BlueSky Western Canada Smoke Forecasting System

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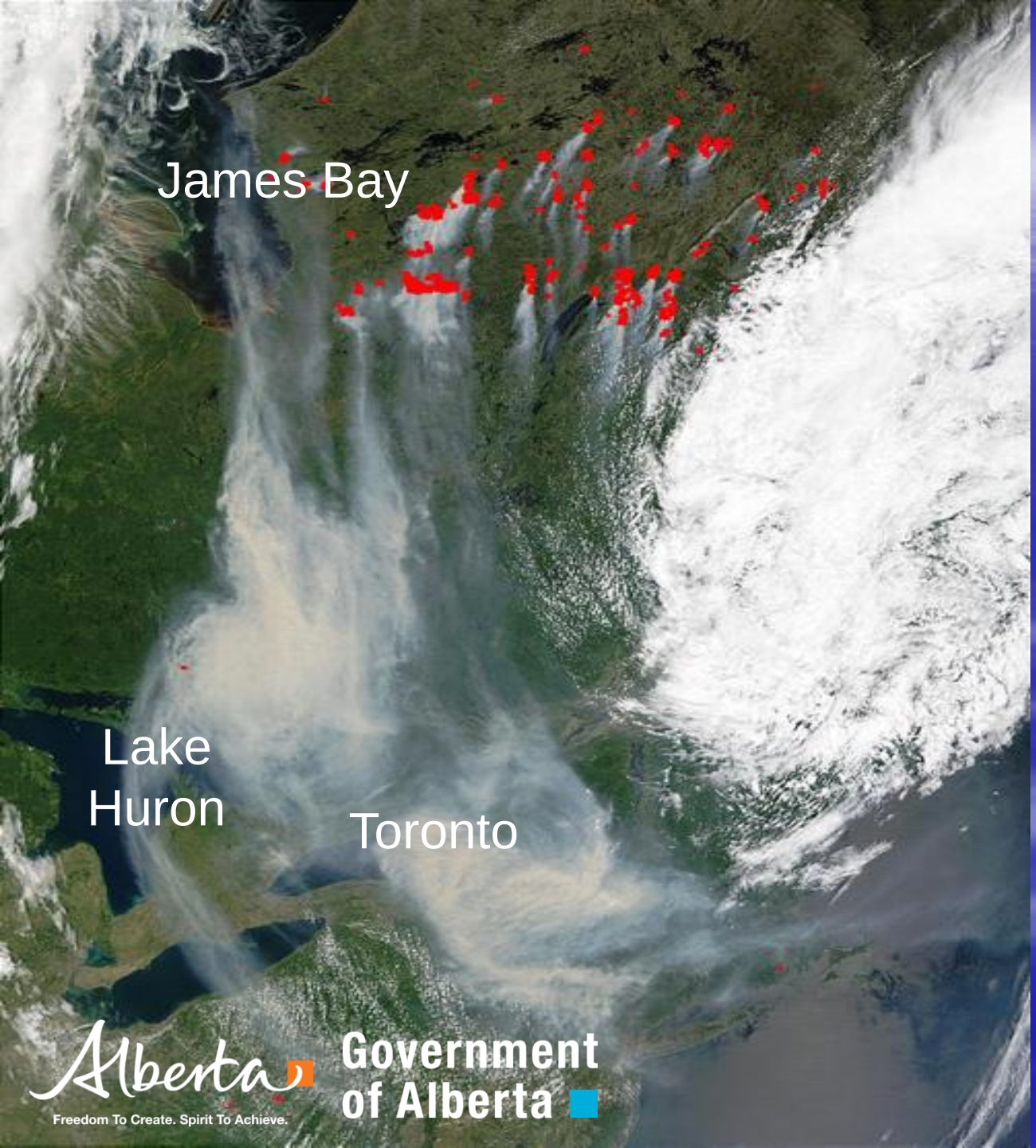

Wildfire Smoke

- Can transport 1000's of km
- Impact health and activities of millions of people


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Forecasting Wildfire Smoke is Important

- We know where it is, but where will it go?
- How “bad” will it be (i.e. concentrations of $PM_{2.5}$)?
- Important:
  - Public health (anticipate poor air quality periods for alerts, or when air quality could improve)
  - Transportation
  - Tourism
  - Fire management
  - Weather Forecasters

History of Smoke Forecasting in Canada

- Emissions and dispersion research conducted
- Provincial efforts (ventilation index in BC)

Studies in GoA

- Estimating the Air Quality Impacts of Forest Fires in Alberta (2003-05)
- Framework for the Development of a Fire Smoke Plume Dispersion Modelling System (2005-06) which led to a Wildfire Smoke Conference in Edmonton, 2007

Birth Place of BlueSky Western Canada

- Wildfire Smoke Conference in Edmonton, 2007 funded by Alberta Environment, Sustainable Resources Development, Environment Canada, and BC Healthy Living and Sport
- Coffee Table talk during the conference with BC, Alberta, Canada, and US agencies
- Idea: Based on the US Forest Service BlueSky System

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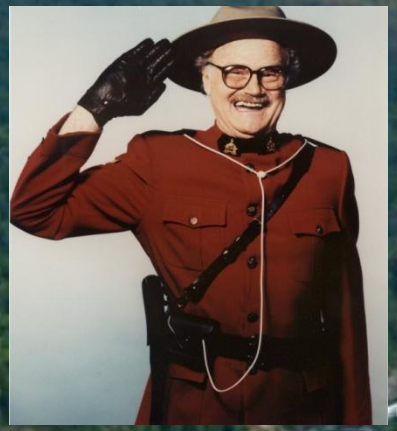
Why BlueSky vs. Homegrown?

- The U.S. Forest Service BlueSky system: a modelling framework that links independent modules of wildfire information, fuel loading, fire consumption, emissions, and smoke dispersion.
- Operational in the U.S. to Forecast Wildfire Smoke for many years.
- U.S. BlueSky is supported, has experience and many users, continues to be developed
- Modular framework means Canadian parts can be swapped in.

Western Canada Smoke Forecasting System
Multi-Agency Workgroup and Process



Partners

Alberta Environment
Alberta Sustainable Resources Development
BC Ministry of Environment
BC Ministry of Forests
Environment Canada
Natural Resources Canada
University of British Columbia
US Forest Service AirFire Team

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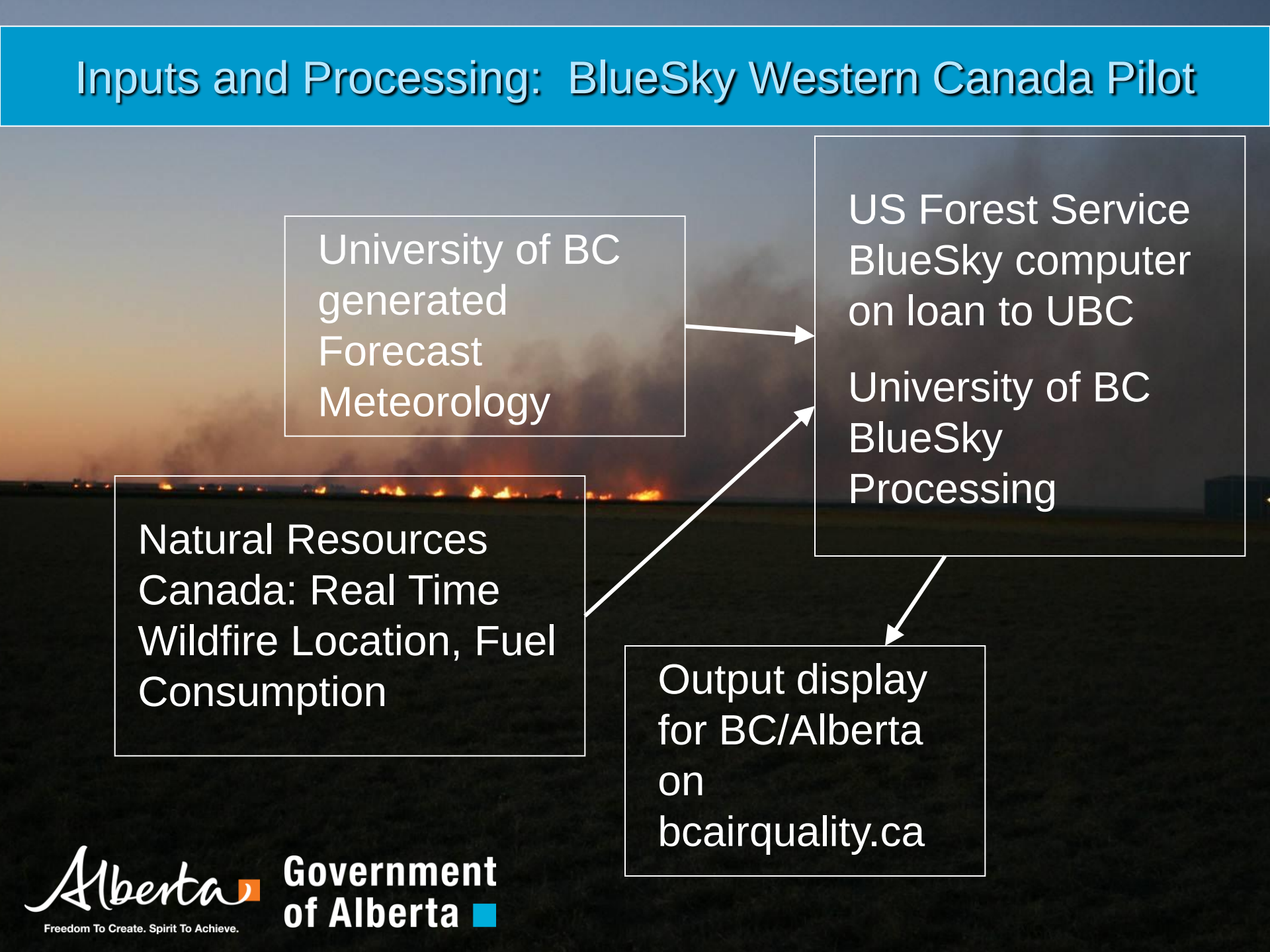
Forecasting Smoke from Wildfires: What is Needed?

- Forecast Meteorology
- Wildfire Attributes: Location, Fuel Consumed, emissions
- Geophysical Data (Topography, Land Use)
- Smoke Plume Model to Calculate Location and Smoke ($PM_{2.5}$) Concentrations
- User Friendly Output Display

Inputs and Processing: BlueSky Western Canada Pilot



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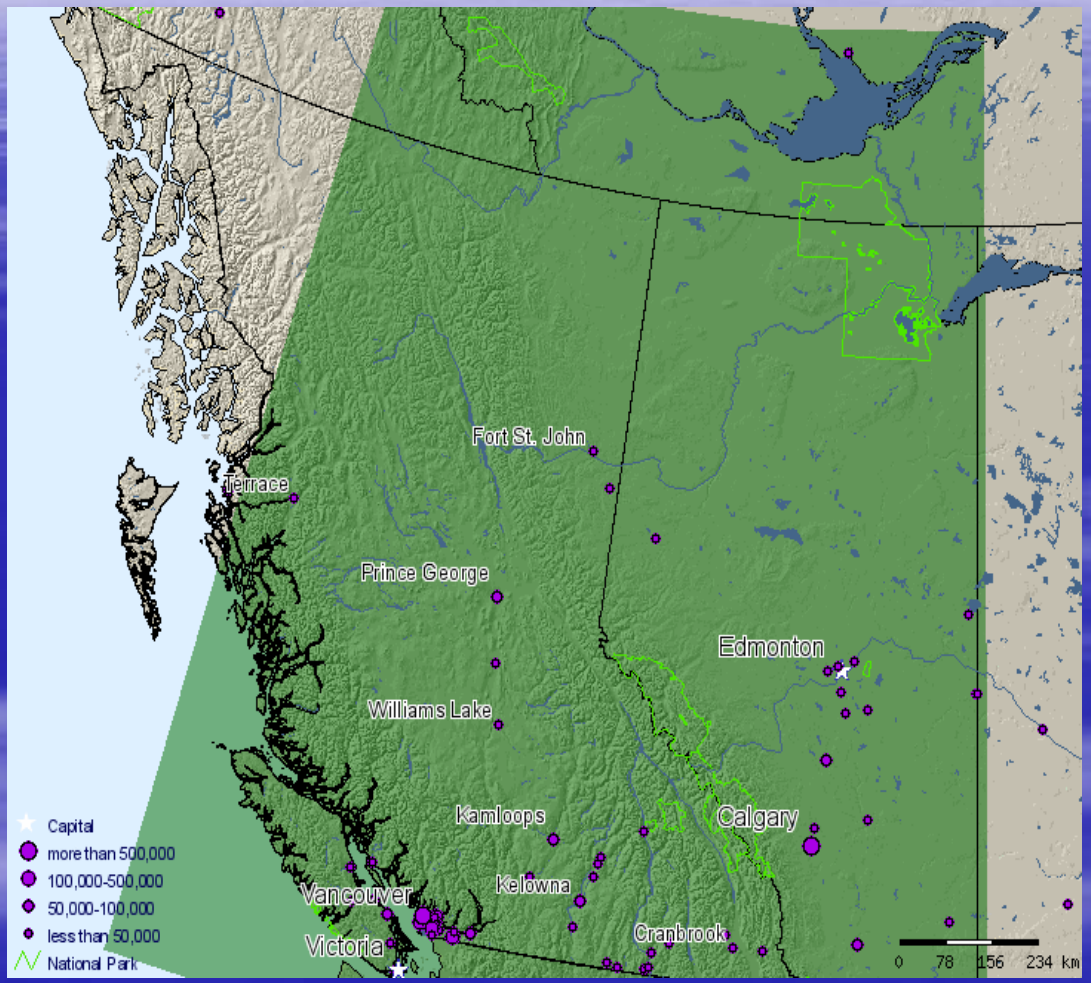
Output Display: Available from BC Website (www.bcairquality.ca/bluesky)



Smoke Location and *Ground Level* $PM_{2.5}$ Concentrations Each Hour up to 48 hours into the Future

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Output Display: Available from BC Website

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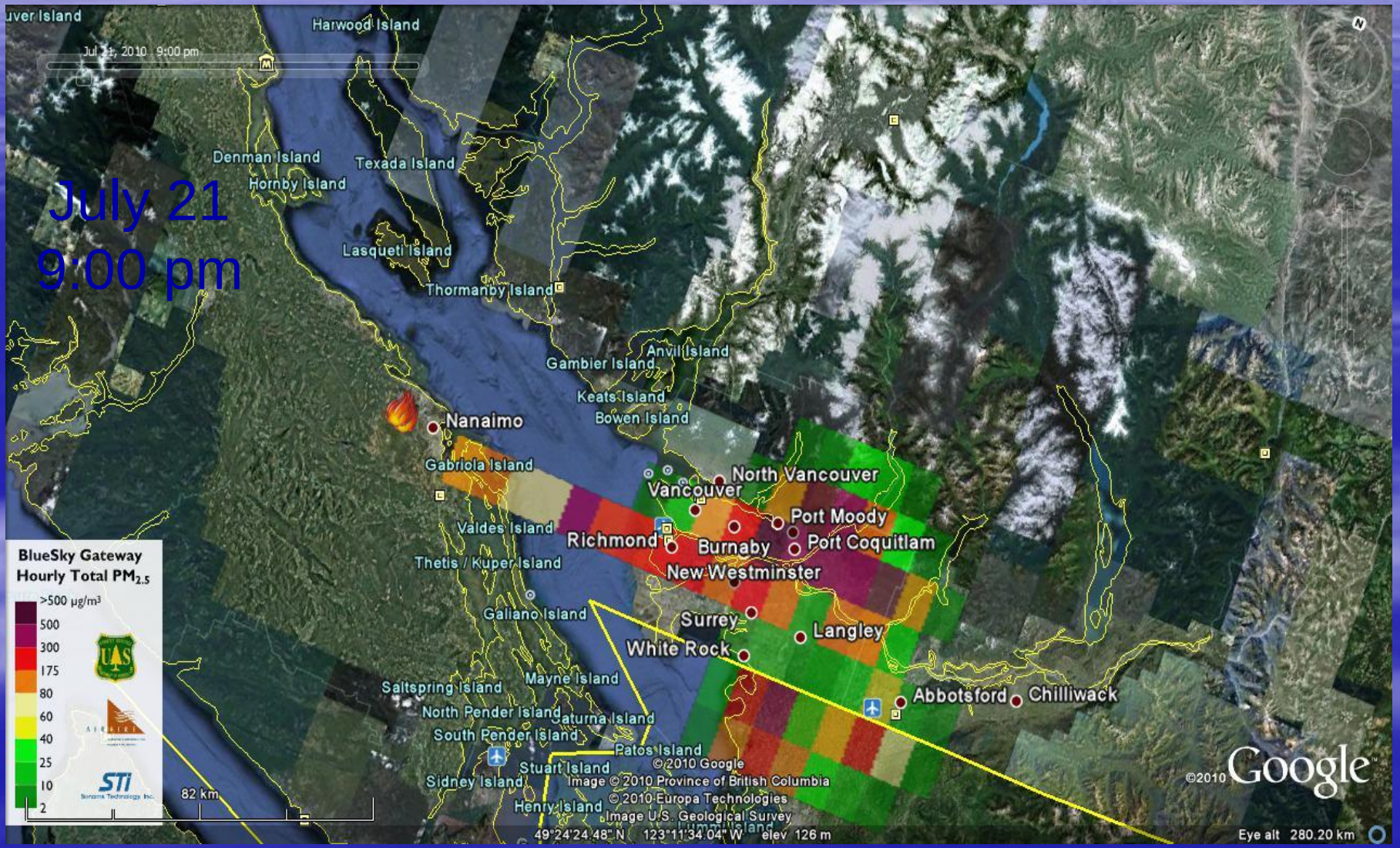

Caveats

Output was experimental.

Learning from last fire season's experience:

- Fire detects based only on satellite: clouds or thick smoke would obscure hotspot
- Estimates of hourly $PM_{2.5}$ concentration were better used to determine areas of high and low concentrations, rather than absolute values.
- Sometimes forecast was not available due to problems with the Canadian Wildland Fire Information System (hotspot detection, fuel consumption model) or UBC (computer failure)

Next Steps: Improvements and Support

- Own Computer Hardware with BlueSky smoke modelling framework
- Separate source emissions: individual fires vs fire complexes
- Include historical smoke from previous days for current forecast (important under stagnating conditions or for smoke transported long distances). A 12 hour spin-up was used in last fire-season.
- Evaluate predictions

Next Steps: Improvements and Support (continued)

- Expand domain to include MB, SK and part of NWT and US
- Include actual fire reports
- Improve output formats
- Secure on-going costs to produce forecasts ($$)
- Include the ability to inform decision making regarding planned/controlled burns.

Acknowledgements

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