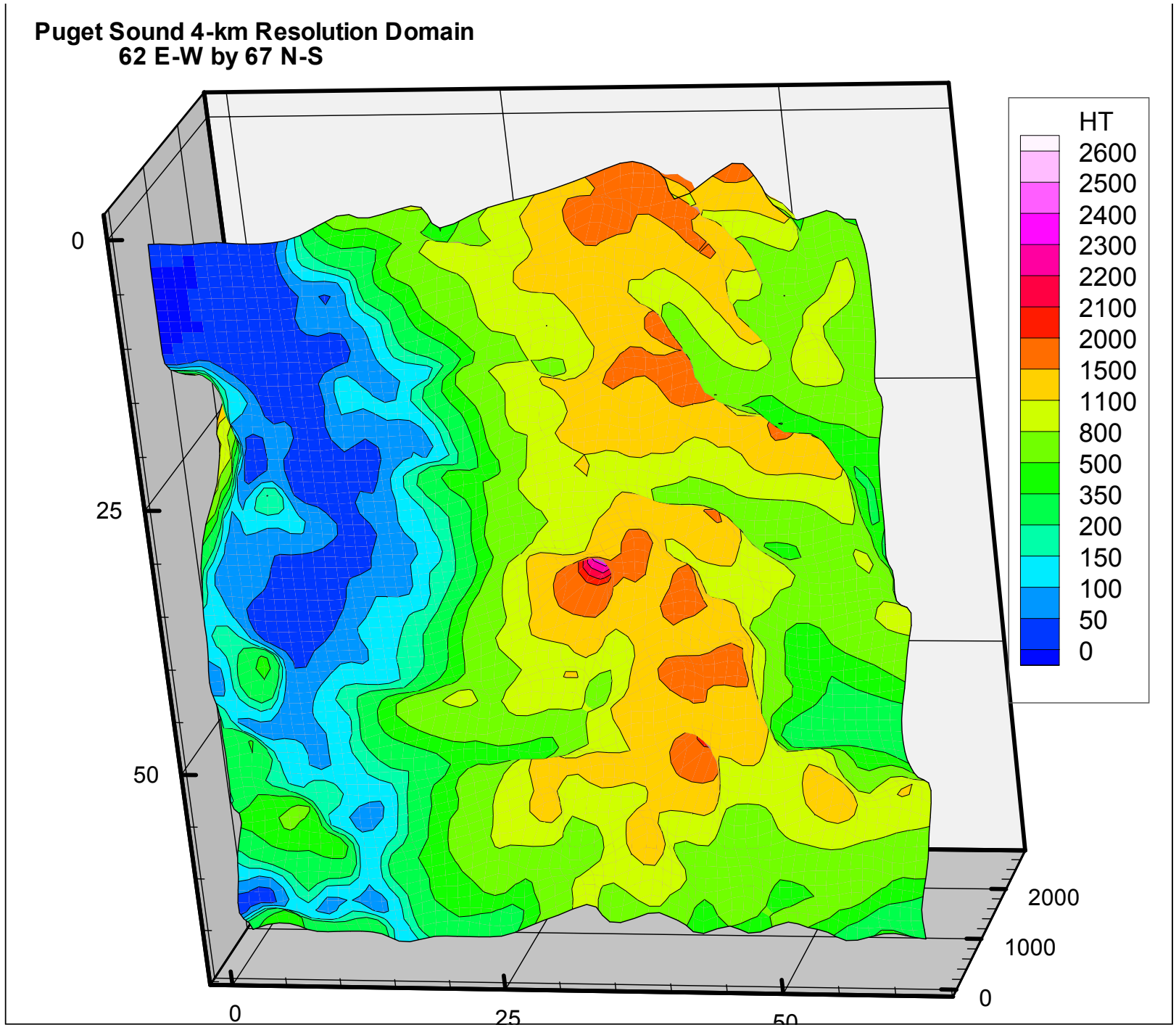
AIRPACT: Air Indicator Reporting for Public Access and Community Tracking

- EPA EMPACT project (Rob Wilson, EPA X)
- Exploit UW MM5 (operational met forecasts).
- Apply CALMET/CALGRID Eulerian photochemical modeling system (or other).
- Use Ecology's AQ monitoring network for AQ forecast verification.
- PSCAA web-hosting graphics for public access.
- Warn populations at *special* risk of predicted AQ episodes (Jane Koenig at UW).

4 km Resolution

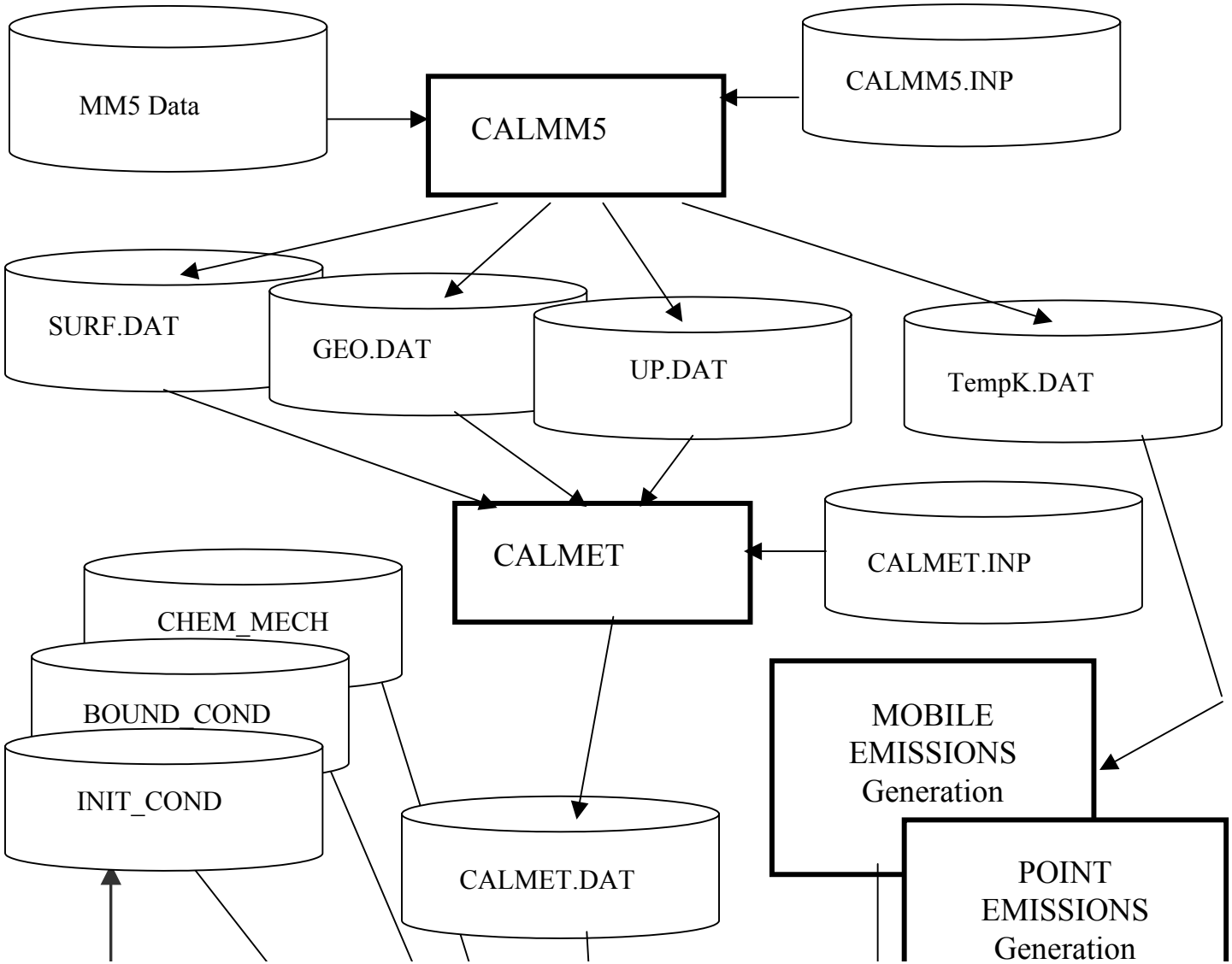



Puget Sound 4-km Resolution Domain
62 E-W by 67 N-S
HT
2600
2500
2400
2300
2200
2100
2000
1500
1100
800
500
350
200
150
100
50
0
0
25
50
0
25
50
2000
1000
0

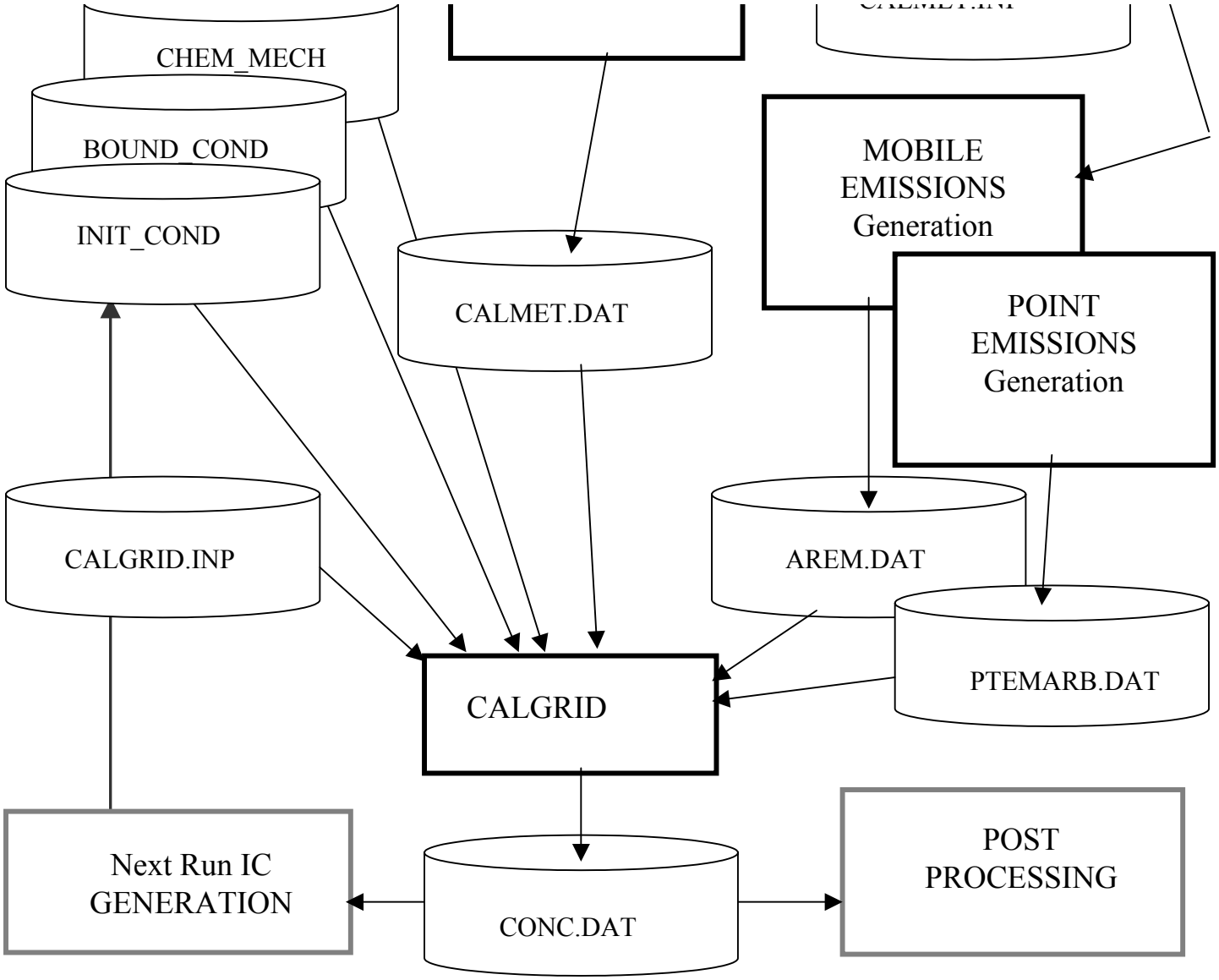
AIRPACT Strategy
use existing tools to build an operational, highly automated, AQ forecasting system

- Use existing models (currently CALMET/CALGRID w/ SAPRC97, maybe CMAQ or MAQSIP?)
- Automate control with perl and csh scripts in unix OS.
- Apply visualization tools for auto-generation of web-hosted graphics (RIP?, NCAR Graphics? netCDF/PAVE?).
- Deliver information to AQ managers in timely manner to permit issuance of public and/or targeted AQ Alerts.

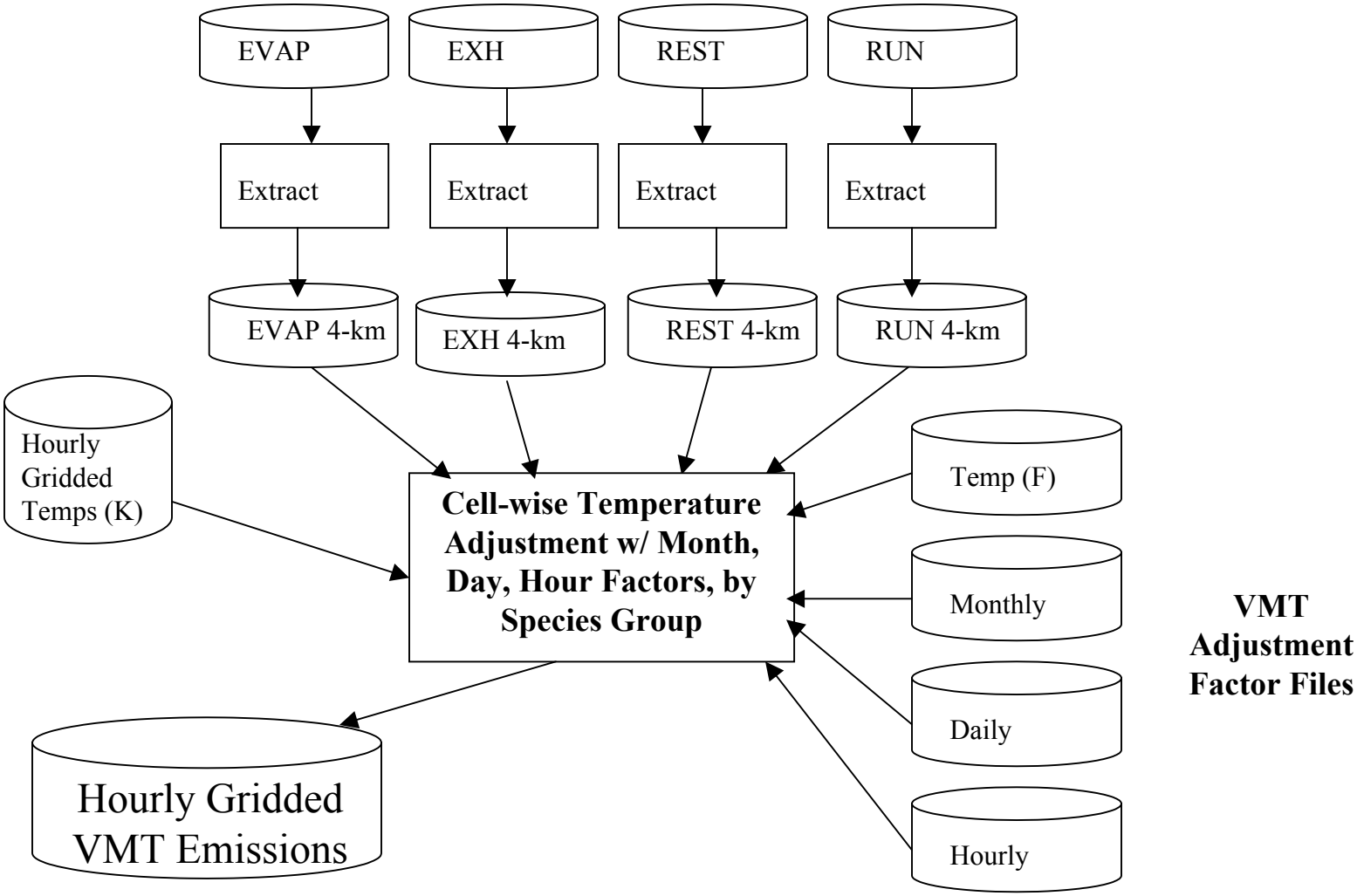
AIRPACT Air Quality Simulation System



AIRPACT Air Quality Simulation System



Mobile Emissions Generation from MM5 Temperatures



AQ forecasting system status and performance

- Operational for testing since last week (2/22/01) and *usually* completes CALGRID successfully.
- Starts after the MM5 4-km run from 00Z initial conditions.
- Uses forecast hours 12 through 36 from MM5 run.
- 24-hour CALGRID run on UW DEC/Alpha (one processor) uses about 4000 sec (~67 min.) CPU time.
- Currently finishes by ~ 1 AM PST.

AQ forecasting system **caveats!**

- Insufficient MM5 boundary layer information is being passed through CALMET. (New CALMET?)
- CALGRID isn't particulate capable model.
- Don't have automated visualization (our current priority).
- Don't have biogenics nor non-mobile 'arem' processors.
- Don't have automated verification.
- Want to run to forecast hour 52 to get to 8 PM (PST) of second day to give longer lead time for AQ managers to evaluate situation. This requires 16 more hours of 4-km MM5!
- Don't have IC/BC generation for 'daisy-chaining' from one run to the next.

Example: 2001/02/27

Mobile Area Emissions

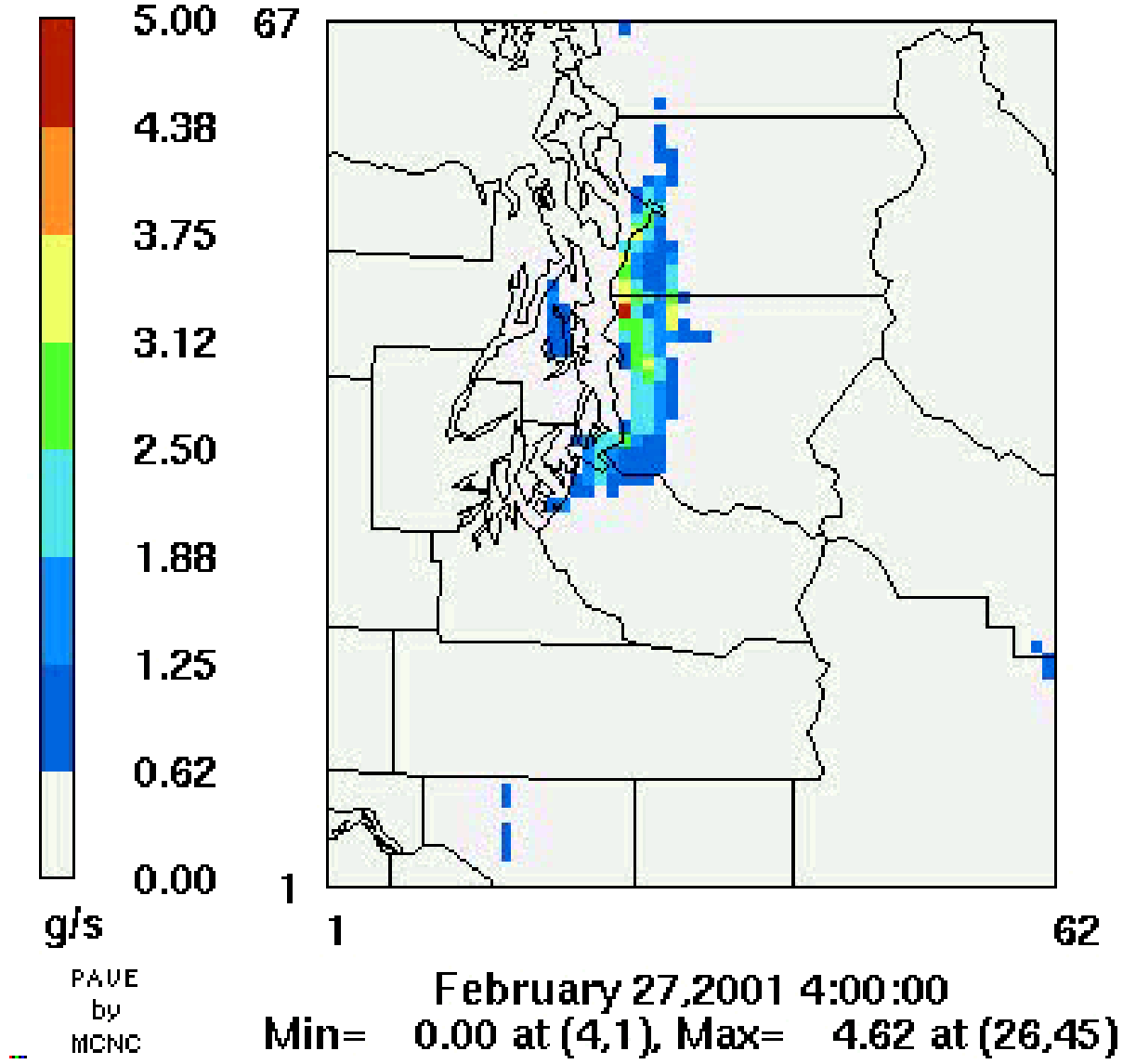
- ALK1
- CO
- NO2

Pollutant Forecasts

- CO
- NOx
- O3

Layer 1 Mob. Emis. ALK1

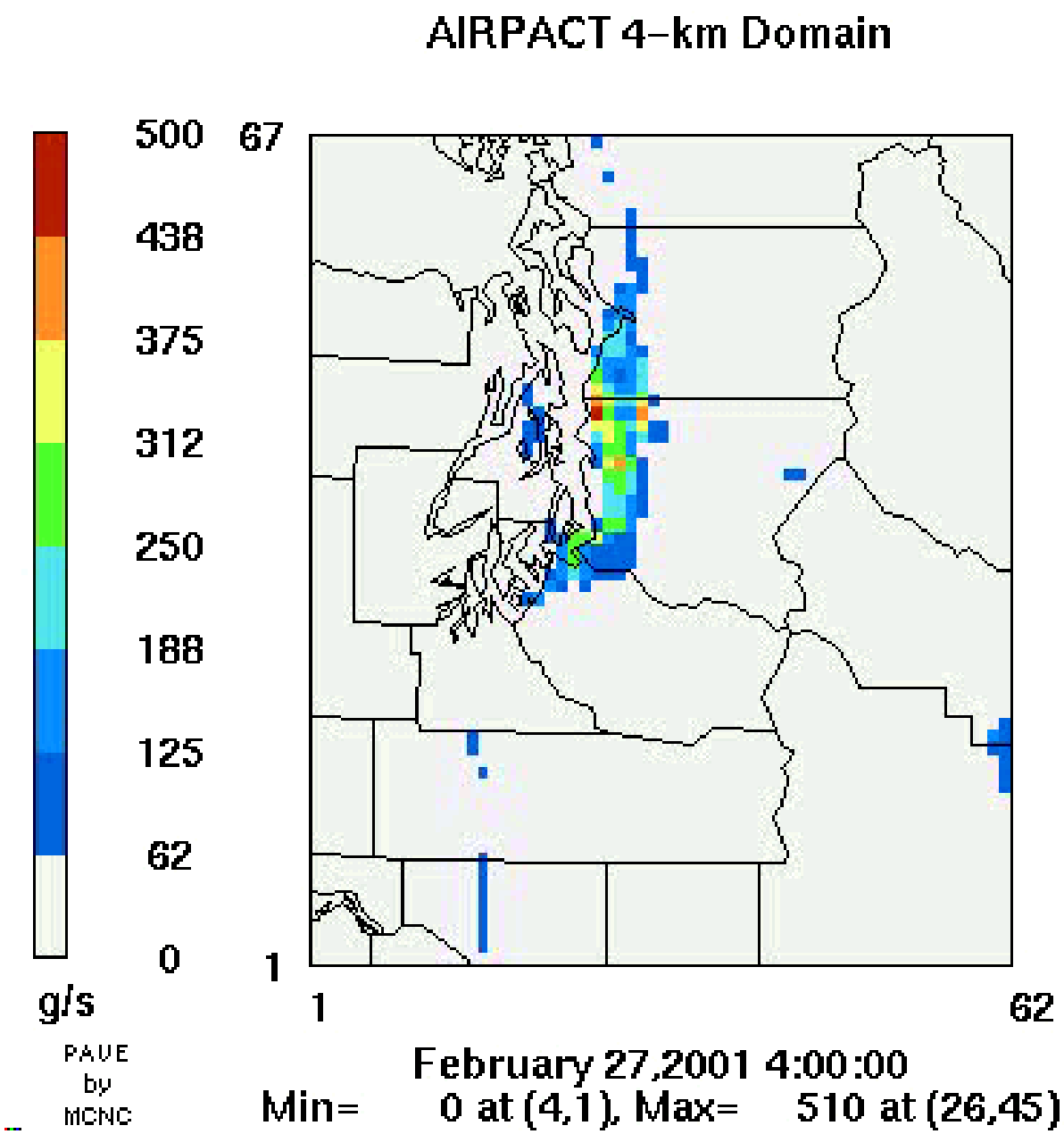
AIRPACT 4-km Domain



February 27,2001 4:00:00

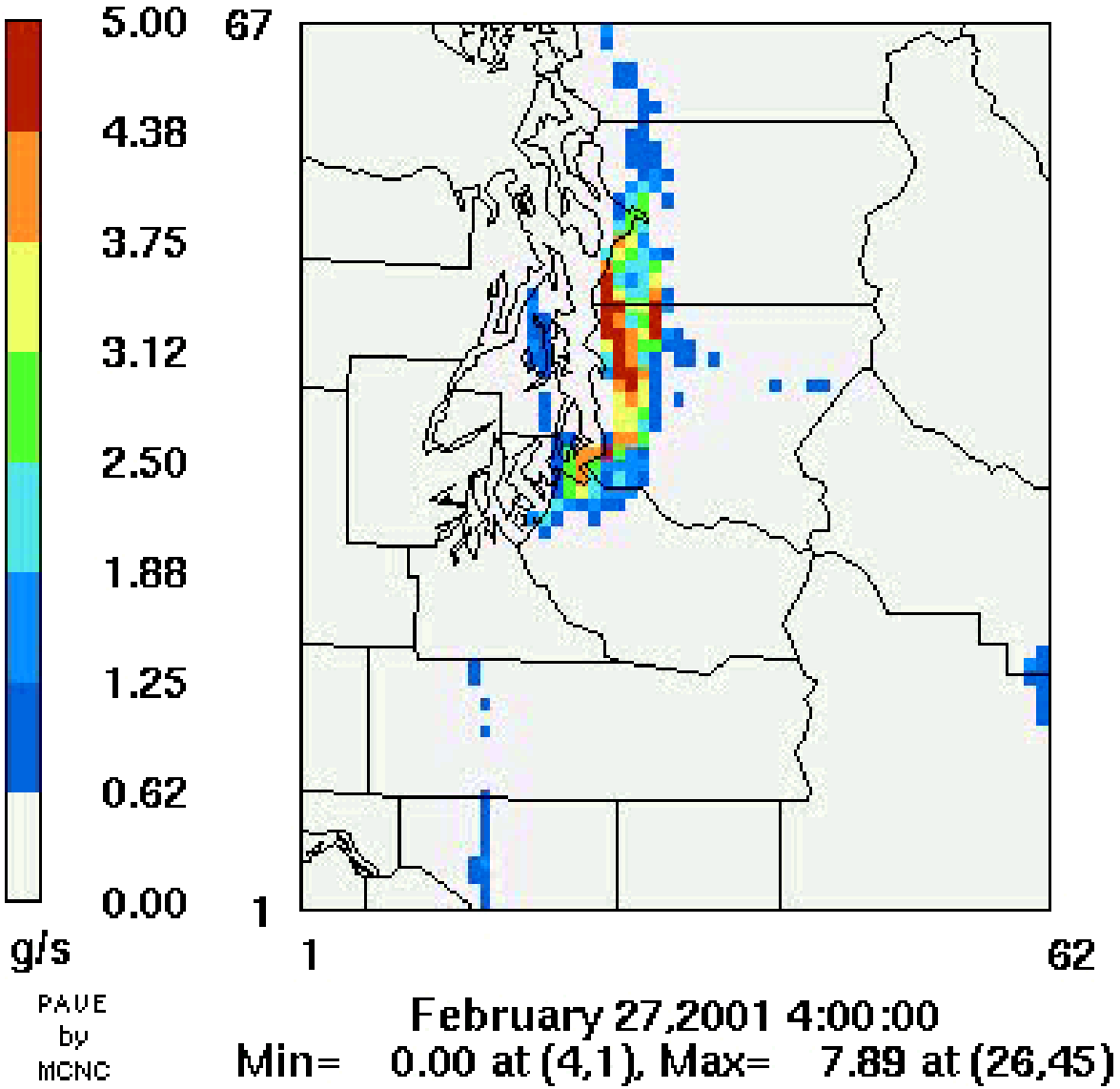
Min= 0.00 at (4,1), Max= 4.62 at (26,45)

Layer 1 Mob. Emis. CO



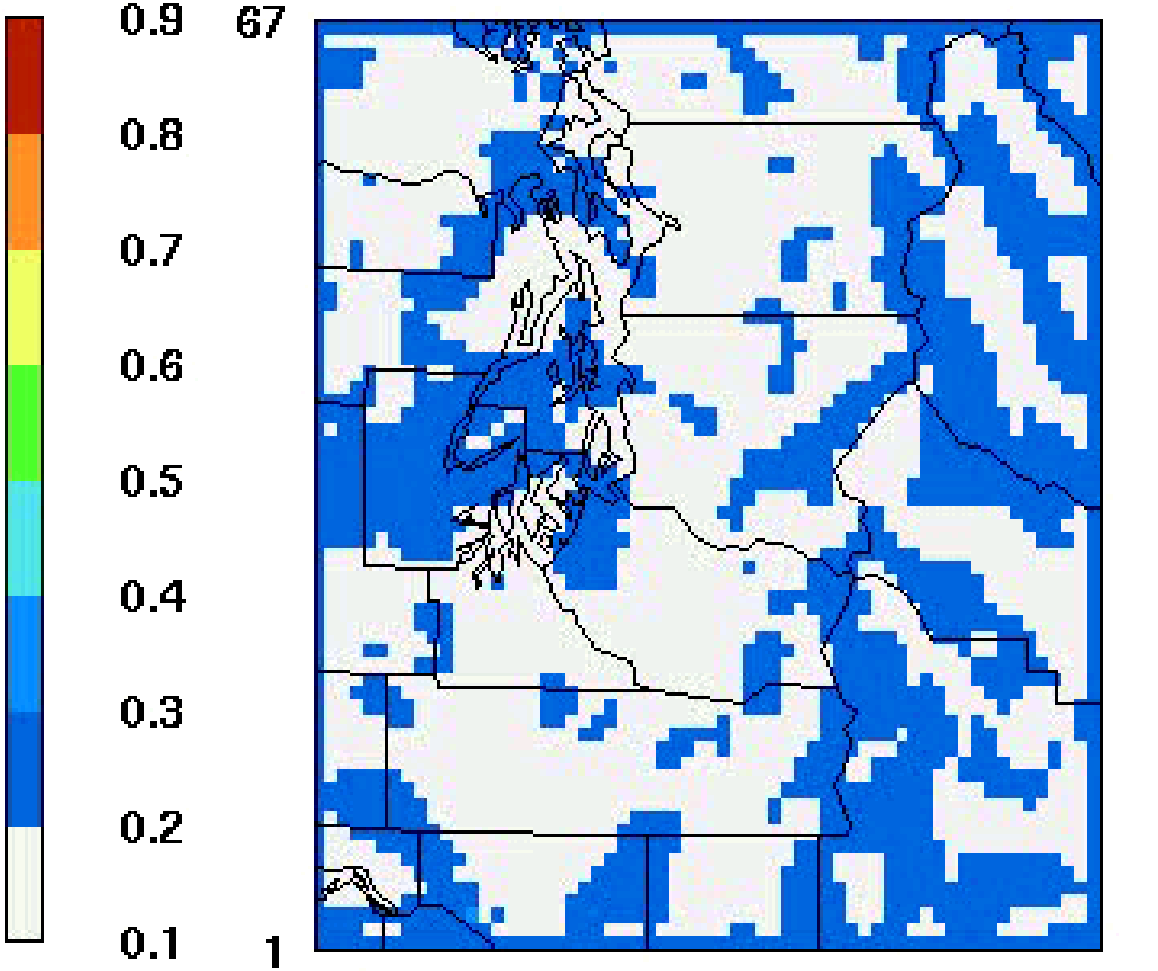
Layer 1 Mob. Emis. NO2

AIRPACT 4-km Domain



Layer 1 CALGRID CO

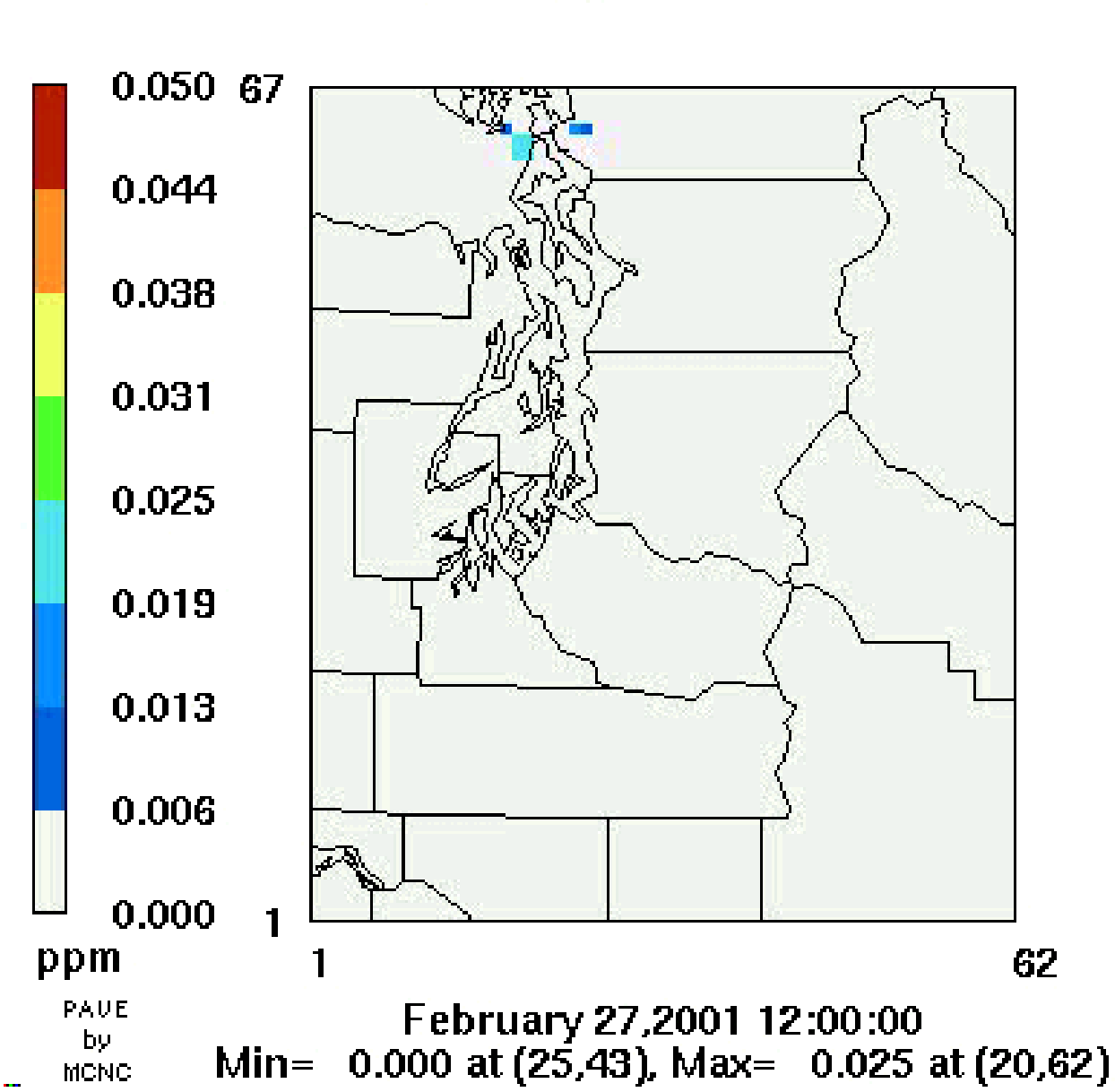
AIRPACT 4-km Domain



February 27,2001 12:00:00

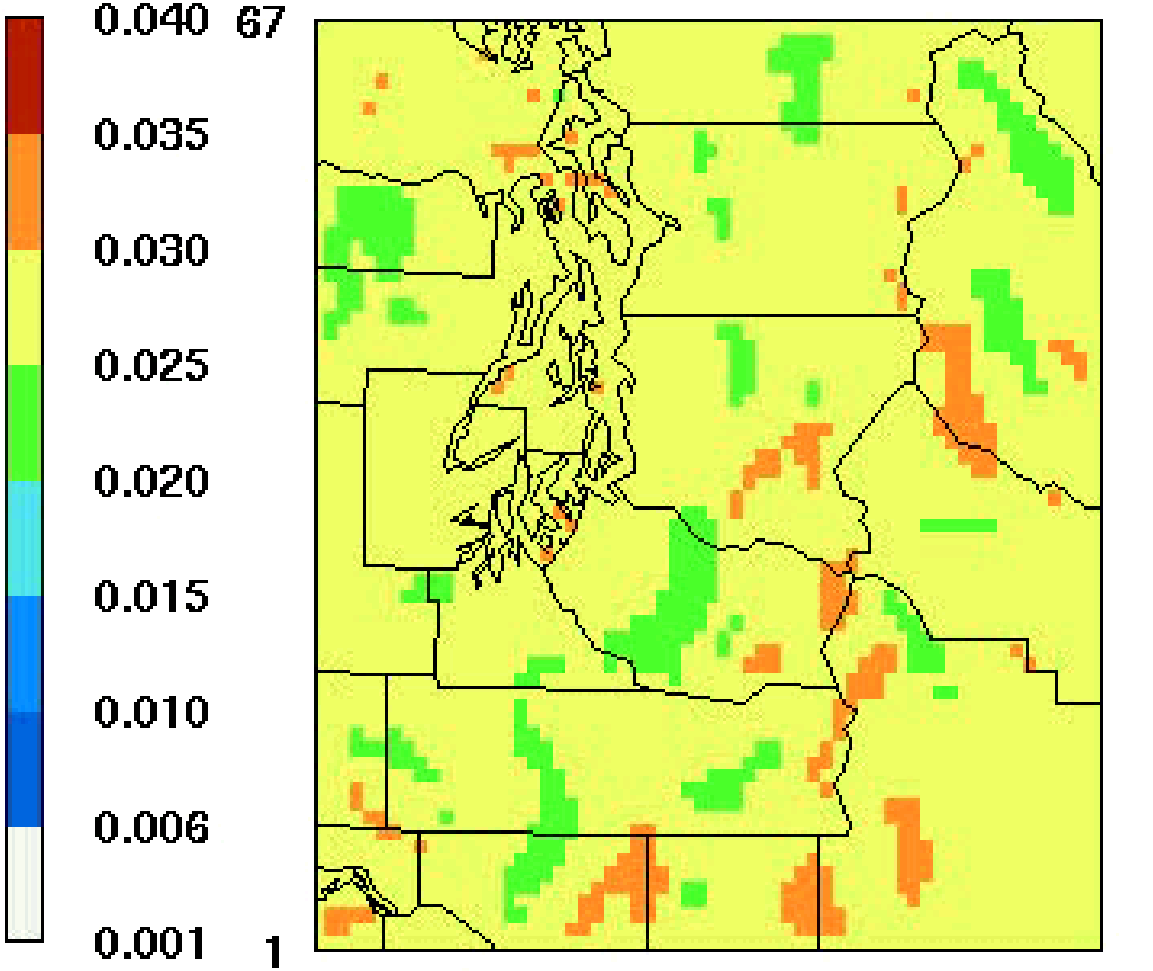
Min= 0.2 at (30,5), Max= 0.3 at (13,3)

Layer 1 CALGRID NOx



Layer 1 CALGRID O3

AIRPACT 4-km Domain



February 27,2001 12:00:00

Min= 0.022 at (58,58), Max= 0.034 at (40,4)

Conclusions

- System is not ‘right’, but it is a system!
- System provides opportunity to evaluate models through daily run and verification against sensor observations.
- Less than half way through two year project and system is running.
- Potential to feed back to emissions inventory generation and refinement.

Acknowledgments

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