Emission Inventory Conference
San Diego, California
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Emission Inventory Preparation for Air Quality Modelling in the Pacific Northwest

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PNW Modelling Project

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Study design

- Prepare MC2 meteorological data for input to SMOKE and CMAQ
- Compile and process EI data through SMOKE
- Perform base case air quality modelling over 12-km and 4-km domains for two episodes
  - Summer: August 9 to 20, 2001
  - Winter: December 1 to 12, 2002
- Perform air quality modelling for transboundary and future year emission scenarios

PNW Model Domains

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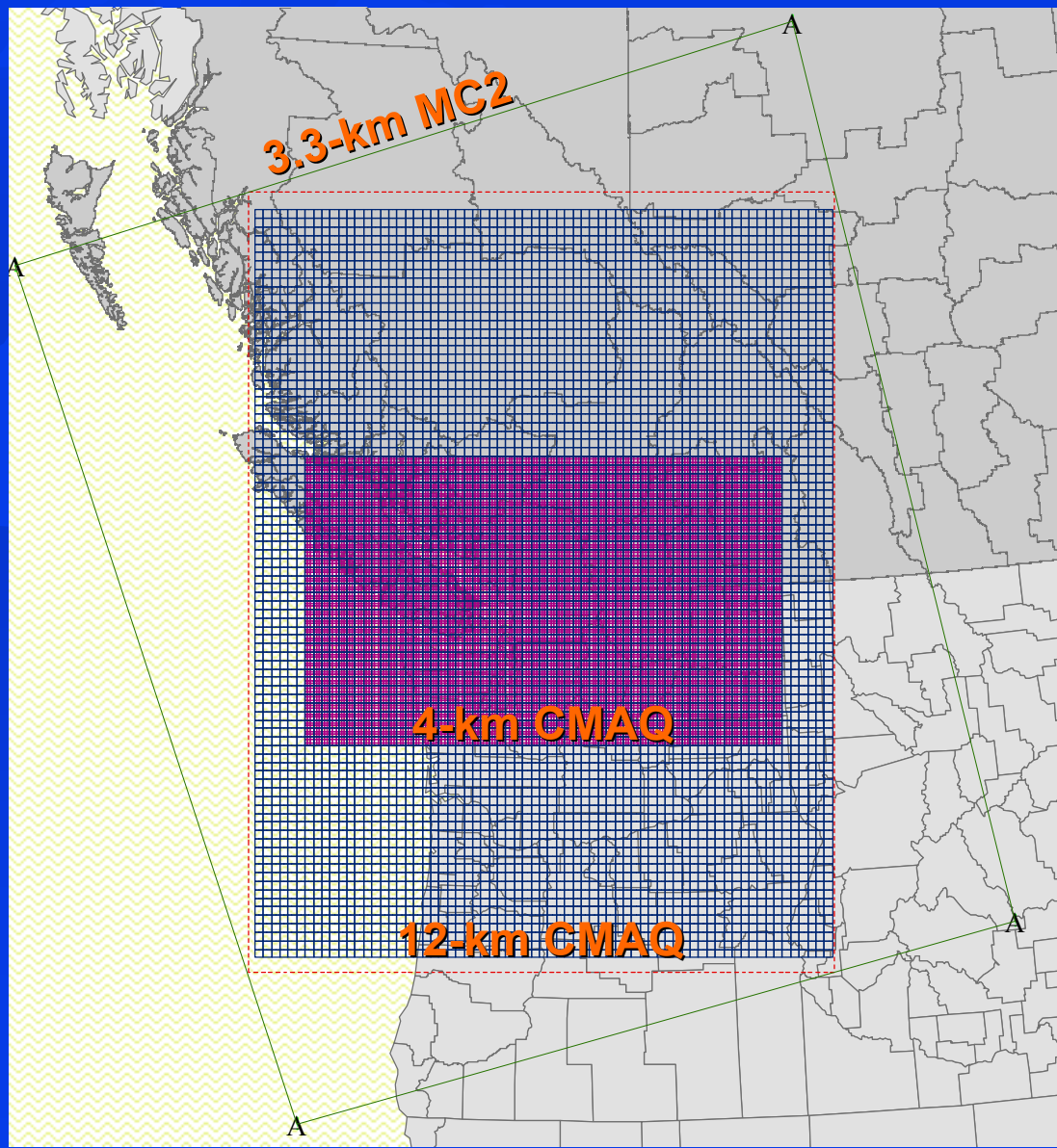
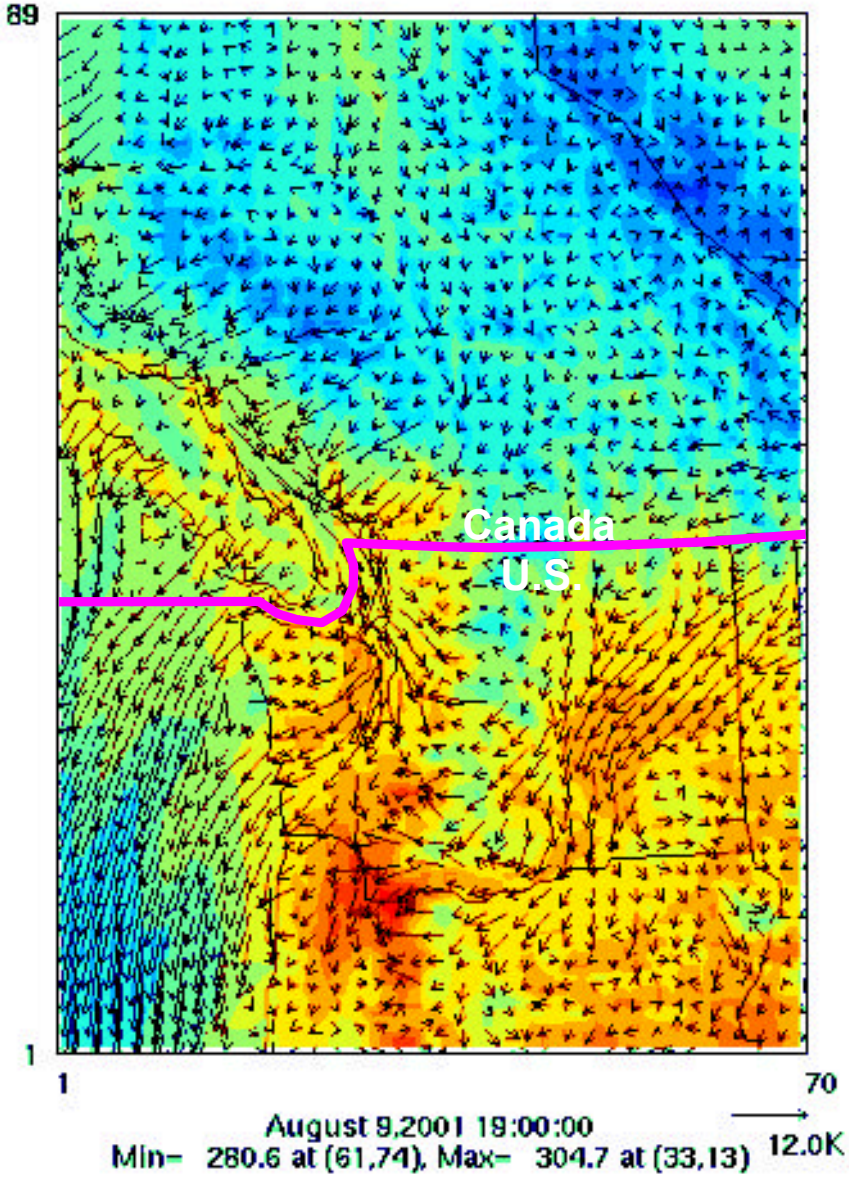
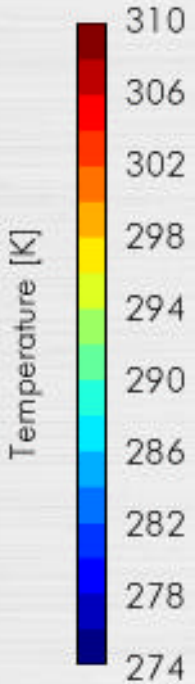
MC2 ® MCIP2 Conversion

Environment Canada's MC2 model output used to run SMOKE and CMAQ

- Map model specific meteorological parameters
- Projection conversion (Polar Stereographic to Lambert Conic Conformal)
- Horizontal interpolation
- Vertical interpolation (sigma level computations)







Surface Wind and Temperature Fields
August 2001 Base Case. 12-km Grid Domain
Pacific Northwest IAQMP

True North

Video #2
Prepared by: VCT
Project #W03-121A

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March 10, 2003

Emission Inventory Compilation

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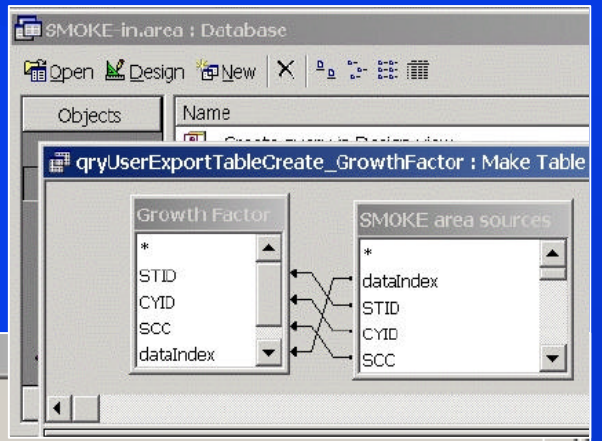
Emission Inventory Data

- GVRD/FVRD, 2000 (GVRD)
- Whatcom county, year (GVRD)
- Canada/US marine, 2000 (GVRD)
- BC and Alberta,1995 CAC EI (EC)
- US, 1996 mobile grown to 2003 (WSU)
- US, 1996 area grown to 2001 (EPA / RWDI)
- Washington state, points, 1999 (Wash. DOE)
- Rest of US, 1996 point inventory (EPA)
- Biogenics processed through BEIS2 (RWDI)

RWDI's "SMOKE-In" EI Tool

- Microsoft ACCESS Database Tool
- Import EC NET and SMOKE IDA files
- Combine multiple EI data Files
- Query, sort, growth factors, QA/QC, etc.
- Export SMOKE IDA data files



SMOKE Area Source Emissions

COUNTRY: Canada

YEAR: 1996

Data Set Description: demonstration data

Pollutant List:

1	CO
2	NH3
3	NOx
4	PM10
5	PM25
6	SOx
7	VOC

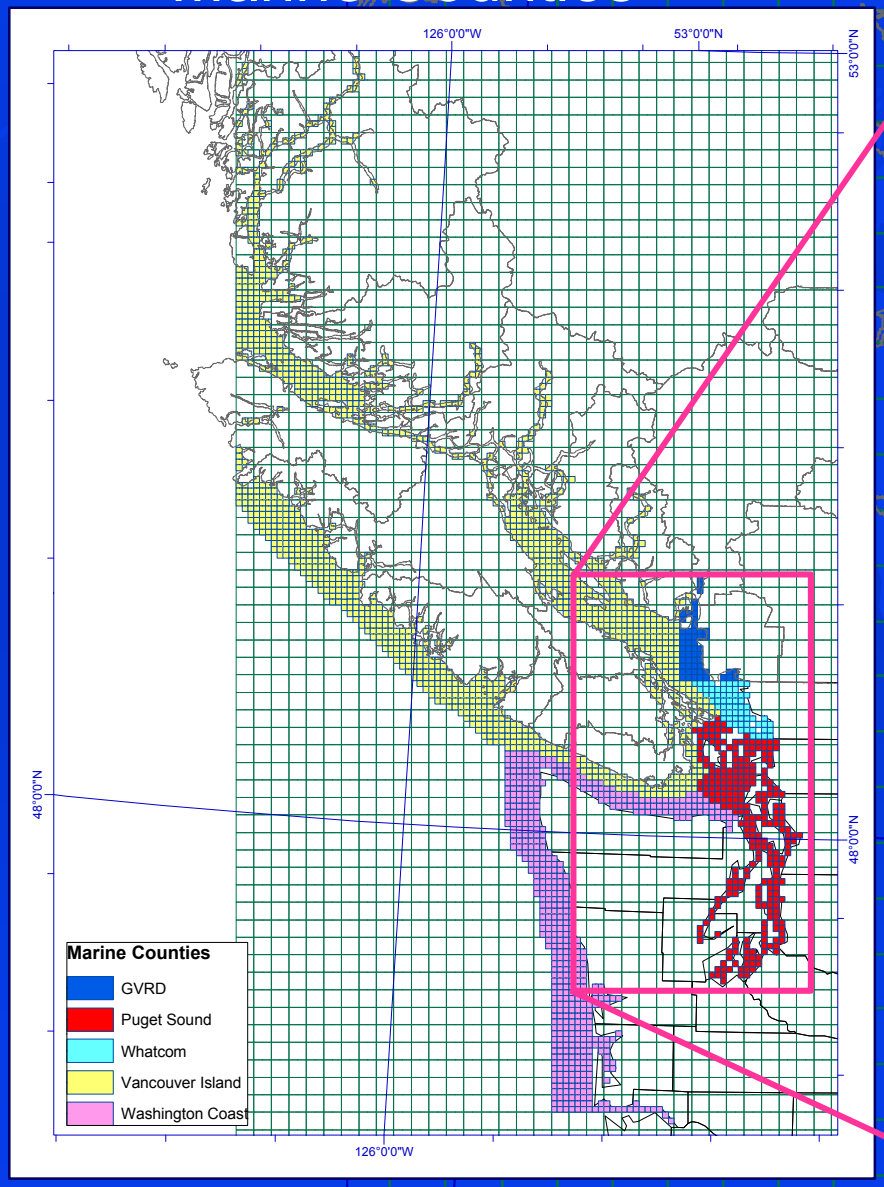
Annual Emissions (short tons/year)

Province Code (STID)	Census Div (CYID)	SCC		NOx Annual Emmissions	PM10 Annual Emmissions	PM25 Annual Emmissions	SOx Emm
1	3	2102002000	4	2.934	135.6597	3.0584	
1	3	2102004000	6	1.292	17.126	0.3549	
1	3	2102006000	3	89.694	0.4161	1.9976	
1	3	2103001000	1	0	2.9847	0.5647	
1	3	2103002000	7	0.518	6.9737	0.0269	
1	3	2103004000	9	2.187	34.1609	0.4972	

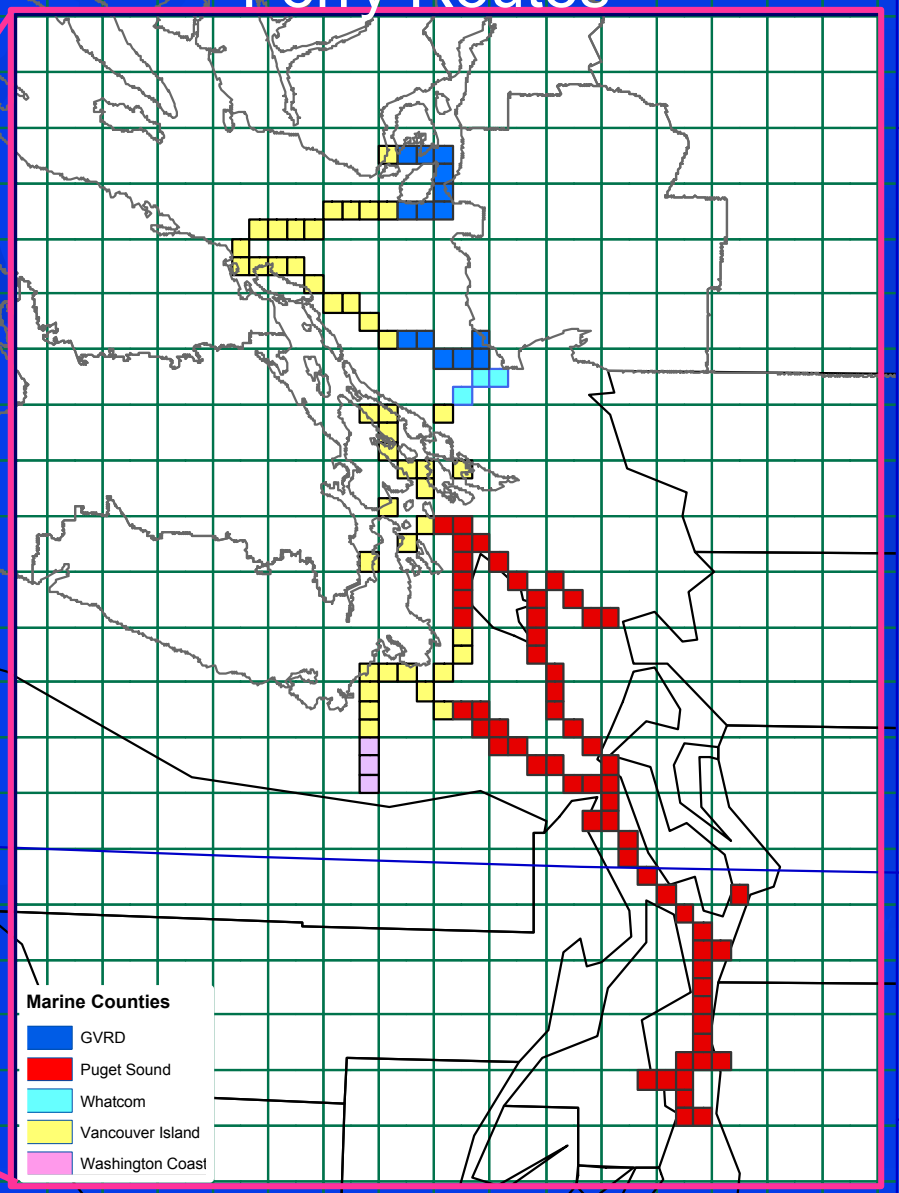
Subform Datasheet
Filter By Selection
Filter Excluding Selection
Filter For: 22*
Remove Filter/Sort
Cut
Copy
Paste
Sort Ascending
Sort Descending

Allocation of Marine Emissions

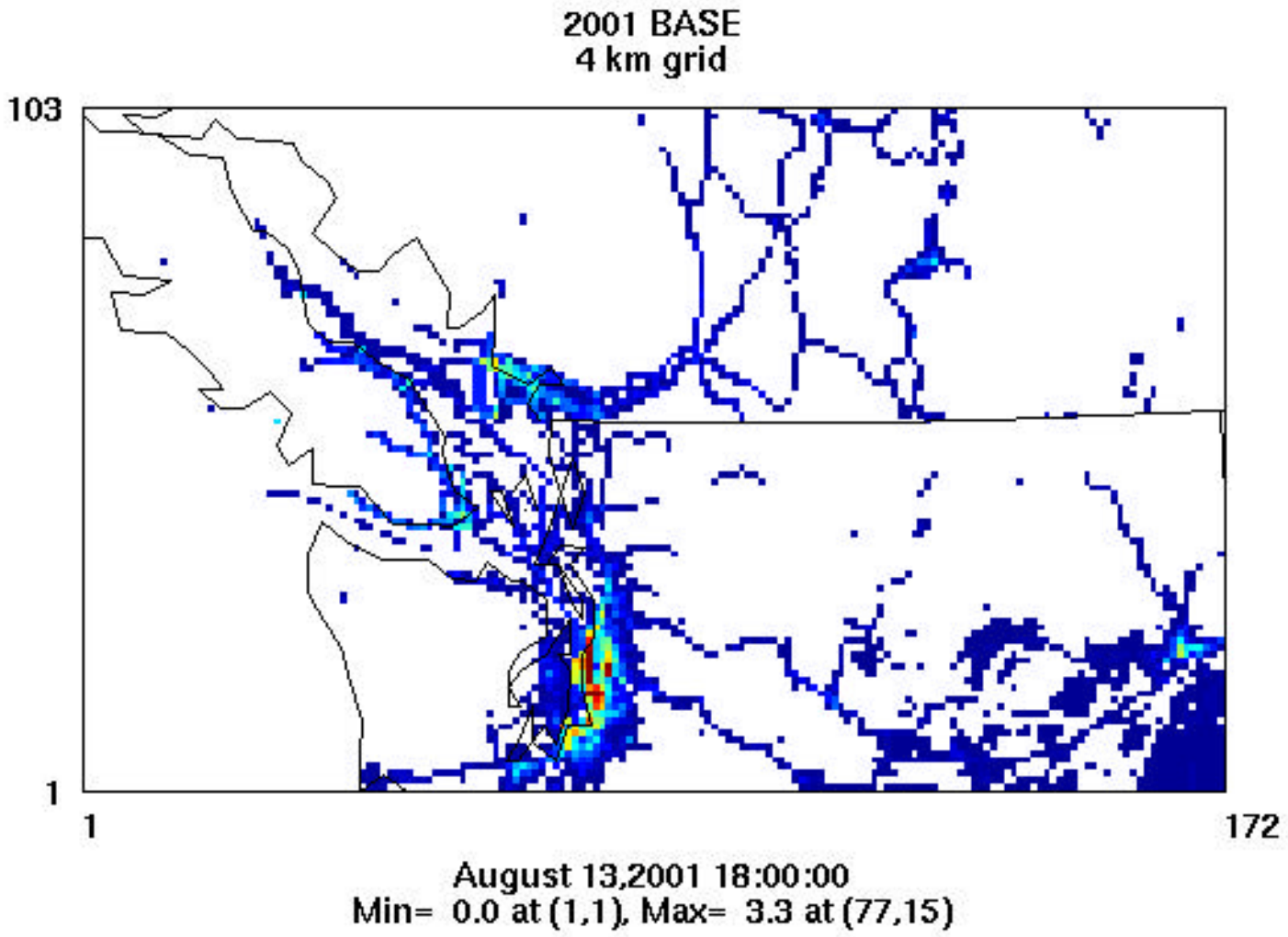
Marine Counties



Ferry Routes



Mobile Emissions: NOx



Mobile NOx Emissions
August 2001 Base Case. 4-km Grid Domain
Pacific Northwest IAQMP

True North

Video #1
Prepared by: VCT
Project #W03-121A

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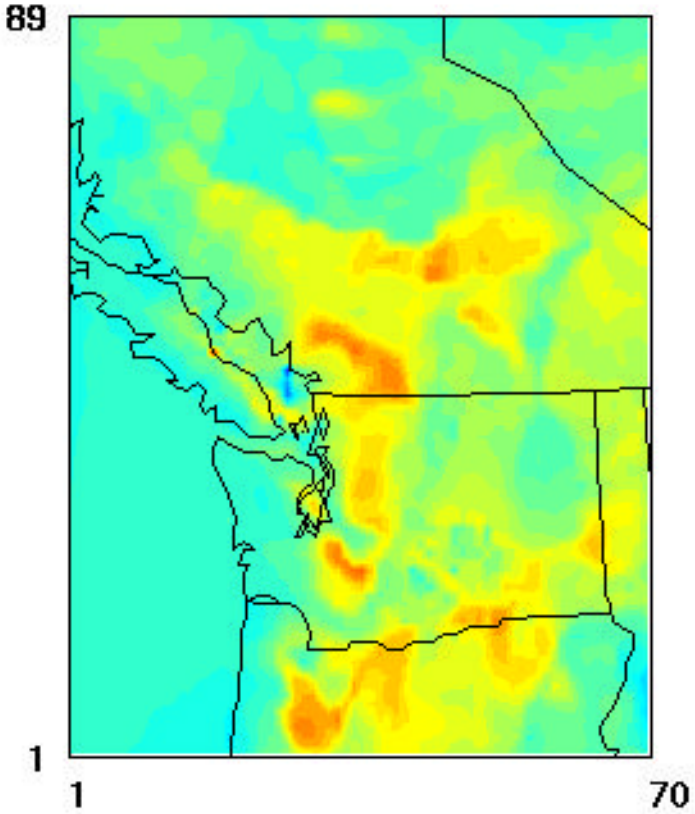
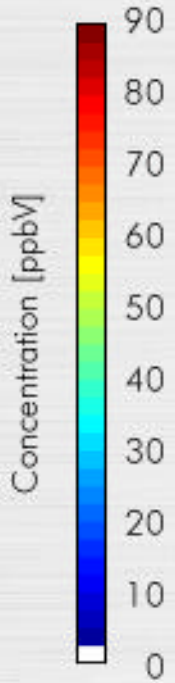
March 10, 2003

O3

2001 BASE
12 km grid



August 14,2001 0:00:00
Min= 16.3 at (27,47), Max= 76.8 at (18,4



Ozone Concentration
August 2001 Base Case. 12-km Grid Domain
Pacific Northwest IAQMP

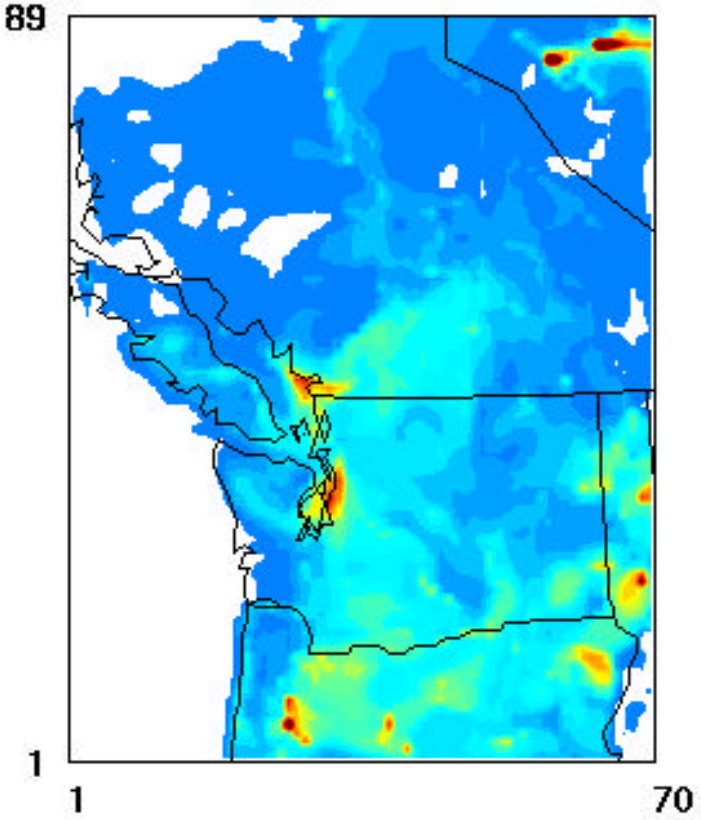
True North

Video #3
Prepared by: VCT
Project #W03-121A

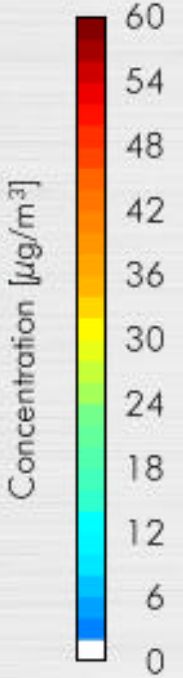
RWDI
March 7, 2003

PM2.5

BASE
12 km grid



August 11,2001 14:00:00
Min= 0.3 at (6,2), Max=135.9 at (64,86)

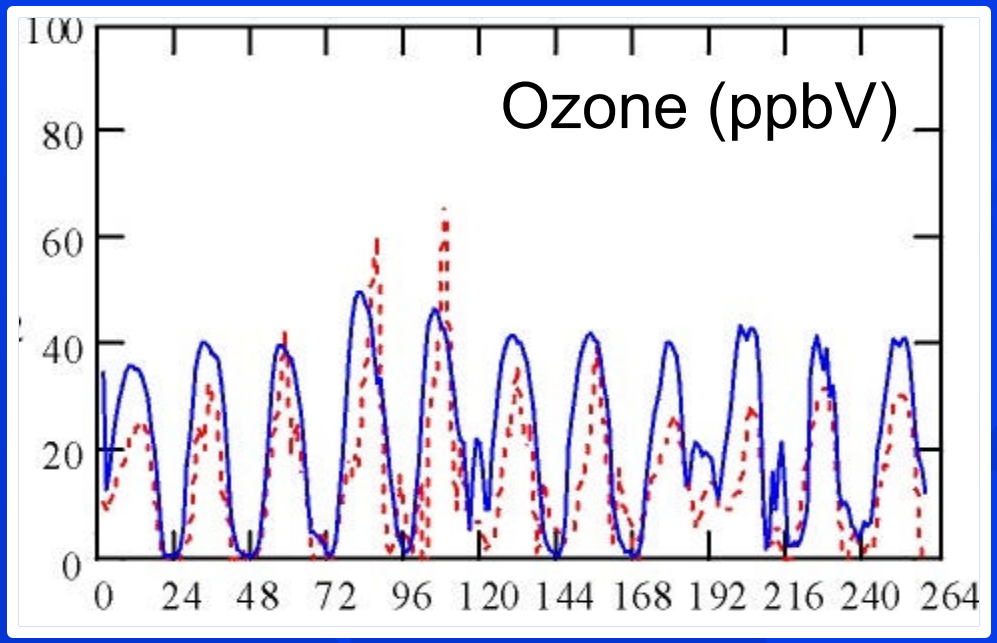


PM 2.5 Concentration
August 2001 Base Case. 12-km Grid Domain
Pacific Northwest IAQMP

True North

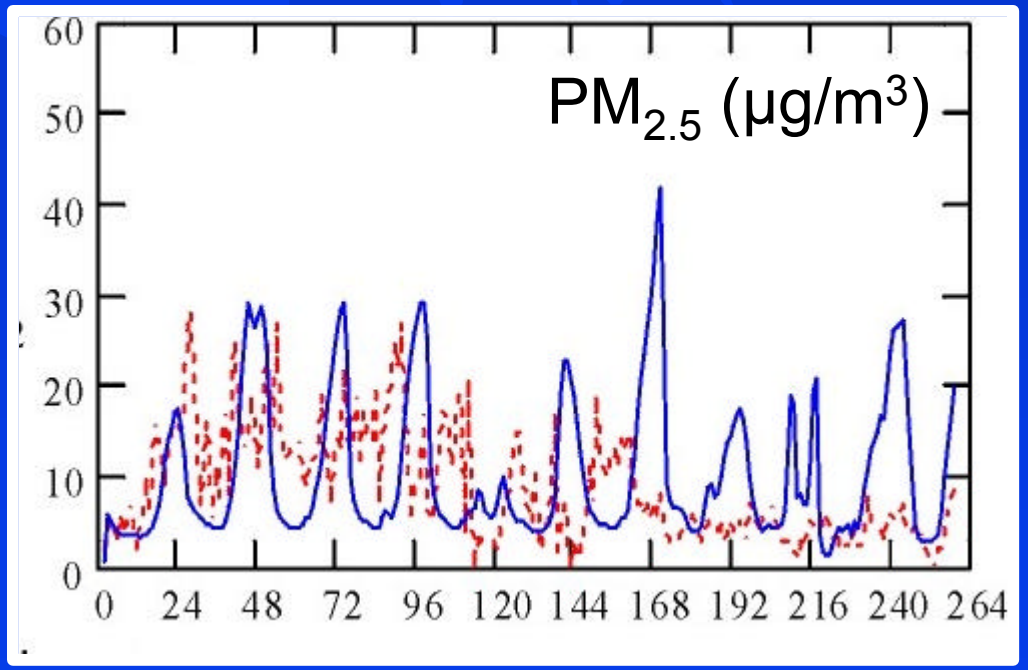
Video #5
Prepared by: VCT
Project #W03-121A

RWDI
March 7, 2003



Vancouver

RWDI

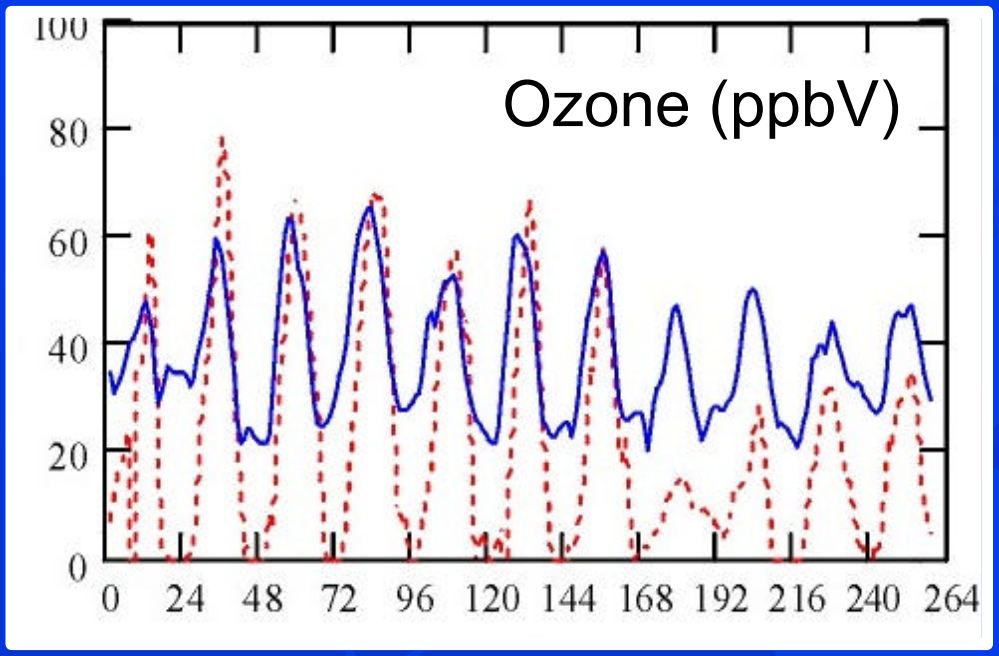


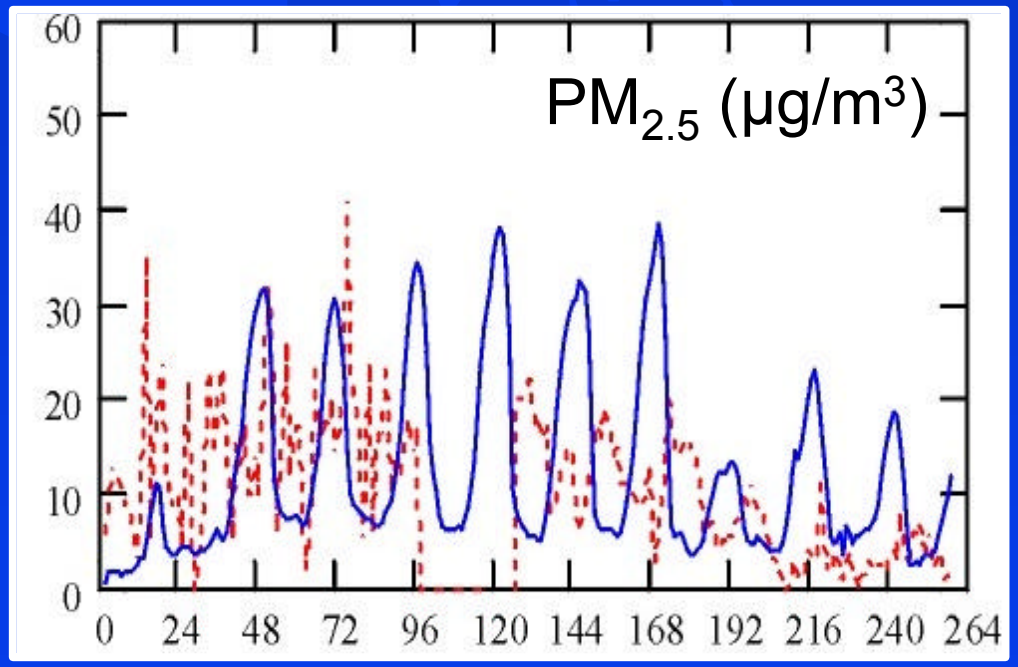
Legend

Modelled

Measured

Chilliwack





Legend

Modelled

Measured

PNW Modelling Project

RWDI

Technical Innovations by RWDI

- CMAQ recompiled and run on Linux in parallel on a 6-node cluster
- Developed software to convert MC2 to MM5
- Used 3.3-km MC2 data for 12-km and 4-km SMOKE and CMAQ runs
- Used SMOKE-In to prepare emission data
- Created software to crop, re-index, and interpolate gridded spatial surrogates
- Ran SMOKE v1.3 on Windows platform

PNW Modelling Project

Some Key Conclusions / Summary to Date

- Met data conversion successful
- Emission consolidation and processing successful (VERY time consuming)
- CMAQ results compare well with observations for ozone and $PM_{2.5}$ at 12-km and 4-km res.
  - Daytime peaks and nighttime lows in ozone levels reproduced well in urban areas but overpredicted at night in rural areas
  - $PM_{2.5}$ results better on 24-hour average