OVERVIEW
OF
James Bay Air Quality Monitoring

Greater Victoria Harbour Authority Board Meeting
March 17, 2011

Presented by Eleanor Setton – University of Victoria

VANCOUVER ISLAND health authority
BRITISH COLUMBIA Ministry of Environment
GREATER VICTORIA HARBOUR AUTHORITY
CRD CAPITAL REGIONAL DISTRICT
University of Victoria
ENE
Malaspina University-College
James Bay Neighborhood Environment Association

2007:

James Bay Air Quality Study (JBAQS) Phase I

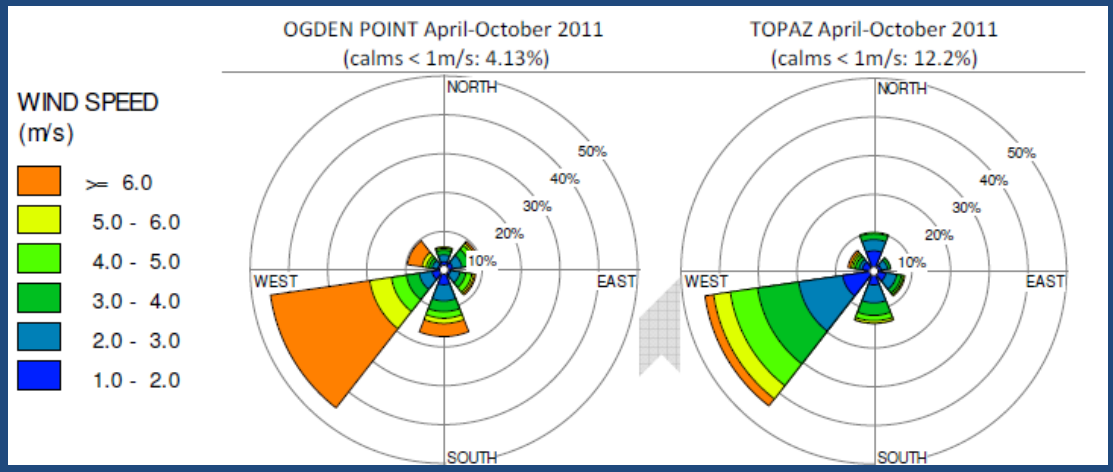
James Bay Air Quality Study (JBAQS) Phase II

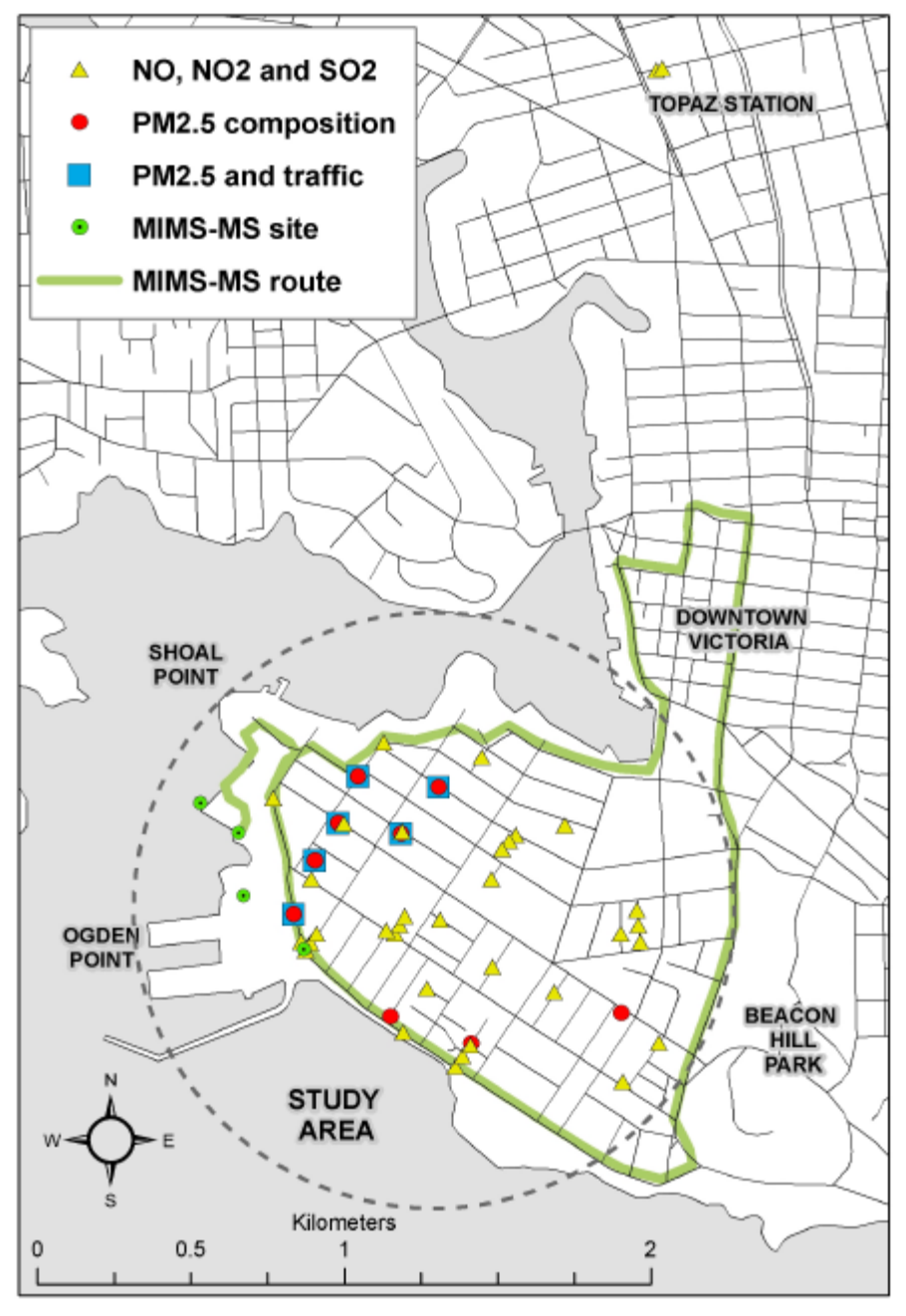
2009:

Mobile Air Monitoring Lab (MAML) Study

2011:

Daniels Site Sulfur Dioxide (SO_2) Study





James Bay Air Quality Study – Phase I Field monitoring

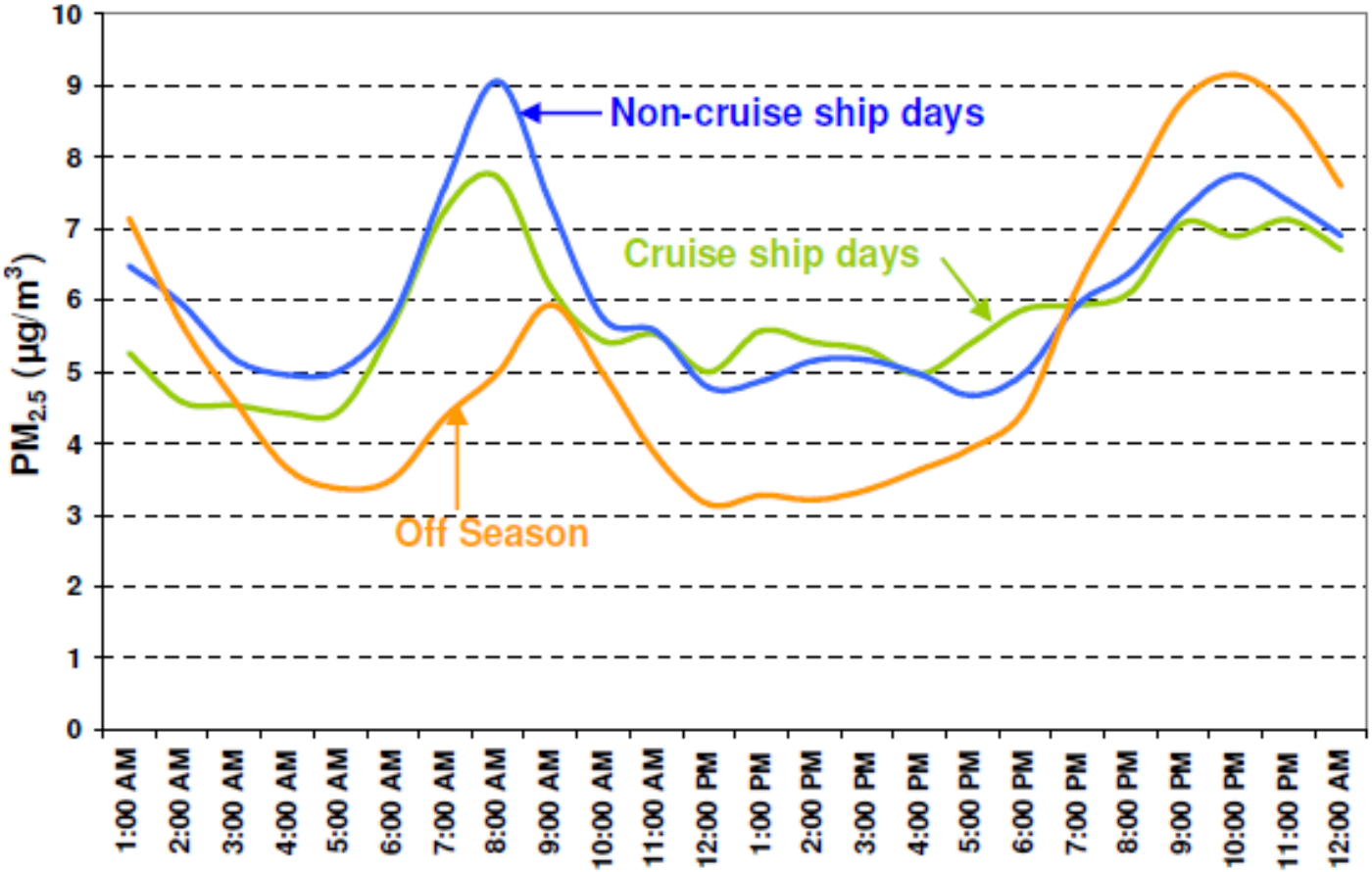
Looked at a variety of pollutants related to:

- vehicle traffic – cars and buses
- marine vessel traffic – cruise ships and ferries
- Air traffic – helijet and floatplane

- Did not find levels of concern for most pollutants
- Unable to measure volatile organic compounds (VOCs) (air traffic)
- Slight indication of short term spikes in SO_2

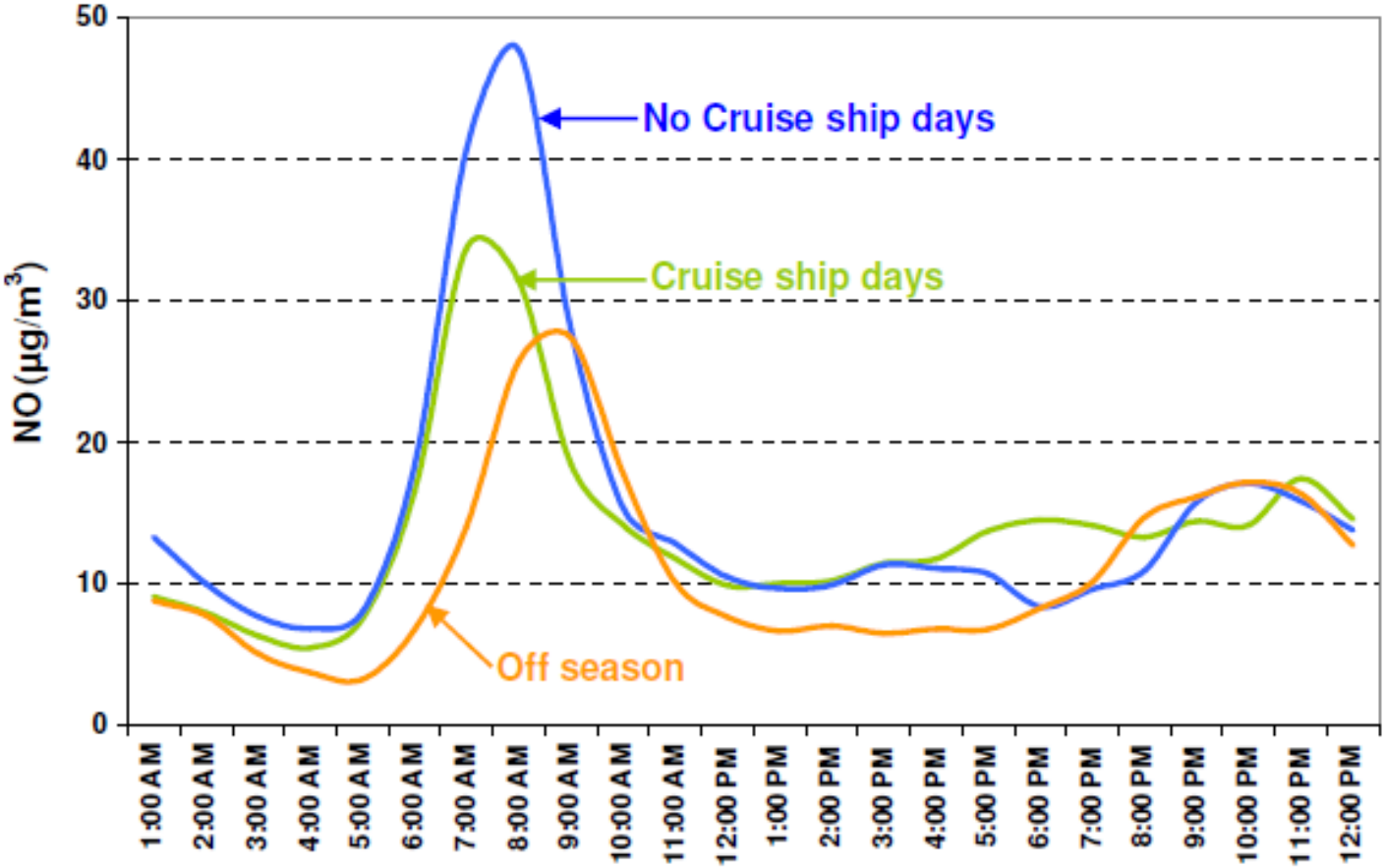
JAMES BAY AIR QUALITY STUDY – PHASE I
TOPAZ STATION ANALYSIS – 2006 DATA

Figure 34. Average diurnal pattern of $PM_{2.5}$ at Topaz Station, 2006 on days with cruise ships, days without, and off season



JAMES BAY AIR QUALITY STUDY – PHASE I
TOPAZ STATION ANALYSIS – 2006 DATA

Figure 13. Average diurnal pattern of NO at Topaz Station, 2006 on days with cruise ships, days without, and off season



JAMES BAY AIR QUALITY STUDY – PHASE I
TOPAZ STATION ANALYSIS – 2006 DATA

Figure 21. Average diurnal pattern of NO_2 at Topaz Station, 2006 on days with cruise ships, days without, and off season

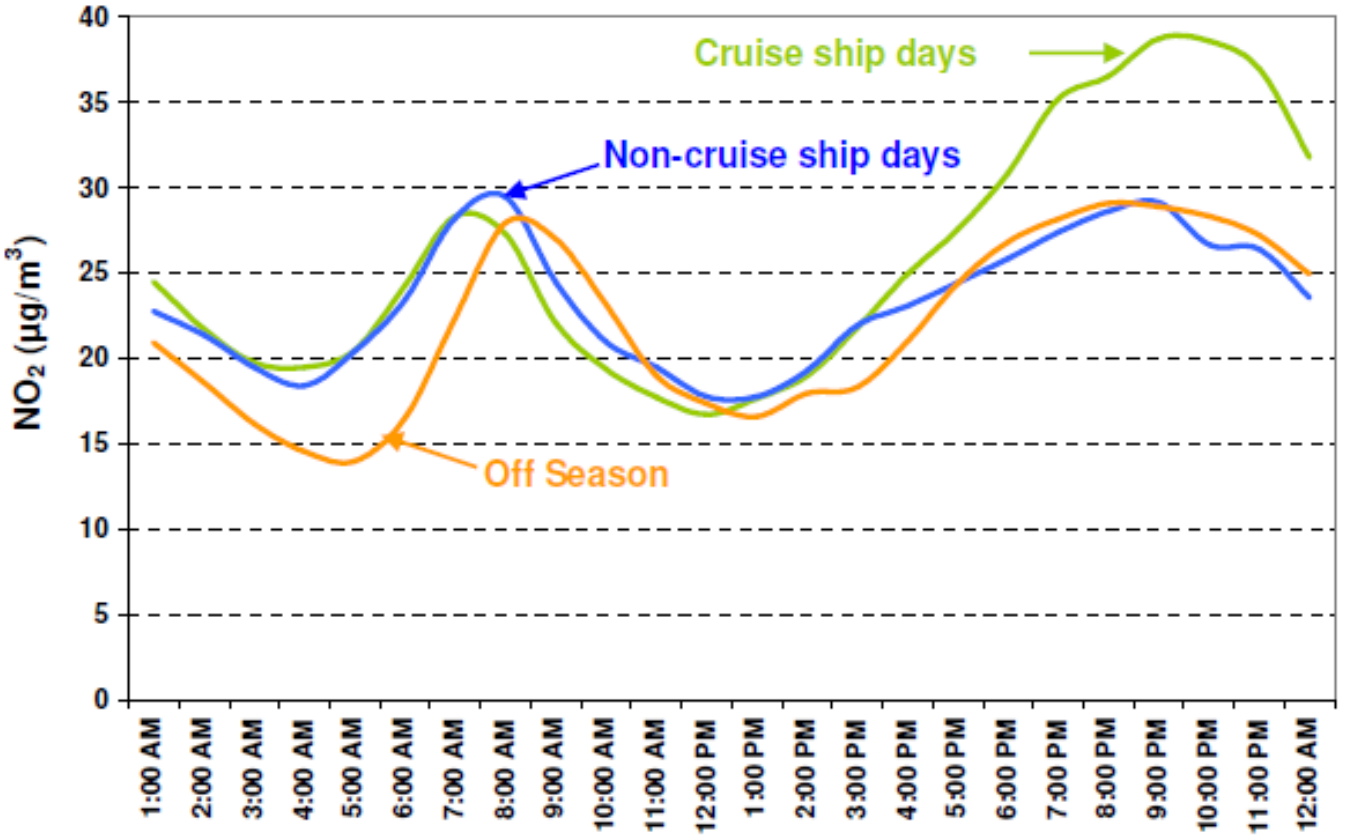
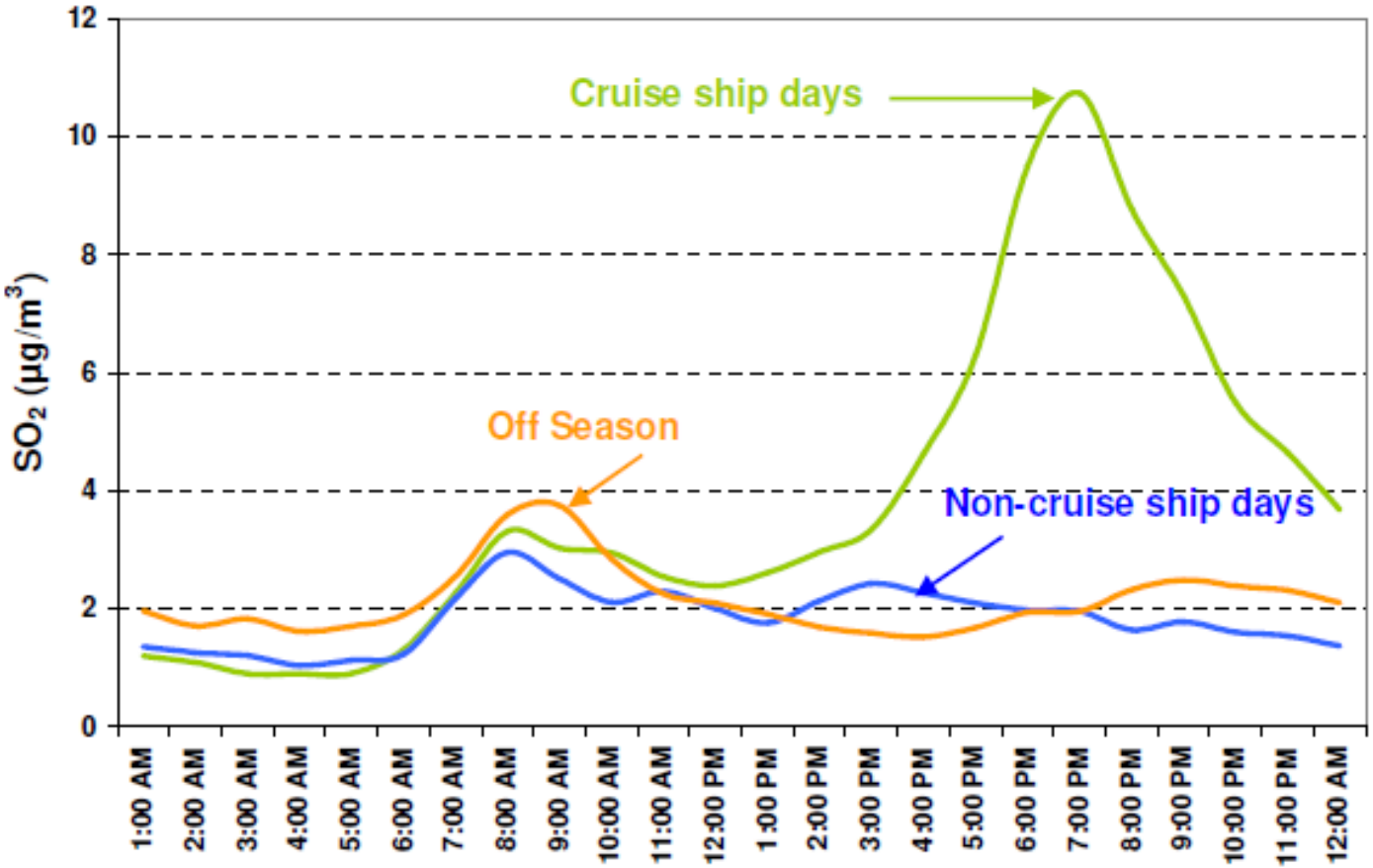


Figure 26. Average diurnal pattern of SO_2 at Topaz Station, 2006 on days with cruise ships, days without, and off season



1 Hour maximum SO_2

JAMES BAY AIR QUALITY STUDY – PHASE II
CALPUFF DISPERSION MODELLING

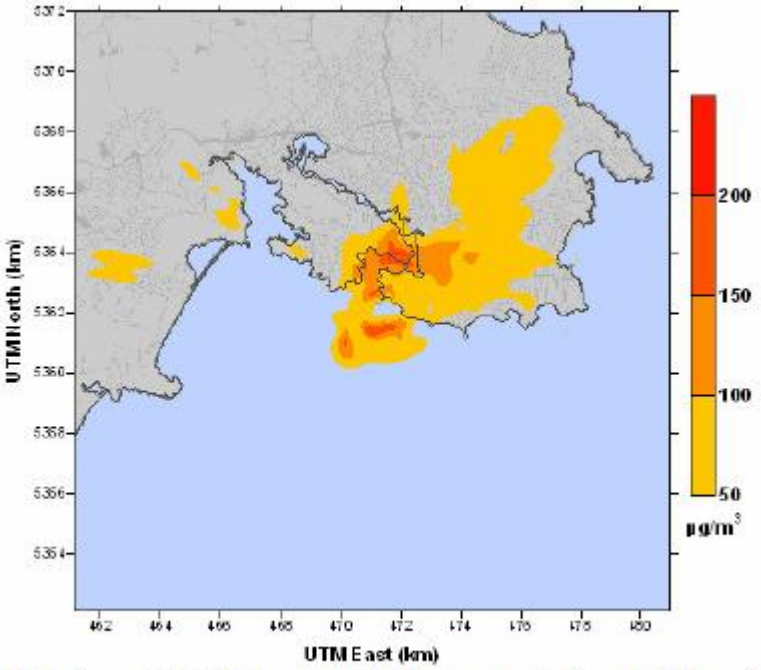


Figure 11. Maximum CALPUFF estimated 1-hour concentrations of SO_2 µg/m^3 due to cruise ship and ferry emissions (berth and transit) for entire study domain.

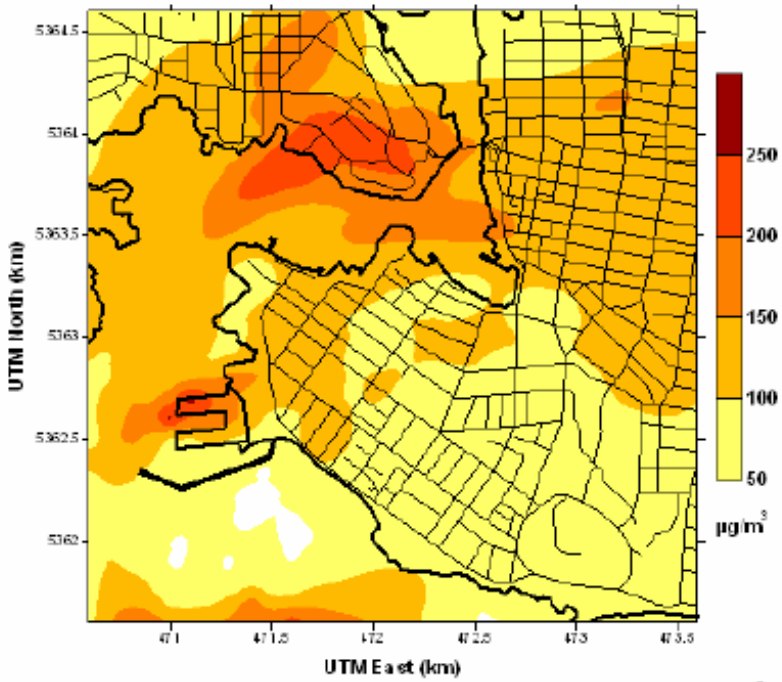


Figure 17. Maximum estimated 1-hour SO_2 concentrations (µg/m^3).

Maps show locations where higher levels occurred based on ANY HOUR during the modelling run, not a representation of the 'worst one hour period'

Model used actual ship schedule for 2007, hourly meteorology, estimates for ship characteristics

24 Hour maximum SO_2

JAMES BAY AIR QUALITY STUDY – PHASE II
CALPUFF DISPERSION MODELLING

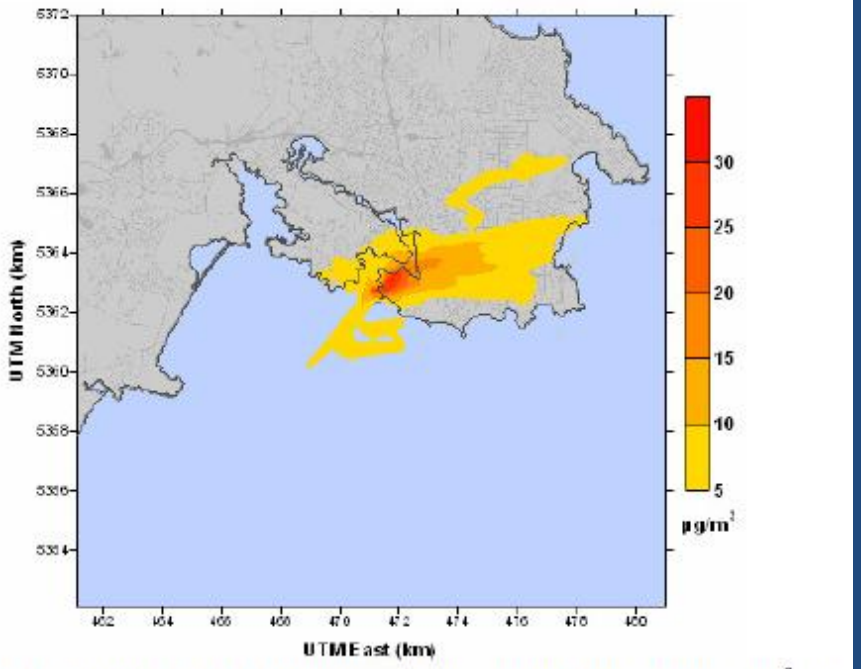


Figure 14. Predicted CALPUFF maximum 24-hour concentrations of SO_2 (µg/m^3) due to cruise ship and ferry emissions (berth and transit).

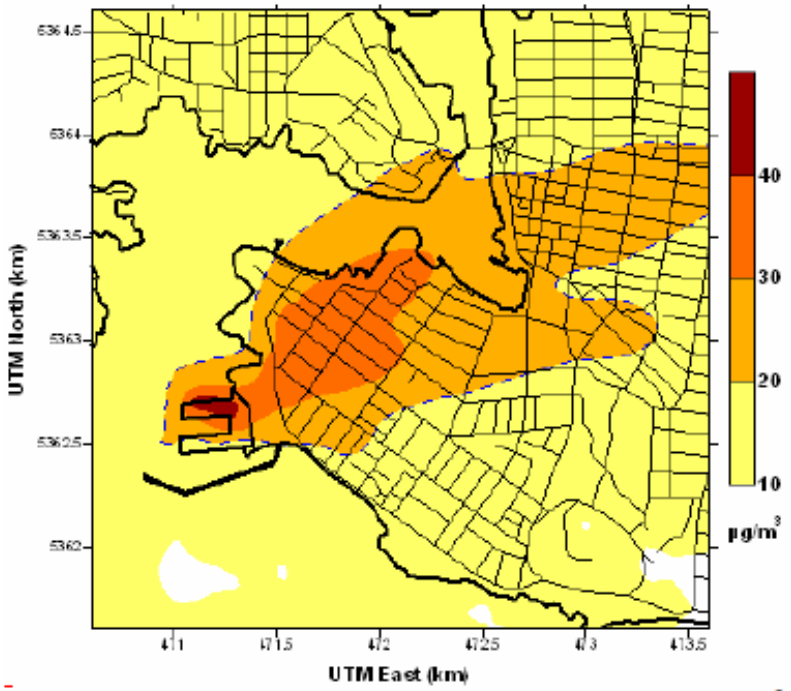


Figure 19. Maximum estimated 24-hour SO_2 concentrations (µg/m^3).

Maps show locations where higher levels occurred on ANY DAY during the modelling run, not a representation of the 'worst day'

Model used actual ship schedule for 2007, hourly meteorology, estimates for ship characteristics

Seasonal Average SO_2

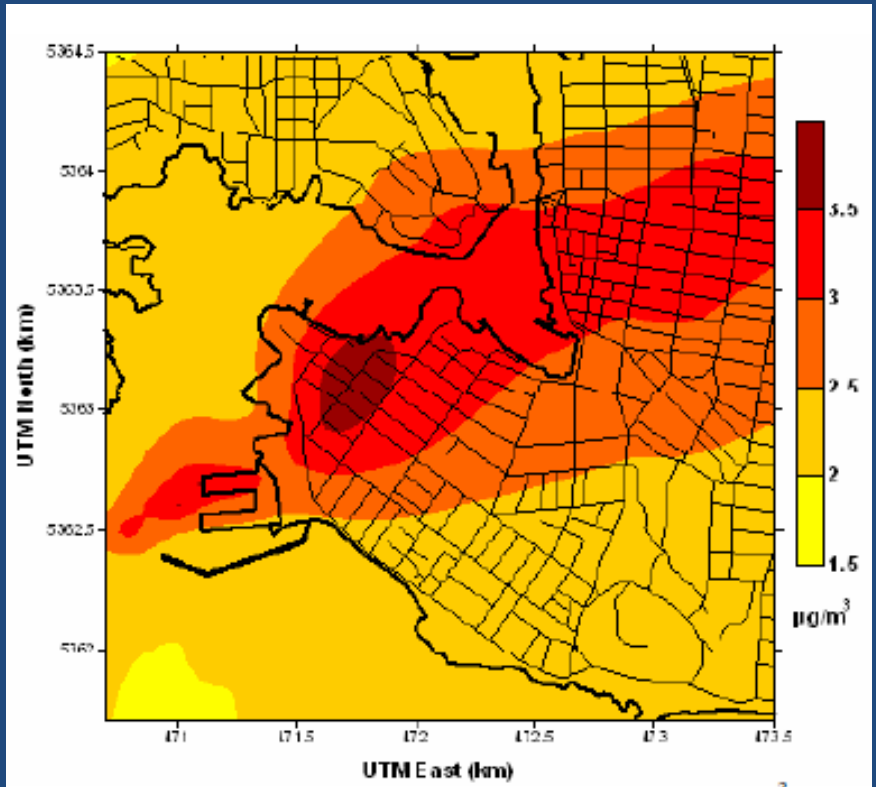


Figure 20. Average estimated SO_2 concentrations (µg/m^3).

Map shows average of predicted concentrations over the season

Model used actual ship schedule for 2007, hourly meteorology, estimates for ship characteristics

Mobile Air Monitoring Lab (MAML) Study 2009

Objective – confirm levels in James Bay neighbourhood with high quality instrument using MoE standards

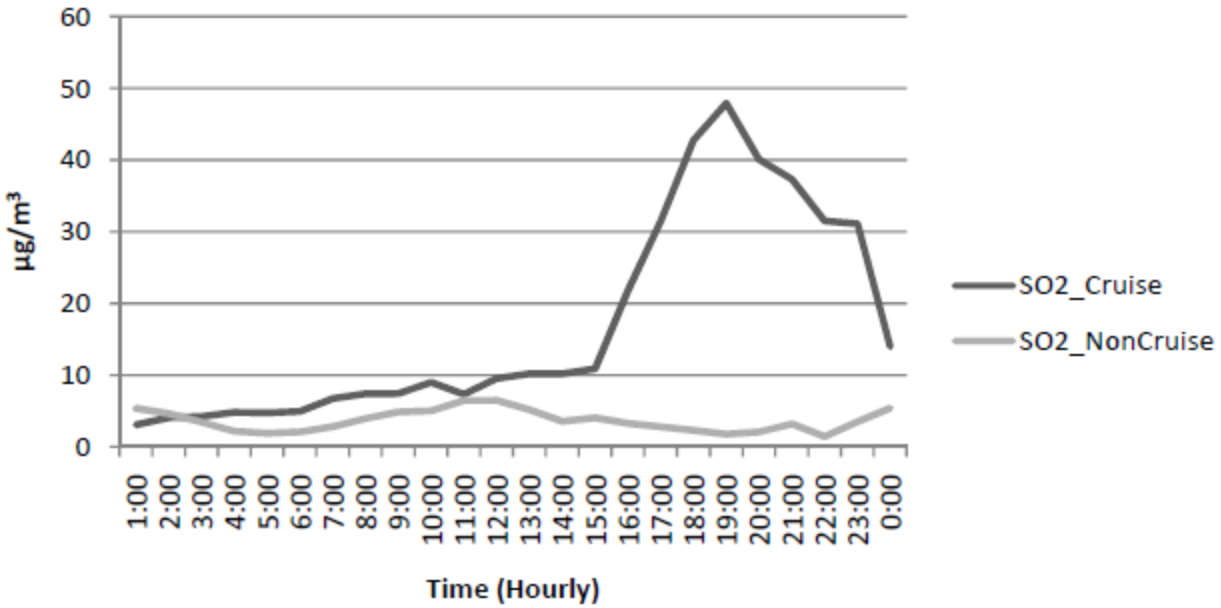


Figure 9.5. MAML SO_2 D

- Higher levels of NO, NO_2 and SO_2 associated with presence of cruise ships AND higher levels than at Topaz
- SO_2 levels exceeded some health based standards

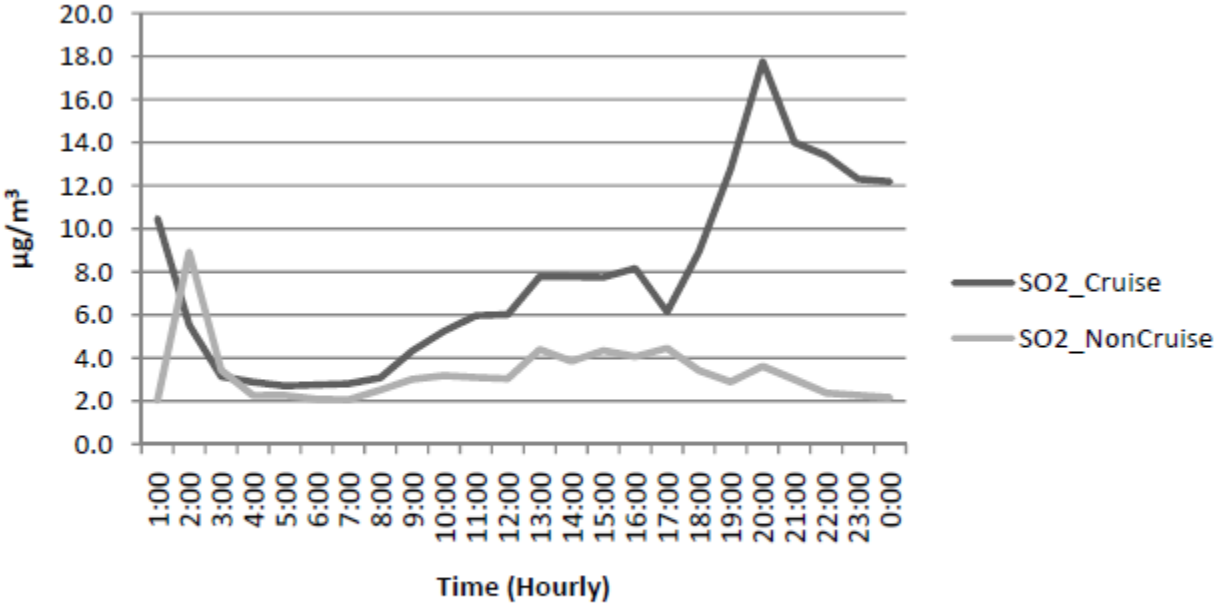
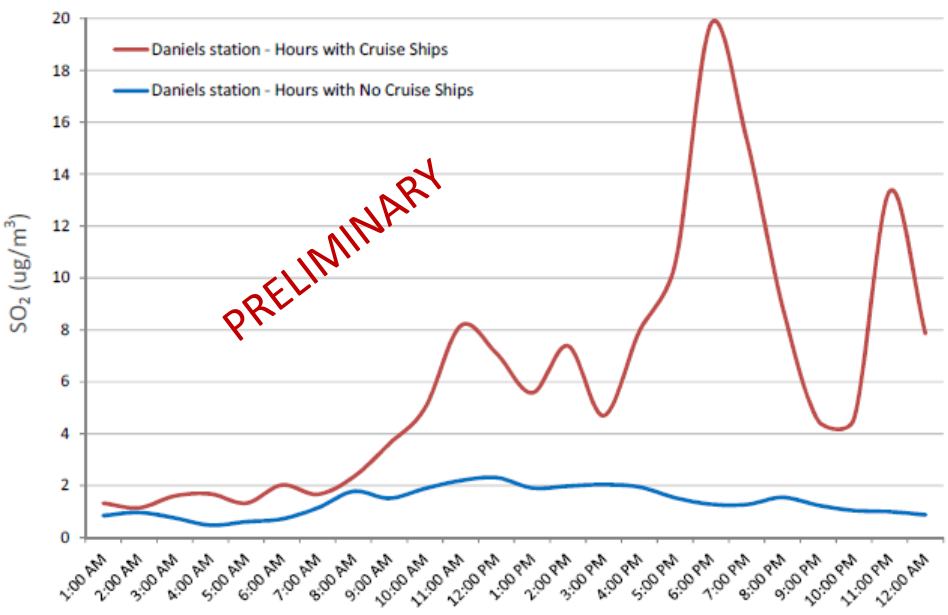


Figure 9.6. TOPAZ SO_2 Diurnal Pattern

Figure 11. Diurnal SO_2 levels with and without cruise ships– Daniels Station 2011



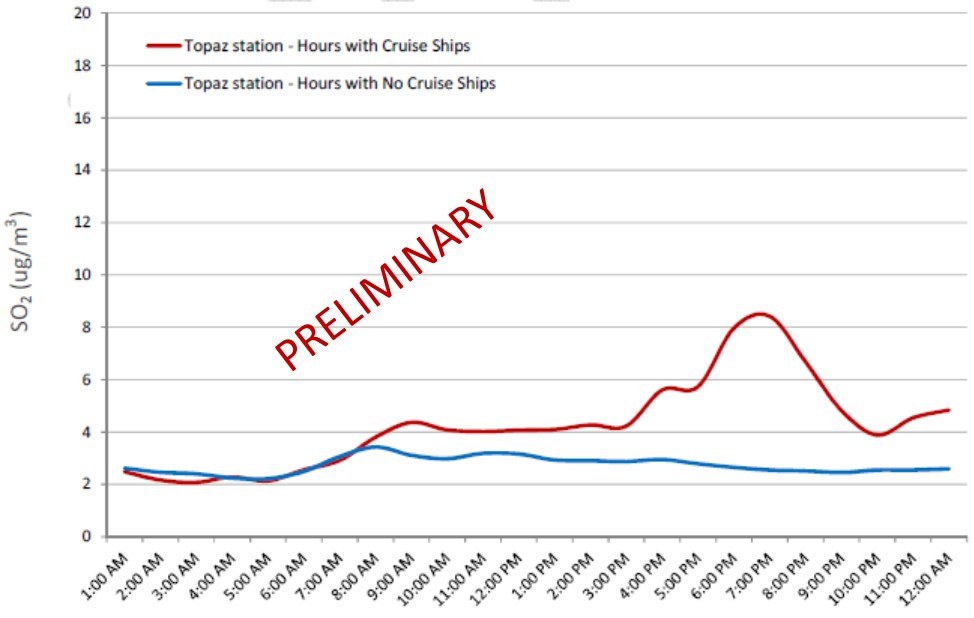
Daniels Site Sulfur Dioxide (SO_2) Study 2011

Objective :

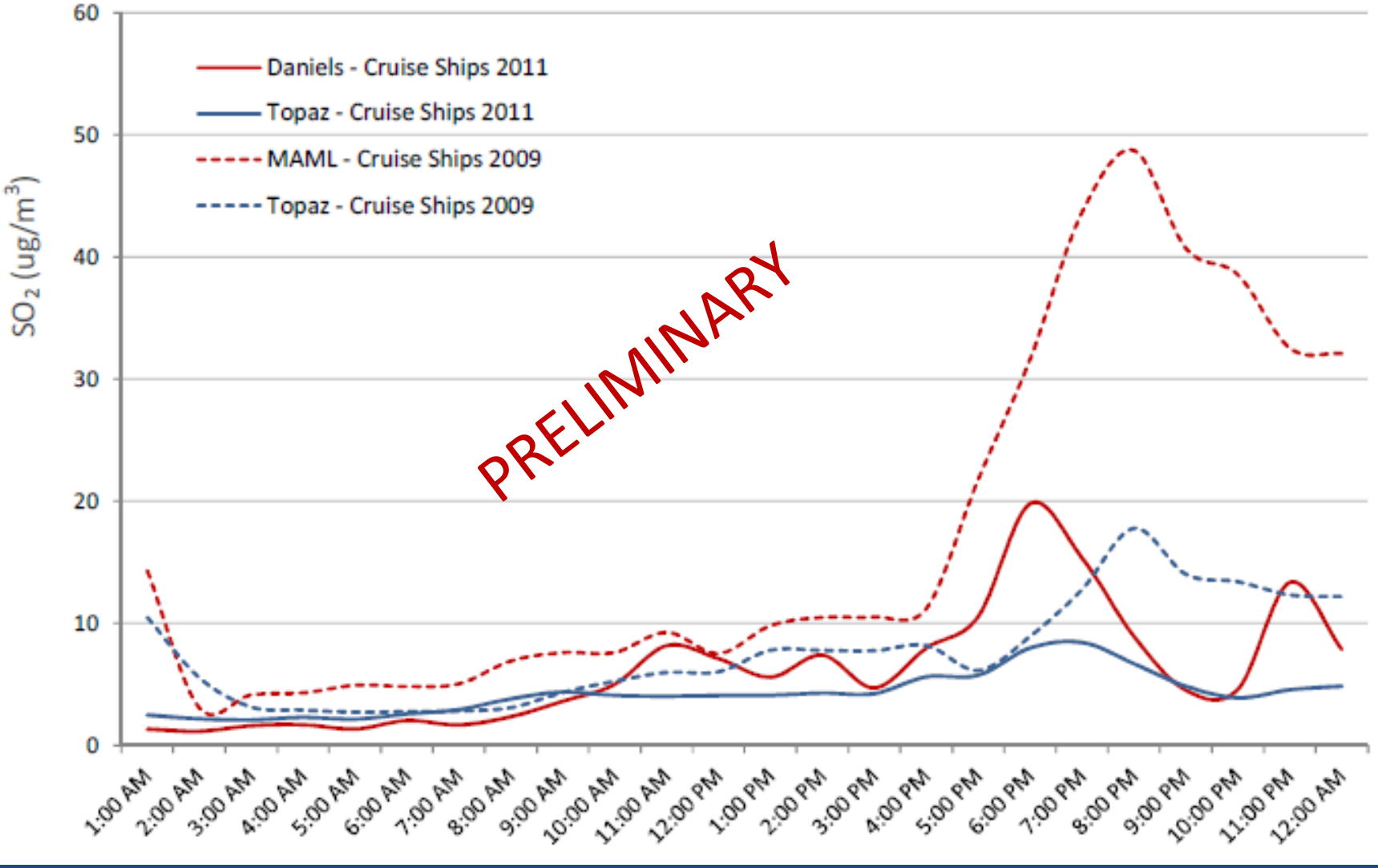
- Provide high quality real time data for residents
- Represent typical neighbourhood location
- Provide high quality data to compare to air quality guidelines
- Support observation of long term trends, especially with new fuel sulfur content regulations imminent

- Change in diurnal pattern observed
- Still assessing factors involved in change observed
- Limitations: one site only, and modelling suggests higher (or lower) levels may be occurring elsewhere at any given time.

Figure 12. Diurnal SO_2 levels with and without cruise ships– Topaz Station 2011



MAML and Daniels Site Sulfur Dioxide (SO_2) comparison



Next steps:

- **Continue to analyze Daniels 2011 data → final report in summer 2012**

- **Investigate spatial pattern of SO_2:**

  Mobile monitoring during 2012 season – 15 second measure with GPS position

  - **will allow us to map 'impact area' and compare to fixed site monitor**

  Passive monitoring at many locations at the same time, for as short as one hour duration

  - **Likely August**

  Collaborative planning for 2012 monitoring programs → UVIC, MoE, JBNA, GVHA, VIHA

THANK YOU!

QUESTIONS?

James Bay
Neighborhood
Environment
Association