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).
Puget Sound 4-km Resolution Domain
62 E-W by 67 N-S
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

CALMET
CALGRID.INP
CHEM_MECH
BOUND_COND
INIT_COND
MOBILE EMISSIONS Generation
POINT EMISSIONS Generation
CALMET.DAT
AREM.DAT
PTEMARB.DAT
CONC.DAT
Next Run IC GENERATION
POST PROCESSING
Mobile Emissions Generation from MM5 Temperatures

Cell-wise Temperature Adjustment w/ Month, Day, Hour Factors, by Species Group
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**

<table>
<thead>
<tr>
<th>Mobile Area Emissions</th>
<th>Pollutant Forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ALK1</td>
<td>• CO</td>
</tr>
<tr>
<td>• CO</td>
<td>• NOx</td>
</tr>
<tr>
<td>• NO2</td>
<td>• O3</td>
</tr>
</tbody>
</table>
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

AIRPACT 4-km Domain

February 27, 2001 12:00:00
Min = 0.000 at (25,43), Max = 0.025 at (20,62)
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)

ppm
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.
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