

BVLD Airshed Dispersion Modelling Project: Initial Results and Next Steps

- A much longer, more detailed presentation was given at our Annual Air Quality Forum on June 15 and is posted on our website
- Modelling supports Goals outlined in Chapter 3 of Clean Air Plan which are to:
 1. Gain a better understanding of air quality and work towards continuous improvement in the Plan Area and
 2. Continuous improvement of air quality in the BVLD airshed.
- For Goal 1, the indicators are:
 - Degree of agreement between modelled air quality results and actual measured air quality for “episode scenarios”.
 - Comparison of PM_{2.5} and PM₁₀ concentrations at a number of locations in the airshed plan area

What information does an Air Pollution Model need?

- Information about the pollution source.
- Information about the atmosphere, 3-D winds, temperature, etc.
- Information about the topography, mountains, valleys, etc.

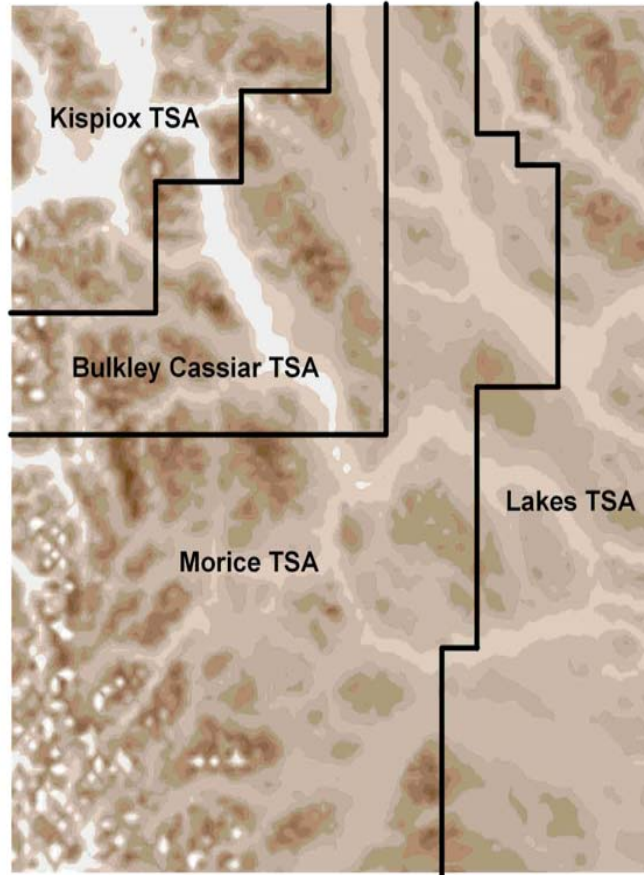
What was Modelled?

- Re-creation of 2002 (Jan. thru Dec.)
- All PM₁₀ and PM_{2.5} emissions were quantified by Ben in his micro-emissions inventory.
- These emissions were then launched into the atmosphere which was simulated using measured weather data and equations.
- This pollution was then moved around in a 3-D simulation of the airshed using topographical and land use data.

Sources of Pollution that were Modelled Separately:

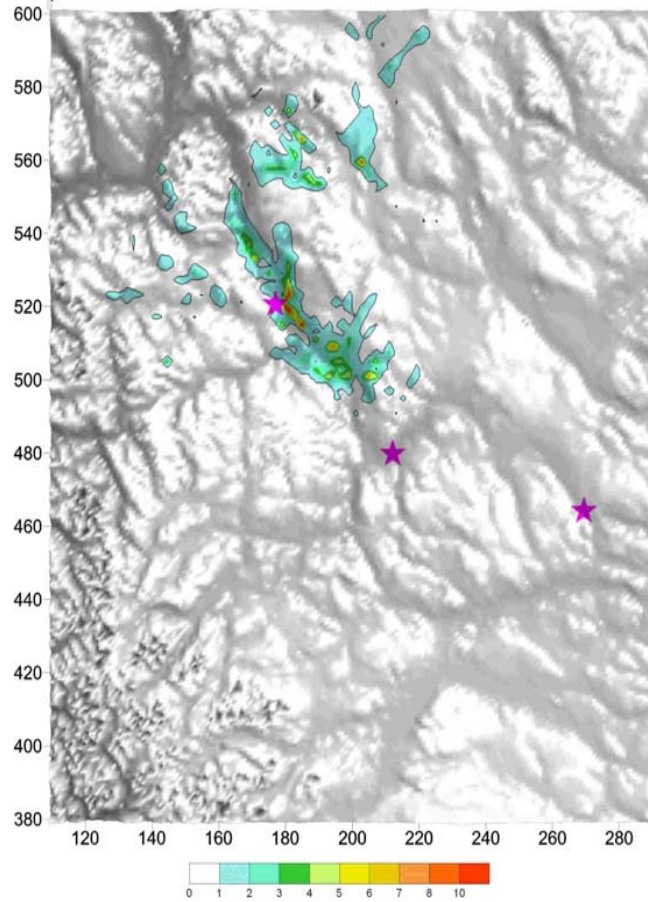
- Woodstoves
- Backyard burning and household waste burning
- Industrial Permitted Point Sources (stacks)
- Industrial Permitted Area Sources
- Open Burning in different Forest Districts and Ventilation Index zones
- Beehive Burners
- Not yet complete: Road dust and open burning from sawmills.

Open burning modelled by Timber Supply Area (Forest Districts)

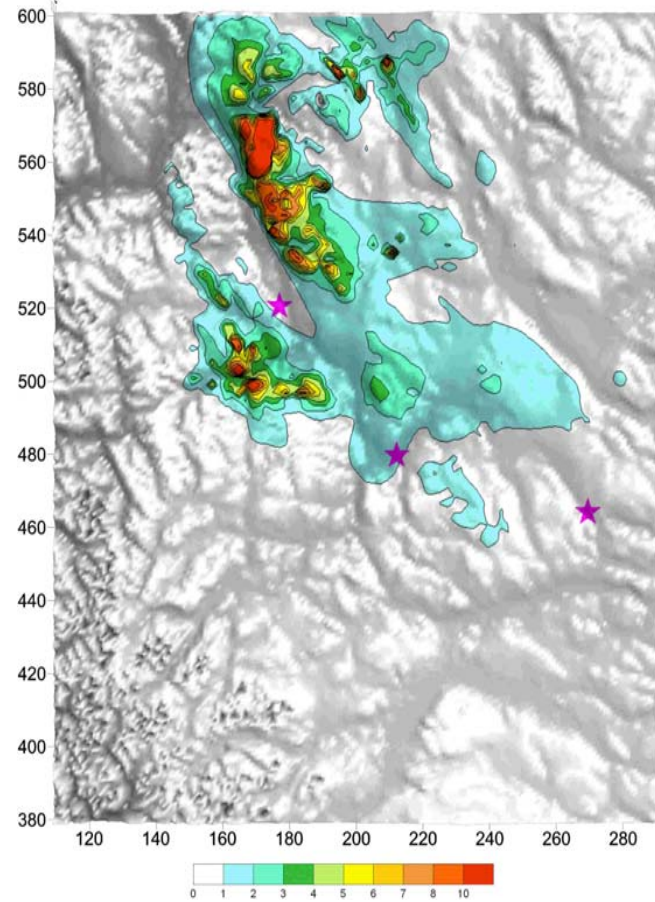


Bulkley-Cassiar TSA

Cassiar OFTS - 2002 - 24-hr PM10 max

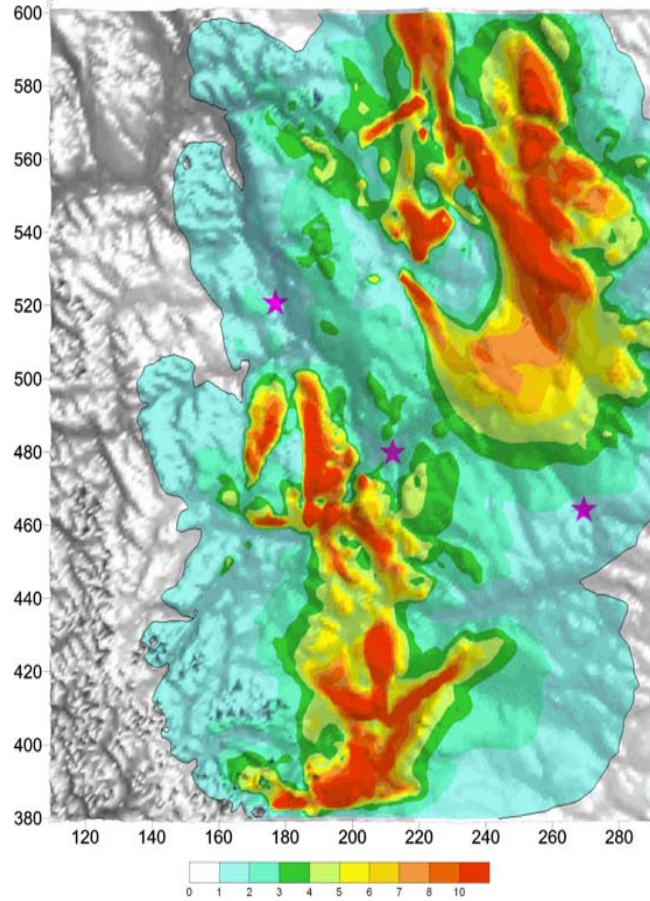


Cassiar Large License - 2002 - 24-hr PM10 max

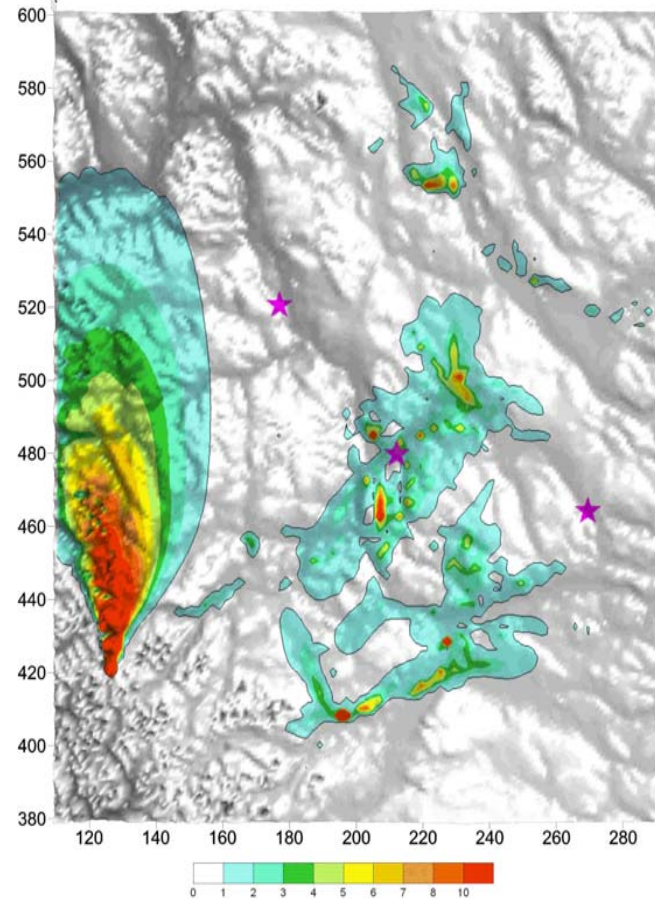


Morice TSA

Morice Large License - 2002 - 24-hr PM10 max

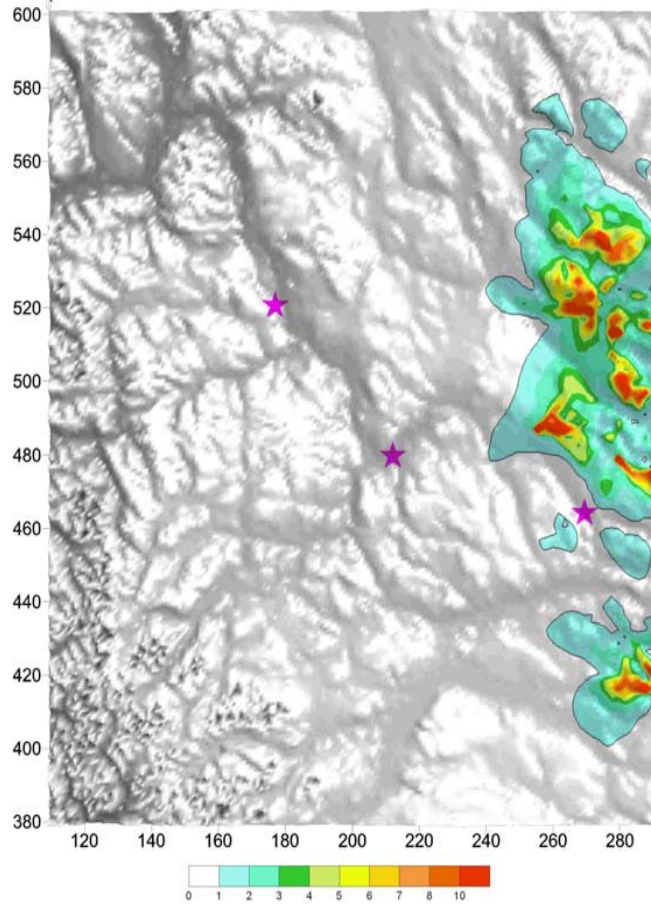


Morice OFTS - 2002 - 24-hr PM2.5 max

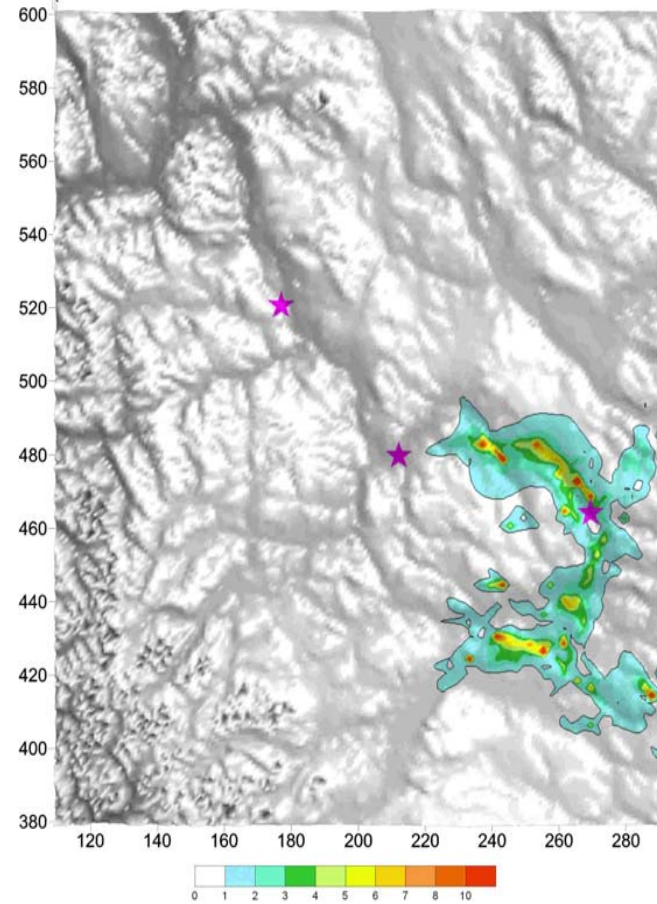


Lakes TSA

Lakes Large License - 2002 - 24-hr PM10 max



Lakes OFTS - 2002 - 24-hr PM10 max



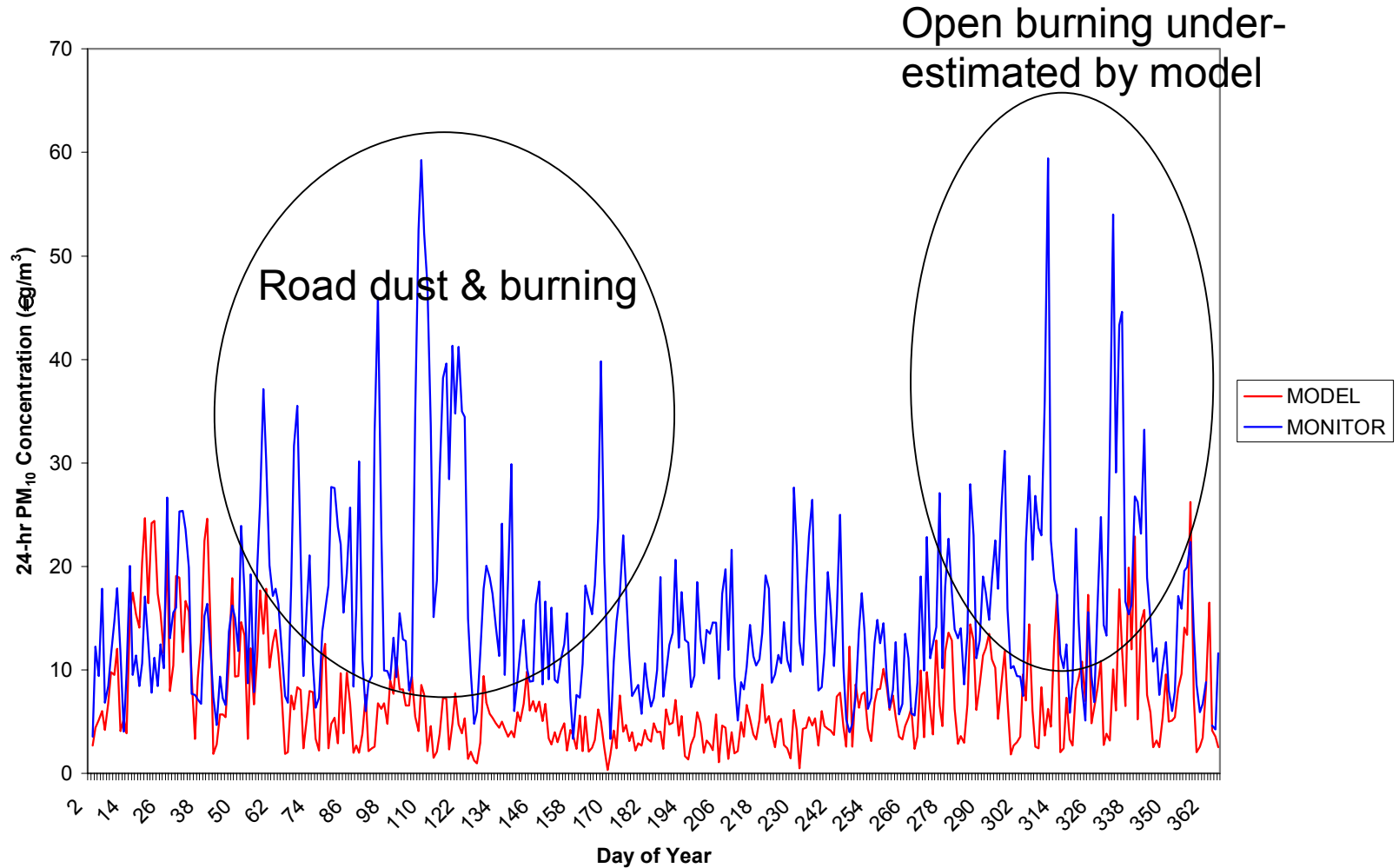
Under-estimation of Open Burning?

- Model has not been well tested for this type of application.
- Model has been tested for forest fires which have different characteristics.
- Fire temperatures, structures, emissions, etc may not be captured properly.
- Dispersion not happening at appropriate level in the atmosphere.



Smithers PM₁₀

Model vs Monitor - Smithers PM₁₀



Questions/Scenarios

- What if we turned off all of the emissions from beehive burners, woodstoves, burning, etc?
- What if we switched to a new technology (e.g. all EPA-certified stoves)?
- What if we managed burning in specific Forest Districts / TSAs under certain weather conditions?

What happens when Beehive Burner emissions are turned off?

Preliminary Results:

- In Smithers, reduction of 24-hr PM₁₀ levels by up to 1 µg/m³
- In Houston, reduction of 24-hr PM₁₀ levels by up to 1.25 µg/m³
- In Burns Lake, reduction of 24-hr PM₁₀ levels by up to 1.5 µg/m³

What happens when all woodstove emissions are turned off?

Preliminary Results:

- In Smithers, reduction of 24-hr PM₁₀ levels by up to 7.5 $\mu\text{g}/\text{m}^3$
- In Houston, reduction of 24-hr PM₁₀ levels by up to 5.5 $\mu\text{g}/\text{m}^3$
- In Burns Lake, reduction of 24-hr PM₁₀ levels by up to 3.6 $\mu\text{g}/\text{m}^3$

So what would happen if we switched all stoves out to EPA-certified? Has not yet been modelled, but could easily be done.

Summary

- Dispersion models are not perfect, but are a great tool for understanding behaviour of pollutants in an airshed.
- Agreement between modelled and measured data indicates some under-estimation, particularly from open burning modelling.
- Future work will address under-estimation.
- This work can be used to answer important management questions, trade-offs, technological changes and other scenarios.

Next Steps

- Road dust and sawmill open burning modelling.
- Thorough evaluation of open burning modelling.
- More validation of modelled vs. measured data.
- Comparison of atmospheric ventilation index conditions vs. modelled atmospheric conditions.
- Scenario modelling guided by questions from the BVLD Airshed Management Society?

Group Discussion

- What scenarios would you like to see modelled?