

TERMS OF USE

For the Ministry of the Environment Regional Meteorological Datasets

Limitations

The meteorological datasets posted on this website were developed by the Ministry of the Environment (MOE) Environmental Monitoring and Reporting Branch (EMRB) to assist all those involved in advanced air modelling in Ontario. Although care was put into the creation of these files, the MOE cannot guarantee absolute accuracy.

Additional local meteorological files are available through EMRB. Please contact EMRB if studies require the use of dry or wet deposition. Obtain the most recent version of AERMOD from your third party supplier, Ontario Government Public Information Centre or the US-EPA website http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod.

IMPORTANT: Please note that the “AERMOD-Ready Meteorological Datasets” available on this site or CD were prepared with AERMET version 06341. To use these fully processed files, it is necessary to check their compatibility with the version of AERMOD used. For most cases, the only change one needs to make is to replace the version number at the end of the first line in the surface file (.sfc) with the version number of AERMOD in application. To make this change, simply open the .sfc file in an ASCII editor (e.g. Notepad) and replace 06341 at the end of the 1st line with the AERMOD version number one is running (see example below).

Example Original

```
43.03N 81.15W UA_ID: 00726320 SF_ID: 00061444 OS_ID: 0 VERSION: 06341
```

Example Revised

```
43.03N 81.15W UA_ID: 00726320 SF_ID: 00061444 OS_ID: 0 VERSION: YYDDD
```

The “Meteorological Datasets before AERMET Processing” hourly surface and upper air data files available on this site or CD may be used to run through Stage 1, 2 and 3 processing without any modification.

Redistribution

You are authorized to further distribute *Ontario meteorological data*, including any portion of it, contained on this website under the following conditions only:

- No fee will be charged explicitly to any party to whom it is distributed.
- The original meteorological files were obtained from Environment Canada. Environment Canada must be accredited as the source of the data used to produce the datasets described below. Redistribution must occur so that any other party must agree to the same redistribution restrictions before use of the redistributed product is allowed. Please refer to http://www.ec.gc.ca/copy_e.html.

- Processed data files were prepared by the EMRB. This data must be distributed in its original form.
- This document is to be provided when data is distributed

Regional Meteorological Data Sets

The MOE has prepared regional meteorological data sets for use in Tier 2 modelling as described in the MOE Air Dispersion Modelling Guideline for Ontario (AMDGO) available from <http://www.ene.gov.on.ca/envision/air/regulations/localquality.htm>. The surface meteorological sites used were Toronto (Pearson Airport), London, Sudbury and Ottawa along with International Falls, MN and Massena, NY. The following meteorological elements were used in AERMET processing for the 5 year period from 1996 to 2000: ceiling height, wind speed, wind direction, air temperature, total cloud opacity and total cloud amount. Anemometer height is 10 meters for all stations

The upper air stations used were Maniwaki, QU, White Lake, MI, Buffalo, NY, Albany, NY and International Falls, MN. Table 1 gives the locations of the surface meteorological sites and lists the upper air station used for each site. The locations of the upper air sites are given in Table 2.

Note that the time stamps in the ISC-PRIME datasets were rolled back 4 years to avoid the year 2000 problem in ISC-PRIME. To be specific, the years in the ISC datasets are from 1992 to 1996 which are from 1996 to 2000 in reality.

Table 1. Surface Meteorological Sites Location and Upper Air Stations to Use

Surface station	ID	Latitude	Longitude	Height above sea level, m	Province/State	UA to use
SUDBURY	6068150	46.62	-80.8	348	ONT	White Lake
OTTAWA	6106000	45.32	-75.67	114	ONT	Maniwaki
LONDON	6144475	43.03	-81.15	278	ONT	White Lake
TORONTO	6158733	43.67	-79.6	173	ONT	Buffalo
MASSENA	72622 (94725)	44.9	-74.9	65	NY	Albany
INT. FALLS	72747 (14918)	48.57	-93.37	359	MN	Int. Falls

Note: Anemometer height is 10 meters for all stations

Table 2. The Location of Upper Air Sites

UA station	ID	Latitude	Longitude
Buffalo	725280	42.93	-78.73
Maniwaki	7034480	46.23	-77.58
Albany	725180	42.75	-73.8
White Lake	726320	42.7	-83.47
Int. Falls	727470	48.57	-93.37

The surface meteorological data was pre-processed to give a minimum wind speed of about 1 m/s and to reduce the amount of missing data. The pre-processing steps were:

- **Treatment of Wind Speed and Direction for calm/missing conditions.**

If the original datasets have approximately 5% or more missing or calm hours, these missing/calm hours were first filled by a nearby station with similar climatology. To be specific, missing/calm hours in original International Falls and Massena datasets were filled by Kenora and Dorval data, respectively. The remaining missing/calms hours (if less than 6 consecutive hours in a row) were then interpolated and the interpolated wind directions were randomized. The random number file is available on this web site or CD. Hours with calm or very low wind speeds were set to minimum speeds of 4 km/h.

- **Interpolation of missing values.**

For each meteorological element, missing hours will be filled by a nearby station. For remaining missing hours, linear interpolation was applied if the number of the missing hours is up to six in a row. Missing data at the very beginning and at the very end of the data set are left as "missing" (no extrapolation is applied). If the number of consecutive hours with missing values for the element is more than 6, the values are left as "missing".

- **Unit conversion.**

All units for Canadian sites were converted to the US standard required for input into AERMET.

AERMET Processing

Regional meteorological datasets are generated in AERMET, stage3 processing step, using different wind independent surface conditions, called "URBAN", "FOREST", "CROPS". It is assumed that surface conditions are the weighted average over a radius of 3 km from the facility in all directions. The surface conditions needed are the Albedo (A), the Bowen ratio (Bo) and the surface roughness (Zo). The parameter values in Tables 3, 4 and 5 below were derived from data in Tables 4.1, 4.2b and 4.3 of the AERMET User's Guide.

"URBAN" - all surface parameters are set to urban values, as in Table 3.

Table 3. URBAN Surface Conditions

Season	Parameter		
	A	Bo	Zo
Winter	0.35	1.5	1
Spring	0.14	1	1
Summer	0.16	2	1
Fall	0.18	2	1

"FOREST" - all surface parameters are set to the mixture of coniferous and deciduous forests in the ratio 50%/50% as in Table 4.

Table 4. FOREST Surface Conditions

Season	Parameter		
	A	Bo	Zo
Winter	0.42	1.5	0.9
Spring	0.12	0.7	1.15
Summer	0.12	0.3	1.3
Fall	0.2	0.9	1.05

"CROPS" - all surface parameters are set to the mixture of Grassland, Cultivated Land, Coniferous and Deciduous forest in the ratio: 45%/45%/5%/5% as in Table 5.

Table 5. CROPS Surface Conditions

Season	Parameter		
	A	Bo	Zo
Winter	0.6	1.5	0.095
Spring	0.16	0.35	0.15
Summer	0.19	0.65	0.265
Fall	0.19	0.85	0.13

Geographic Application of the Regional Meteorological Data Sets

The application of the regional meteorological data sets across Ontario is described in Table 6. This table lists the MOE region and districts for which each of the meteorological data sets is most applicable. Figure 1 on the web site provides a graphical representation of the geographic application of these regional data sets. Corresponding file names are listed in Table 7.

Table 6 Application of Regional Meteorological Data Sets for MOE Regions and Districts

Meteorological data set	MOE region	MOE district/area
Toronto	Central	Toronto, York-Durham, Halton-Peel
	Southwestern	Barrie, Owen Sound
London	Southwestern	London, Windsor, Sarnia
	West Central	Hamilton, Niagara, Guelph
Ottawa	Eastern	Ottawa, Peterborough, Belleville
Sudbury	Northern	Sudbury, North Bay, Sault Ste. Marie, Timmins
Int. Falls	Northern	Thunder Bay, Kenora
Massena	Eastern	Kingston, Cornwall

Table 7 Meteorological Data File Names

Dataset	Region	ISC-PRIME	AERMOD-ready			AERMET-ready	
			CROPS	FOREST	URBAN	Surface	Upper Air
Int. Falls	Northern Thunder Bay, Kenora	Intfalls.met	IntfalCR.sfc IntfalCR.pfl	IntfalFR.sfc IntfalFR.pfl	IntfalUR.sfc IntfalUR.pfl	Intfalls.txt	Intfalls.ua
Sudbury	Northern Sudbury, North Bay, Sault Ste. Marie, Timmins	Sudbury.met	SudburCR.sfc SudburCR.pfl	SudburFR.sfc SudburFR.pfl	SudburUR.sfc SudburUR.pfl	Sudbury.txt	WhiteLake.ua
Massena	Eastern Kingston, Cornwall	Massena.met	MassenCR.sfc MassenCR.pfl	MassenFR.sfc MassenFR.pfl	MassenUR.sfc MassenUR.pfl	Massena.txt	Albany.ua
Ottawa	Eastern Ottawa, Peterborough, Belleville	Ottawa.met	OttawaCR.sfc OttawaCR.pfl	OttawaFR.sfc OttawaFR.pfl	OttawaUR.sfc OttawaUR.pfl	Ottawa.txt	Maniwaki.ua
Toronto	Central Toronto, York-Durham, Halton-Peel Southwestern Barrie, Owen Sound	Toronto.met	TorontCR.sfc TorontCR.pfl	TorontFR.sfc TorontFR.pfl	TorontUR.sfc TorontUR.pfl	Toronto.txt	Buffalo.ua
London	West Central Hamilton, Niagara, Guelph Southwestern London, Windsor, Sarnia	London.met	LondonCR.sfc LondonCR.pfl	LondonFR.sfc LondonFR.pfl	LondonUR.sfc LondonUR.pfl	London.txt	WhiteLake.ua

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