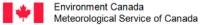


## MAIN FEATURES OF COMPLEMENTARY MLDP AND FIREWORK SYSTEMS MLDP (AutoSim) FireWork **Features** Full 3D Lagrangian atmospheric transport and dispersion Model type Full 3D Eulerian atmospheric chemistry inline model offline model Pan-Canadian (including Canada and Northern **Domains** CONUS) North America (including Canada, CONUS and Alaska) Regional in Canada Driving meteorological **HRPDS RDPS** model Meteorological spatial 2.5 km, 1 h 10 km, 1 h and temporal resolution Advection Turbulent diffusion Advection Radiation Turbulent diffusion Dynamical & physical Planetary Boundary Layer Planetary Boundary Layer processes Condensation Dry deposition Convection Wet scavenging (in-cloud) Cloud Microphysics Surface processes Gas-phase, Aqueous-phase, and Heterogeneous chemistry is included Aerosol dynamics (nucleation, condensation, coagulation, inorganic gas-particle partitioning, sedimentation and dry deposition, in-cloud and below-cloud scavenging, and secondary organic aerosol (SOA) formation) No chemical transformations/reactions (inert passive Employs a simple 2-bin sectional representation of the Chemical processes PM size distribution (Bin 1 is 0-2.5 μm aerodynamic tracer) diameter and Bin 2 is 2.5-10 μm), but PM chemical composition is treated in more detail. Nine chemical components are considered: SO<sub>4</sub>, NO<sub>3</sub>, NH<sub>4</sub>, elemental carbon (EC), primary organic aerosol (POA), SOA, crustal material, sea salt, and particle-bound water.

1



Between 75 and 90 minutes, approximately

System total run time

## MAIN FEATURES OF COMPLEMENTARY MLDP AND FIREWORK SYSTEMS MLDP (AutoSim) FireWork Features Anthropogenic sources based on the 2010 Canadian national Air Pollutant Emissions Inventory (APEI), the 2011 U.S. National Emissions Inventory (NEI) and the 1999 Mexican emissions inventory. Wildfires sources (PM<sub>2.5</sub>) calculated from effective Biogenic sources calculated online based on the algorithm biomass burned multiplied by emission factor for PM<sub>2.5</sub> **Emissions** from BEIS version 3.09 with BELD3-format vegetation only. land cover for Canada and the U.S. Wildfires sources (PM<sub>2,5</sub>, COV, NOx, SO<sub>2</sub>, CO, NH<sub>3</sub>) calculated by CFFEPS based on effective biomass burned multiplied by emission factors for different chemical species. NRCan's Canadian Wildland Fire Information System (CWFIS) NRCan's Canadian Wildland Fire Information System **Hotspot source** (CWFIS) in near real-time biomass burning emissions in near real-time biomass burning emissions • Total Fuel Consumption > 0.1 kg/m<sup>2</sup> Total Fuel Consumption (kg/m<sup>2</sup>) Emission time profile: Variable (diurnal profile) • Fire growth and spread calculated from meteorological Emission time profile: Constant forecast information Emission source term Injection plume height: Fixed (200 m) Injection plume height: Variable, i.e. calculated from Vertical mass distribution: Uniform thermodynamic properties and atmospheric stability Vertical mass distribution: Uniform Assimilation period of 48 h 24 h hotspots Old smoke recycling Yes Yes Number of daily runs 2 times (00 UTC, 12 UTC) 4 times (00 UTC, 06 UTC, 12 UTC, 18 UTC) Operational 24/7 Operational 24/7 Support status

2

50 minutes, approximately

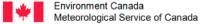


## MAIN FEATURES OF COMPLEMENTARY MLDP AND FIREWORK SYSTEMS

Features	MLDP (AutoSim)	FireWork
Available products	48-h hourly forecasts of PM <sub>2.5</sub> near-ground concentrations	<ul> <li>48-h hourly forecasts of PM<sub>2.5</sub> concentrations at ground level</li> <li>48-h hourly forecasts of PM<sub>2.5</sub> total mass column concentrations</li> <li>24-h average of PM<sub>2.5</sub> concentrations at ground level</li> <li>24-h maximum of PM<sub>2.5</sub> concentrations at ground level</li> <li>Air Quality Health Index (AQHI, internal)</li> </ul>
Output formats	<ul><li>HTML animations</li><li>ZIP animations</li><li>SHP</li><li>PNG</li></ul>	<ul><li>HTML animations</li><li>PNG</li><li>GRIB</li></ul>
Product time availability	Between 5 and 6 hours after the time of the HRDPS cycle run:  O0 UTC run: between 05 and 06 UTC  O6 UTC run: between 11 and 12 UTC  12 UTC run: between 17 and 18 UTC  18 UTC run: between 23 and 00 UTC	Approximately 4 hours after the time of the RDPS cycle run:  00 UTC run: 04 UTC  12 UTC run: 16 UTC

3

Last update: 24 May 2019



## MAIN FEATURES OF COMPLEMENTARY MLDP AND FIREWORK SYSTEMS

Features	MLDP (AutoSim)	FireWork
Veb site	http://eer.cmc.ec.gc.ca/mandats/AutoSim/Fire/index.html	<ul> <li>https://weather.gc.ca/firework/index_e.html</li> <li>http://collaboration.cmc.ec.gc.ca/cmc/air/firework/</li> <li>http://aqhi.cmc.ec.gc.ca/firework/</li> </ul>
eal-time additional upport	<ul> <li>Yes</li> <li>high-resolution products provided upon request</li> <li>Highly configurable and flexible system</li> </ul>	No
Recommended for	<ul> <li>Planning and prevention purposes for emergency management organizations         <ul> <li>On-site operations</li> <li>Tactical decisions</li> <li>Establishment of command post</li> <li>Evacuation of area at risk</li> <li>Shelter in place</li> <li>Guidance for air/ground sampling</li> </ul> </li> <li>Air Concentrations</li> <li>Local, regional and continental scales</li> <li>More frequent updates (4 times daily)</li> <li>Custom products at high resolution (upon request)</li> </ul>	<ul> <li>Air quality advisories and special weather statements</li> <li>Health impact</li> <li>Air concentrations</li> <li>Regional and continental scales</li> <li>Secondary aerosols</li> <li>Custom products (health impact guidance)</li> <li>Long-term analysis for air-quality, health and climate change studies</li> </ul>
Jsers	<ul> <li>Weather Preparedness Meteorologists (WMPs)</li> <li>Storm Prediction Centres (SPCs)</li> <li>National Environmental Emergency Centre (NEEC)</li> <li>Aviation and Defence Services (Joint Meteorological Centre CFB Gagetown)</li> <li>Public Safety Canada (Government Operations Centre)</li> <li>Provincial and Municipal Emergency Management Organizations</li> <li>Federal, Provincial and Municipal Public Health Agencies</li> <li>Provincial Departments of Environment</li> </ul>	<ul> <li>Storm Prediction Centres (SPCs)</li> <li>Federal, Provincial and Municipal Governments</li> <li>Decision Makers</li> <li>Universities</li> <li>Federal and Provincial Public Health Agencies</li> <li>Private Sector and Media</li> <li>International partners (NOAA, USFS, ECMWF)</li> </ul>

Last update: 24 May 2019