The Environmental Prediction in Canadian Cities (EPiCC) Network

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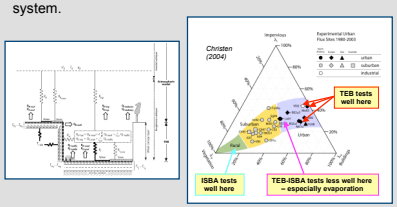
Environmental Prediction in Canadian Cities

Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)
Fondation canadienne pour les sciences du climat et de l'atmosphère (FCSCA)

Project Overview

The EPiCC network is a multi-year (2006-2010) project of university and government researchers intended to provide a version of the TEB-ISBA (TEB - Town Energy Balance; ISBA - Interactions Soil-Biosphere-Atmosphere) model (Masson 2000, Noilhan and Planton 1989) optimized and verified for conditions found in Canadian cities and ready for operational implementation in the Canadian Meteorological Centre numerical prediction system.



TEB Model (left) and previous testing (right).

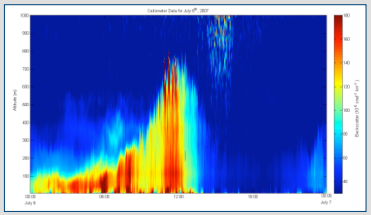
Residential and Suburban Study Sites

Our study sites are two Canadian cities with contrasting climate and long histories of urban climate research: Montréal and Vancouver. Residential urban and suburban areas are a significant fraction of the total urban area and are areas for which TEB-ISBA has not been extensively tested.

Montréal (above) and Vancouver (below) site locations and (inset) urban residential areas.

Project Components: Observations

The observational component is comprised of long term continuous observations of the radiation and energy balance including CO_2 concentrations and fluxes in Montréal and Vancouver with seasonal deployment of other instrumentation. Rural baseline observations are also included.



Vancouver (Sunset site) ceilometer results. A 2-d running average has been applied to the data: 4 point averaging temporally and 10-point average along the vertical. Image resolution: 15 s × 5 m. (D. van der Kamp).

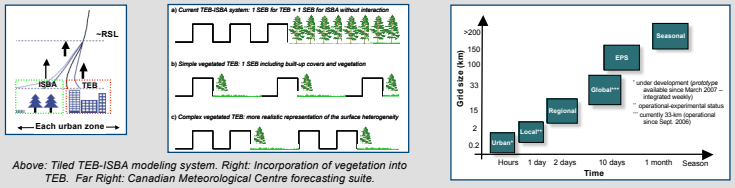
	Montréal	*Vancouver*
Flux Observations	•urban residential •suburban •scintillometer* •rural	•urban residential •mobile tower* •rural
Related Tower Site Measurements	•thermal imaging •digital camera (snow cover) •canyon wall and lot area T_{sfc} and snow measurements	•microscale hydrology (soil moisture, T_{sfc} and T_{soil}) •water monitoring
Boundary Layer Observations	McGill Radar Facilities: •X band, S band doppler •ceilometer •RASS •UHF wind profiler	•ceilometer •lidar* •tethered balloon*
Mesonet Observations	Mésonet Montréal	GVRD / Lower Fraser Valley Monitoring Network

* *select deployment periods*

Above: Summary of EPiCC observations. Right: MUSE flux tower will be deployed in the same neighbourhood of Montréal

Project Components: Modelling

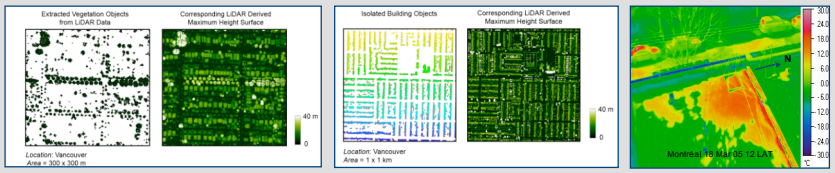
The modeling component includes mesoscale atmospheric modeling and studies of the atmospheric boundary layer as well as development and evaluation of the TEB-ISBA system. The model system will be evaluated for the winter response of anthropogenic heat forcing (Montréal) and the summer response of anthropogenic water forcing (through garden irrigation in Vancouver). Development of the TEB hydrological parameterization and advective feedback in the TEB-ISBA coupling are planned.



Above: Tiled TEB-ISBA modeling system. Right: Incorporation of vegetation into TEB. Far Right: Canadian Meteorological Centre forecasting suite.

Project Components: Remote Sensing

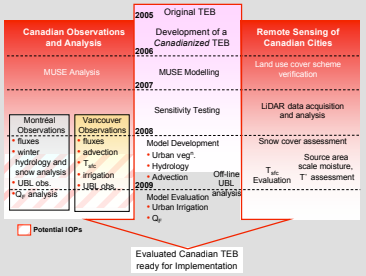
The remote sensing component includes evaluation and continued development of an urban land use characterization scheme that provides the surface information necessary for the TEB-ISBA modeling system, use of airborne LiDAR data to help parameterize the vertical and horizontal structure of urban environments for the modeling system (including both the built and vegetated environment) and use of other ground or space-based remote sensing to assess surface characteristics, especially temperature and snow cover.



Left and middle: Vegetation and building structure extracted from airborne lidar data (N. Goodwin). Right: Thermal image of partly snow-covered roof. (G.Morneau).

Western · UBC · McGill · King's College London · Météo France · Environnement Canada · Environment Canada

Project Timeline



Project Intensive Observation Periods

EPiCC is proposing to hold IOPs for select periods in Montreal and Vancouver. These IOPs will provide the opportunity to make use of the EPiCC network infrastructure and undertake detailed studies of the urban atmosphere that will contribute to network objectives.

Anticipated dates: summer-time IOP for Vancouver and both summer and winter IOPs for Montreal during the period Winter 2008 – Fall 2009.

Interested members of the scientific community should identify their interest with EPiCC (see How to Contact us below) and should watch our website for information about proposed IOPs.

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CCRS, CMHC, FCM, ICSC, MSC Pacific Region, NRC

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