

Trois-Rivières Parsivel Disdrometer Data [UQAM]

Authors:

Mathieu Lachapelle (Lead author, Corresponding author)

Ph.D Candidate/Student

Department of Earth and Atmospheric Sciences

Université du Québec à Montréal

lachapelle.mathieu@courrier.uqam.ca

Margaux Girouard (Co-author)

Master Candidate/Student

Department of Earth and Atmospheric Sciences

Université du Québec à Montréal

girouard.margaux@courrier.uqam.ca

Hadleigh D. Thompson (Co-author)

Research Assistant

Department of Earth and Atmospheric Sciences

Université du Québec à Montréal

thompson.hadleigh@uqam.ca

ORCID: 0000-0001-5145-5951

Julie M. Thériault (Co-author)

Professor

Department of Earth and Atmospheric Sciences

Université du Québec à Montréal

theriault.julie@uqam.ca

ORCID: 0000-0001-6534-5083

1. Data Set Description

1.1. Introduction: This dataset contains raw data from an OTT Parsivel² laser disdrometer that was temporarily installed at the Université du Québec à Trois-Rivières (UQTR) campus from December to April 2022 to support the Winter Precipitation Type Research Multi-Scale Experiment (WINTRE-MIX). The instrument provides histograms of hydrometeor size and fallspeed. The site sits in the St. Lawrence River Valley. Several other sites also collected Parsivel data during WINTRE-MIX. Data from these other sites will also be made available in the WINTRE-MIX data archive

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

1.2. Data version: v1.0, 31 August 2022

1.3. **Time period covered:** 6 December 2021 – 8 April 2022

1.4. **Location:**

- The OTT Parsivel laser disdrometer was mounted on a small tripod located at UQTR campus (Fig. 1), co-located with other meteorological instruments. The approximate location is shown in Fig. 2.
- Latitude: 46.349835°
- Longitude: -72.581354°
- Elevation: 49 m MSL

1.5. **Data frequency:** 60 seconds

1.6. **Web address:** <https://doi.org/10.26023/7XA0-EV5N-990K>

Preliminary Parsivel data are visualized as “quick look” plots on the WINTRE-MIX field catalog (<https://catalog.eol.ucar.edu/wintre-mix/114/date/>).

1.7. **Dataset 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.





Fig. 1. Photos of the Trois-Rivières site and OTT Parsivel laser disdrometer.

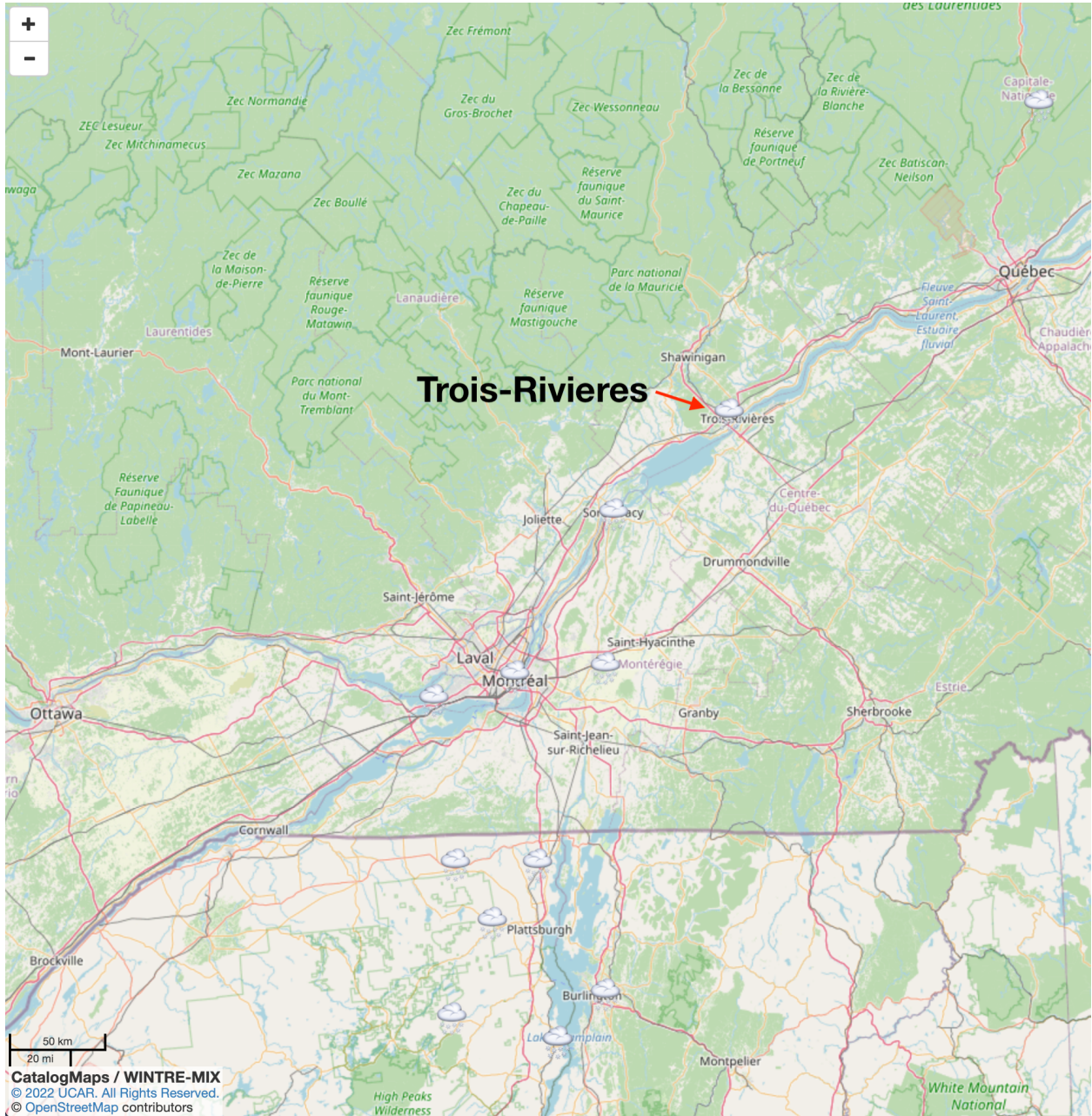


Fig. 2. Approximate location of Trois-Rivières station in Trois-Rivieres, QC.

2. Instrument Description

A Parsivel² laser disdrometer (Parsivel; <https://www.otthydromet.com/en/p-ott-parsivel-laser-present-weather-sensor/70.210.002.3.0>) was deployed at UQAM-PK (Fig. 1). The Parsivel uses measured extinction of a laser beam by falling hydrometeors to classify each hydrometeor by its size and fall speed. The data are recorded as counts in 32 size bins and 32 fall speed bins. The

attributes of the Parsivel are summarized in Table 1. More detailed technical information on the Parsivel is available in OTT (n.d.) and Tokay et al. (2014).

Table 1: Technical specifications and configuration settings for the Parsivel

Parameter	Values
Measuring surface	180 x 30 mm
Measuring range – liquid precipitation particle size	0.2 – 8 mm
Measuring range – liquid precipitation particle size	0.2 – 25 mm
Measuring range – particle speed	0.2 – 20 m/s
Optical sensor laser diode – wavelength	650 nm
Optical sensor laser diode – output power	0.2 mW
Data collection frequency	60 s

3. Data Collection and Processing

The Parsivel was configured to collect data every 60 seconds (Table 1). Heating was supplied to the sensor heads to prevent accumulation of snow and ice, using the default temperature threshold of 10 degC. Data files were written to a linux-based single board computer using Python, and transferred to a Windows PC every 10 minutes. These were converted into netCDF files with additional metadata added. No quality control checks were applied beyond those used in the routine OTT processing.

4. Data format

The whole dataset is saved in one file named TROI_Parsivel_WINTRE-MIX.nc .

The variables provided in each file are summarized in Table 2. Additional metadata is provided in the netCDF file.

Table 2: Variables recorded in Parsivel netCDF files.

<u>Parameter</u>	<u>Value</u>	<u>Unit</u>
bin_velocities	Middle of velocity bin	m s ⁻¹
bin_diameters	Middle of diameter bins	mm
time	Measurement time in UTC	Timestamp
Prcp_Intensity	Intensity of precipitation	mm h ⁻¹
Sample_Int	Sample Interval	s
Num_Particles	Number of detected particles	-
Sensor_Temp	Temperature in sensor	degC
Nd_Spectra	Particle number concentration in each diameter bin	log ₁₀ (m ⁻³ mm ⁻¹)
Vd_Spectra	Average particle speed in each diameter bin	m s ⁻¹
Raw_Data	Number of counts in each combined velocity, diameter bins	-
latitude	latitude of Parsivel	deg N
longitude	longitude of Parsivel	deg W
height_above_mean_sea_level	elevation of Parsivel	m above mean sea level
bin_diameters_width	Width of diameter bins	mm
bin_velocities_width	Width of velocity bins	m s ⁻¹

5. Data Remarks

The two smallest size bins are outside the measurement range of the instrument and are not used. The Parsivel appears to systematically undercount drops in the third smallest size bin. Thus, drops with diameters < 0.37 mm are likely poorly characterized by this instrument.

Table 3 summarizes Trois-Rivières Parsivel interruptions > 1 h. Only 2 long interruptions occurred from 1 Feb 2022 - 15 March 2022, during the field campaign. They are highlighted in **yellow**.

Table 3: Summary of missing data

Interruption length [hours]	Start	End
25.4	2021-12-07 17:41	2021-12-08 19:05
14.9	2021-12-17 00:22	2021-12-17 15:17
24.0	2021-12-18 23:59	2021-12-20 00:00
2.7	2022-01-31 19:32	2022-01-31 22:13
187.3	2022-02-03 00:29	2022-02-10 19:47
24.0	2022-02-17 23:59	2022-02-19 00:00
5.9	2022-03-17 19:19	2022-03-18 01:10
1.3	2022-03-19 20:55	2022-03-19 22:11

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the instrument on their field. This README was largely inspired from NYSM Chazy, NY Parsivel Disdrometer Data (Minder et al. 2022).

7. References

Minder, J., N. Bain, W. Bartolini, Jr., K., and S. McKim, 2022: NYSM Chazy, NY Parsivel Disdrometer Data. Version 1.0. <https://doi.org/10.26023/KRFX-TMZW-JJ0W> .

Tokay, A., Wolff, D. B., & Petersen, W. A. (2014). Evaluation of the New Version of the Laser-Optical Disdrometer, OTT Parsivel2. Journal of Atmospheric and Oceanic Technology, 31, 1276-1288. <https://doi.org/10.1175/JTECH-D-13-00174.1>

*OTT, n.d: Operating instructions – Present Weather Sensor Parsivel 2 . OTT Hydromet GmbH, document number: 70.210.001.BE.

** OTT Parsivel manual is provided as an attachment.*

8. Appendix

Suggested GCMD keywords to accompany this dataset are provided below in no particular order:

- Solid precipitation
- Frozen precipitation
- Rain
- Freezing rain
- Drizzle
- Freezing drizzle
- Ice pellets
- Snow
- Droplet size
- Ice storms
- Snow storms
- Extratropical cyclones