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**\* Transport Quebec road weather stations (10 min data) \***

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**1.0 Data Set Description**

The Transport Ministry of Quebec (MTQ) operates weather and ground stations along major highways to monitor road-related conditions such as depth of frozen ground and atmospheric conditions that may change those.

**DOI:** <https://doi.org/10.26023/RWHR-1HOS-7510>

**Image:**

[https://aqtr.com/sites/default/files/styles/body\\_large/public/thumbnails/image/station\\_meteoroutiere\\_fixe\\_texte\\_ap.jpg](https://aqtr.com/sites/default/files/styles/body_large/public/thumbnails/image/station_meteoroutiere_fixe_texte_ap.jpg)



Data for 10 stations that cover the Quebec side of the WINTRE-Mix study area were obtained and are available.

Data version: 1.0, 17 March 2022

Data Status: Final

Time period: 1 February 2022 - 15 March 2022

Data frequency: 10 mins

Physical locations of 10 stations (ID#, name, lat, lon):

2: Sainte-Hélène-de-Bagot	45.720465	-72.759723
5: Ulverton	45.691966	-72.26421
6: Sherbrooke - Deauville	45.306081	-72.089328
17: Saint-Bernard-de-Lacolle	45.061706	-73.454603
23: Sainte-Thérèse	45.6458	-73.86812
24: Saint-Jean-sur-Richelieu	45.32365	-73.23685
25: Les Cèdres	45.32878	-74.11552
27: Sainte-Anne-du-Sault	46.17239	-72.12916
28: Maskinongé	46.19789	-73.00484
51: Austin	45.289851	-72.260761

**Data source:** Ministère du Transport du Québec (MTQ)

**Data set restrictions:** None; acknowledgement of MTQ is requested if the data are used in a scientific publication. Please see the [WINTRE-MIX Data Policy](#) and [Data Management Plan](#).

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## 2.0 Instrument Description

The data we have obtained are from the following sensors:

- Vaisala PTB101B or PTB110 pressure sensors, sold under the brand name Campbell Scientific CS105 (in \*CS105\_10.csv files)

[https://s.campbellsci.com/documents/us/product-brochures/b\\_cs105.pdf](https://s.campbellsci.com/documents/us/product-brochures/b_cs105.pdf)

- Vaisala HMP45 temperature and humidity sensor (in \*HMP45C10.csv files)

<http://www.iprocessmart.com/images/Vaisala/HMP45AD.pdf>

- Unspecified (R.M. Young?) 10-m wind sensor (in \*Wind1\_10.csv files)

Sites being along roads that are often surrounded by forests, wind direction and speed for some stations are likely to be influenced by those. For specifics on siting, I suggest entering station coordinates on Google Maps, go on Street View, spot the station, and examine the surroundings. For example, for Sainte-Hélène-de-Bagot, see:

<https://www.google.ca/maps/@45.7202318,-72.7597456,3a,75y,47.3h,87.41t/data=!3m6!1e1!3m4!1st80FsUAHGM3L5lyEG-kdg!2e0!7i16384!8i8192>

And though stations also measure precipitation, MTQ was unwilling to share those data. I did not ask for soil temperature at depth.

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### 3.0 Data Collection and Processing

Stations collect data on pressure, temperature, humidity, and winds.

Derived and archived quantities every 10 mins are as follows:

#### a) For pressure (or CS105\_10) files:

BaroPress\_1min: Surface pressure in the last minute

#### b) For temperature and humidity (or HMP45C10) files:

AirTemp\_1min: Air temperature in the last minute of the 10-min interval (C);  
DewPoint\_1min: Dew point temperature in the last minute (C);  
RH\_1min: Relative humidity % in the last minute of the 10-min interval;  
Ta\_max: Maximum air temperature (in the past 10 min?)  
Ta\_min: Minimum air temperature (in the past 10 min?)  
Ta\_U\_max: Air temperature at RH maximum (in the past 10 min?)  
Td\_Ta\_max: Dew point temperature at maximum temperature (Ta\_max)  
Td\_Ta\_min: Dew point temperature at minimum temperature (Ta\_min)  
Td\_U\_max: Dew point temperature at maximum relative humidity (U\_max)  
U\_max: Maximum relative humidity  
U\_Ta\_max: Relative humidity at maximum air temperature (Ta\_max)  
U\_Ta\_min: Relative humidity at minimum air temperature (Ta\_min)

#### c) For wind (or Wind1\_10) files:

Dir: 10-min average vectorial wind direction (deg)  
Dir\_Sigma: 10-min standard deviation of wind direction

Sca\_Spd: 10-min scalar average of wind speed (km/hr)  
 Vct\_Spd: 10-min vectorial average wind speed  
 W1HSpd\_2min: Scalar average of wind speed in the last 2 mins  
 W1RDir\_2min: Scalar average of wind direction in the last 2 mins  
 W1RSpd\_2min: Vectorial average of wind speed in the last 2 mins  
 W1StdDir\_2min: Standard deviation of wind direction in the last 2 mins  
 WindDir1: Instantaneous wind direction at the end of the interval  
 WindDir1\_SMM: Wind direction of the strongest wind in the 10-min interval  
 WindSpd1: Instantaneous wind speed at the end of the interval  
 WindSpd1\_Max: Wind speed of the strongest wind in the 10-min interval

*No information is available on quality assurance and control procedures, nor on data intercomparisons. "The data from the weather stations have not been processed and are not guaranteed for quality or accuracy".*

Finally, the file "**Explications\_Donnees.xlsx**" has a description of the measurements on one Excel tab and the list of stations in another. It is the source of much of the information transcribed here.

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#### **4.0 Data Format**

Data were submitted as compressed ZIP archive of monthly files, namely:

**Fevrier\_2022.zip** contains all the data for all stations in February 2022;

**Mars\_2022.zip** contains all the data for all stations in March 2022.

Each monthly archive contains 29 CSV files, whose name follows the following convention: YearMonth\_CR5000\_ID\_Instrument.csv; for example, 202203\_CR5000\_2\_CS105\_10.csv contains the data for March 2022 of the CS105 pressure sensor at station #2 (Sainte-Hélène-de-Bagot) collected on stations model CR5000. The exception to that convention is for station 51 (Austin, historically station #1) that is of an older model of logger (CR1000) that do not have winds; for those the file name would look like YearMonth\_CR1000\_1\_Instrument.csv. We have 29 files because the station with the older data logger (Austin) only has files for pressure (CS105) and temperature/humidity (HMP45C10), while the other nine stations also have wind files.

#### **File contents:**

The CSV files will all start with the same three (header) lines:

---

```
ide_source;nom_statn_loggr;nom_table;cod_type_table;nom_elemn;dah_donne;dah_prod;val_tranm;
ta_valr;image;
```

1 row selected.

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The first line has the label of the columns of data to follow, while the next two seems to be an irrelevant output of the extraction program used.

```
ide_source:      The documentation states "ignore"
nom_statn_loggr: Name of the data logger (CR1000_1 or CR_5000_1);
```

nom\_table: Name of the table format (HMP45C10, Wind1\_10, or CS105\_10)  
 cod\_type\_table: "Ignore" (either HMP45C10, VENT1, or CS10510)  
 nom\_elemn: Name of the weather element measured (see below for details)  
 dah\_donne: Date and time of the end of the 10-min interval (EST = UTC-5)  
 dah\_prod: Date and time of output processed  
 val\_tranm: Value of data  
 sta\_valr: Status of value/instrument, "V" being "valid", "I" invalid  
 image: "Ignore"

Afterwards, each row contains information about `_one_single_measurement_` at a specific time (or for a specific time interval).

**a) Pressure files:**

One type of rows of data, as there is only one measurement, pressure.

The following line,

```
2;CR1000_1;CS105_10;CS10510;BaroPress_1min;2022-03-01 00:00:00;2022-03-01 00:00:00;987,1069;V;N;
```

reads as:

The data from BaroPress\_1min (last minute of pressure measurements) ending at midnight (05:00 UTC) is 987.1069 hPa and is considered a valid measurement.

**b) Temperature humidity files:**

Twelve (12) types of rows of data, as there are twelve derived types of measurements. The following two lines,

```
2;CR1000_1;HMP45C10;HMP45C10;AirTemp_1min;2022-03-01 00:00:00;2022-03-01 00:00:00;-17,88351;V;N;
```

```
2;CR1000_1;HMP45C10;HMP45C10;RH_1min;2022-03-01 00:00:00;2022-03-01 00:00:00;66,99244;V;N;
```

can be summarized as:

In the minute before midnight EST (05:00 UTC), the average temperature was -17.88351 C and the relative humidity was 66.99244%, both considered valid.

**c) Wind files:**

Also twelve (12) types of rows of data, as there are twelve derived types of measurements. The following two lines,

```
2;CR5000_2;Wind1_10;VENT1;W1HSpd_2min;2022-03-01 00:00:00;2022-03-01 00:00:00;8,379001;V;N;
```

```
2;CR5000_2;Wind1_10;VENT1;W1RSpd_2min;2022-03-01 00:00:00;2022-03-01 00:00:00;8,315832;V;N;
```

can be summarized as:

In the 2 minutes before midnight EST (05:00 UTC), the scalar average wind speed was 8.379 km/hr while the vectorial average wind speed was 8.3158 km/hr, both being considered valid.

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**5.0 Data Remarks**

Some important particularities of these CSV files:

- 1) Columns and numbers follow an unusual (French) convention:

First, in floating numbers, commas instead of points are used as decimal separators, i.e., to separate the integer part from the decimal point. For example, a temperature of -3.4 C will be listed as "-3,4", not "-3.4".

2) Entries/numbers/columns are separated by semi-colons (";").

3) Data are roughly, but not exactly, in chronological order.

I have found that Excel has difficulty dealing with those files, even if you tell it that ";" separates columns (works OK) and that "," is the decimal separators (it still believes they are 3 digit separators and makes a mess of the data).

You may want, in a text editor, to replace all "," by ".", then all ";" by ";", and finally save the modified CSV files in another file that will be more readily read by people/code without being confused by the unusual ";" and ",". Then, in a spreadsheet, you will probably want to sort rows by increasing times, and maybe put different atmospheric parameters in different rows.

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## 6.0 References

See "[Explications\\_Donnees.xlsx](#)" for some details in French.

I am unfamiliar of previous scientific use of these datasets.

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## 7.0 Appendix

GCMD science keywords:

SURFACE PRESSURE, SURFACE TEMPERATURE, DEW POINT TEMPERATURE,  
RELATIVE HUMIDITY, WIND SPEED, WIND DIRECTION