Numerical Weather Prediction System Dedicated to Urban Comfort and Safety During the 2015 Pan American Games in Toronto (Canada)

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NWP moving towards sub-km scales with urban processes included

NWP science showcase during Toronto 2015 Pan-American games (EC project)

Summertime extreme weather in the Greater Toronto Area
Environmental Prediction Systems

NWP (GEM), 2.5km, 1km, and 0.25km

Air quality model (GEM MACH), 2.5km

3D Lake model (NEMO), 2km

Particle tracing

Water level forecasting

Wave forecasts (WW3), 1km deterministic, 2.5km ens.

Precipitation analysis and streamflow prediction
NWP km- and subkm-scale systems

Upper air initial conditions from regional 10-km system

Land surface initial conditions from CaLDAS

Lake water temperatures from NEMO

One run per day, at 0600 UTC

Includes the TEB urban model and appropriate microphysics

Diagnostics for PBL height, comfort indices, extreme weather

Available real-time through GRIB2 and web mapping service
Heat stress indices

**Humidex** (equivalent dry air temperature)

**UTCI** (Universal Thermal and Climate Index)

**WBGT** (Wet-Bulb Globe Temperature)

to evaluate UTCI and WBGT: PanAm Obs. of the globe temperature
Objective evaluation

Summertime, period from 2014-07-07 to 2014-08-31

Near-Surface Wind Speed, (m/s)

37 stations EC
Near-Surface Air Temperature, (°C)

Objective evaluation
Summertime, period from 2014-07-07 to 2014-08-31

37 stations EC
Interacting land breezes
Cloud cover structure (18:50)

MODIS Aqua
250 m

250 m

1 km

2.5 km
Will serve as the basis for upcoming experimental systems at Environment Canada (Vancouver, Toronto, Montreal, some airports)

Current and future tests over other cities / airports (international, e.g., Tokyo – TOMACS, presentation yesterday)

Pan Am will provide an interesting database for development and evaluation of sub-km urban NWP systems.