

Sorel, QC MRR-Pro Data [ECCC]

Authors

Daniel Michelson (Lead author, corresponding author)

A/Chief, High Impact Weather Research

Environment and Climate Change Canada

4905 Dufferin St., Toronto, ON, Canada, M3H 5T4

E-mail: daniel.michelson@ec.gc.ca

Telephone: 416-739-4469

ORCID: 0000-0003-3222-9881

1. Data Set Description

1.1. Introduction: This dataset contains the raw data from the METEK vertically profiling K-band Micro Rain Radar (MRR-PRO) sited at Sorel-Tracy, QC for the Winter Precipitation Type Research Multi-Scale Experiment (WINTRE-MIX). Data was collected between October 20, 2021 and May 03, 2022. The MRR-PRO detects vertical profiles of reflectivity, Doppler velocity, and spectrum width. Sorel-Tracy is located at the northern end of the Champlain Valley, on the southern shore of the St. Lawrence River northeast of Montreal. The site was in a small park to the east of the Richelieu River. Several other instruments were also stationed at the site and will be available from the WINTRE-MIX data archive

(https://data.eol.ucar.edu/master_lists/generated/wintre-mix/).

1.2. Data version number: 1.0

1.3. Data version date: 2022-03-16

1.4. Data Status: Final

1.5. Time period covered by data: 16:00 UTC October 21, 2021 to 23:00 UTC March 31, 2022

1.6. Latitude: 46.030222°N

1.7. Longitude: -73.110337°E

1.8. Elevation: 19.0 m

(<http://geogratis.gc.ca/services/elevation/cdem/altitude?lat=46.030222&lon=-73.110337>);

13.3m (<http://geogratis.gc.ca/services/elevation/cdsm/altitude?lat=46.030222&lon=-73.110337>)

1.9. Other (address): Sorel-Tracy, QC, Canada (approximately behind 66 Rue de la Comtesse)

1.10. Data Frequency - Frequency of data collection: 10 second

1.11. Data source: High Impact Weather Research, Environment and Climate Change Canada

1.12. Web address references: https://www.eol.ucar.edu/field_projects/wintre-mix

1.13. Data set restrictions: Please refer to the WINTRE-MIX data policy

(<https://www.eol.ucar.edu/content/wintre-mixdata-policy>) as well as the WINTRE-MIX data management plan (https://www.eol.ucar.edu/system/files/Data_Management_Plan-1Dec2021.pdf) for more information regarding dataset restrictions and dissemination.

2. Instrument Description

2.1. Description:

The METEK vertically profiling K-band Micro Rain Radar (MRR-PRO) is a remote sensing instrument used for the measurement of precipitation in the atmosphere up to a height of 6.35 km with a vertical resolution of 50 m every 10 seconds. The instrument operates at a frequency of 24.1 GHz (K-band) and uses Doppler radar principles to detect and measure the size and velocity of precipitation particles in the atmosphere.

For these datasets, a Micro Rain Radar was located in Sorel-Tracy, Quebec, Canada.

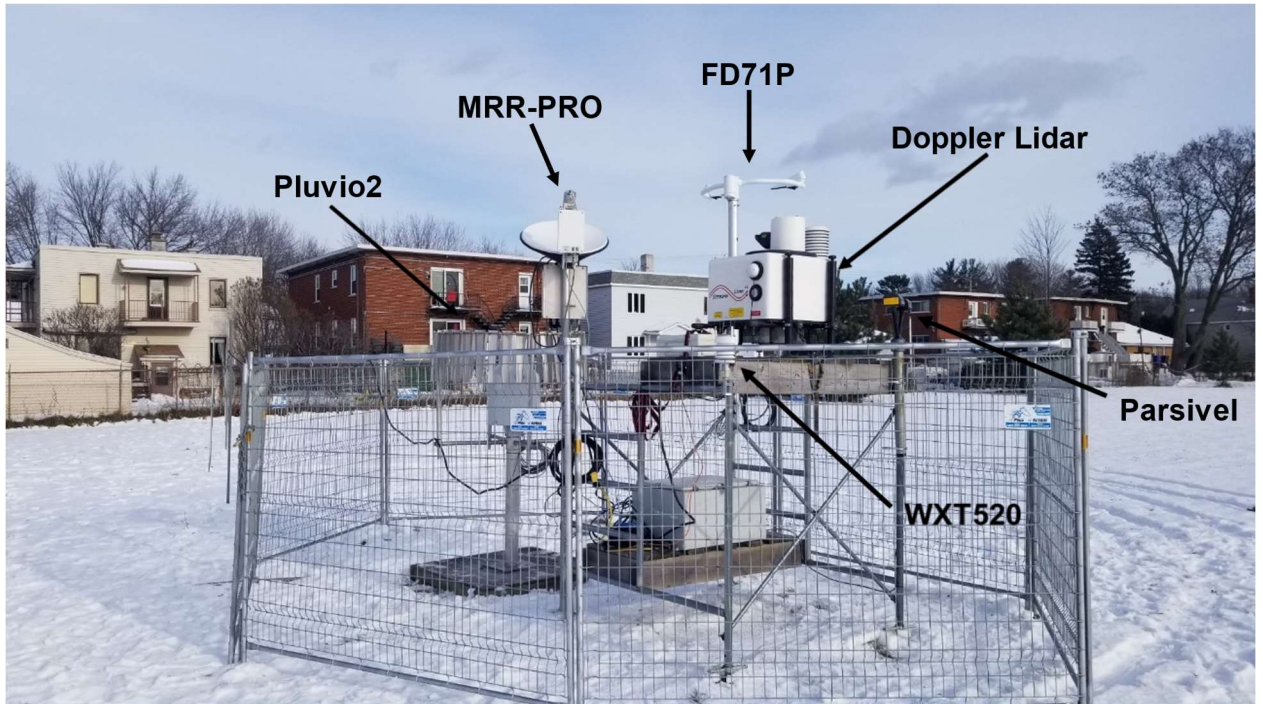


Figure 1 - Photograph of the Sorel-Tracy meteorological instrument site.



Figure 2 - Google Maps map of the location of the Sorel-Tracy site.

2.2. Table of specifications:

Table 1: Table of Specifications

Parameter	Specification
Range resolution	> 10 m

Operating frequency	24 GHz (K-band)
Sampling frequency	500 kHz
Number of range gates	min. 30 ... max. 254
Acquisition time for one set of spectra	≥ 1.6 ms
Time interval for averaged spectra	≥ 1 s
Velocity resolution	0.05 - 6.00 m/s
Nyquist velocity range	12.3 - 96.3 m/s
Min. detectable radar reflectivity (z=1000 m, Δz=100 m, Δt=60 s)	- 8 dBZ

3. Data Collection and Processing

- 3.1. Description of data collection:** The MRR-PRO was configured to collect data every 10 seconds. The data was logged on a Windows PC using the METEK data logging program. This program transformed the message output into hourly netCDF files, providing further documentation of the parameters. No quality control has been done beyond the internal METEK processing.
- 3.2. Description of derived parameters/processing techniques:** See METEK MRR-PRO manual.
- 3.3. Description of quality assurance/control procedures:** See METEK MRR-PRO manual.

4. Data format

- 4.1. Data file structure and file naming conventions:** Observations are collected into hourly netCDF files. File names are of the form: YYYYMMDD_hh0000.nc where YYYY=year(e.g. 2022), MM=month(e.g. 02 or 03), DD=day, and hh=hour.
- 4.2. Data format and layout:** Hourly netCDF data files.
- 4.3. List of parameters:**

Table 2: List of Parameters

Parameter	Description	Units
Za	log attenuated reflectivity	dBZ
Zea	attenuated equivalent reflectivity factor	dBZ
Ze	equivalent reflectivity factor	dBZ
RR	rainfall rate	mm h ⁻¹
LWC	mass concentration of liquid water in air	g m ⁻³
PIA	path integrated rain attenuation	dB
VEL	radial velocity of scatters towards instrument	m s ⁻¹
WIDTH	doppler spectrum width	m/s
SNR	signal to noise ratio	dB
spectrum	log attenuated power	dB
N	drop size distribution	

5. Data Remarks

5.1. Missing data periods:

No significant (> 1h) missing data periods, except:

Table 3: List of Data Gaps

Gap Start	Gap End	Length
2021/10/20 09:00	2021/10/21 16:00	01d 07h 00m

2021/11/24 00:00	2021/12/07 14:00	13d 14h 00m
------------------	------------------	-------------

Note: No missing data periods during the WINTRE-MIX campaign

6. Acknowledgment

This README was inspired by [CFI Climate Sentinels Gault MRR-2 Processed Data](#) (Lachapelle *et. al.*, 2022).

7. References

Lachapelle *et. al.*. 2022: CFI Climate Sentinels Gault MRR-2 Processed Data. Version 1.0. UCAR/NCAR - Earth Observing Laboratory. <https://doi.org/10.26023/AKWD-BRV8-R80D>. Accessed 20 April 2023.

METEK web site: <https://metek.de/product/mrr-pro/> Accessed 20 April 2023.

*METEK, 2019: Micro Rain Radar MRR Pro Manual. METEK, Meteorologische Messtechnik GmbH.

*METEK, 2015: MRR Physical Basics. METEK GmbH. METEK, Meteorologische Messtechnik GmbH.

* *Metek MRR manuals are provided as attachments.*

8. Appendix

Suggested GCMD keywords (no particular order):

- Solid precipitation
- Frozen precipitation
- Precipitation profiles
- Melting layer height
- Rain
- Freezing rain
- Drizzle
- Freezing drizzle
- Ice pellets
- Snow
- Ice storms
- Snow storms
- Extratropical cyclones
- Radar
- Doppler velocity
- Radar reflectivity
- Spectrum width