Parsivel disdrometer data (Chazy, NY) [UAlbany, NYSM]

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1. Data Set Description

 1.1. Introduction: This dataset contains data from an OTT Parsivel laser disdrometer deployed at Chazy, New York in support of the WINTRE-MIX field campaign (https://www.eol.ucar.edu/field_projects/wintre-mix). The instrument provides histograms of hydrometeor size and fallspeed. The site sits in the northern end of the Lake Champlain 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, 19 July 2022

 1.3. Time period covered: 7 January 2022 – 20 April 2022

 1.4. Location:

- The Parsivel was mounted on pipe atop a roof (Fig. 1), co-located with an MRR-2 profiling radar and the profiler instruments of the New York State Mesonet Chazy profiler station (PROF_CHAZ; http://nysmesonet.org/about/sites#network=profiler&stid=prof_chaz). The approximate location is shown in Fig. 2.
- Latitude: 44.889°
- Longitude: -73.46634°
- Elevation: 74.3 m MSL

 1.5. Data frequency: 10 second

 1.6. Web address: 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 Chazy Parsivel, taken at the time of deployment showing mounting and nearby surroundings.
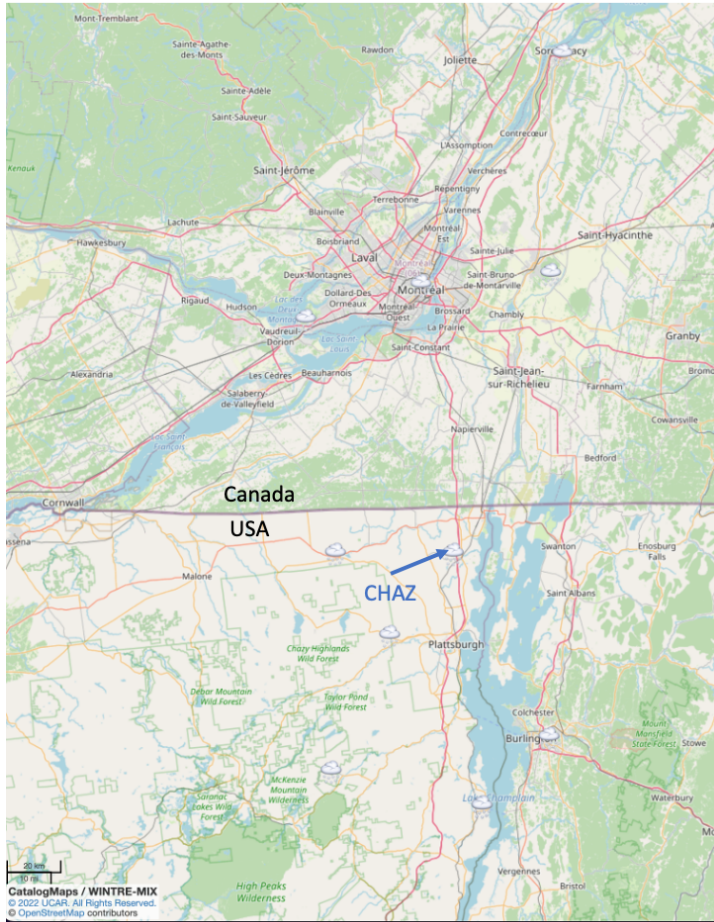
Fig. 2. Approximate location of Chazy, NY Parsivel radar deployment (CHAZ).

2.   Instrument Description

A Parsivel[2] laser disdrometer (Parsivel; https://www.otthydromet.com/en/p-ott-parsivel-laser-present-weather-sensor/70.210.002.3.0) was deployed at CHAZ (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	**Value**

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	10 s

3. Data Collection and Processing

The Parsivel was configured to collect data every 10 seconds (Table 1). Heating was supplied to the sensor heads to prevent accumulation of snow and ice. Data was logged onto a Windows PC using the OTT ASDO Software (ASDO Basic Version 1.15.0) as text daily text files in "ATM4" format. 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

Files are daily, containing 24 hours of data, and are named with the following format:
WINTRE-MIX_Parsivel_CHAZ_YYYYMMDD.nc
where *CHAZ* represents the site identifier and *YYYYMMDD* is the date of data collection in UTC.

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.

Field Name	**Description**	**Unit**
bin_velocities	Middle of velocity bin	ms^-1
bin_diameters	Middle of diameter bins	mm
time	Measurement time in UTC	seconds since start of day
Prcp_Intensity	Intensity of precipitation	mm h^-1
Prcp_Start	Precipitation since start of period	mm
Wx_Code_Synop	Synoptic Present Weather code	
Wx_Code_METAR	METAR Special Weather code	
Wx_Code_NWS	NWS Weather code	
Reflectivity	Radar reflectivity	dBZ
Visibility	Meteorological Optical Range (MOR) visibilit	m
Sample_Int	Sample interval	s
Signal_Ampl	Signal amplitude of laserband	-

Num_Particles	Number of detected particles	-
Sensor_Temp	Temperature in sensor	degC
Heating_Current	Heating current	A
Sensor_Voltage	Sensor voltage	V
Kinetic_Energy	Kinetic Energy	J m^-2 h^-1
Snow_Intensity	Snow Intensity	mm h^-1
Nd_Spectra	Particle number concentration in each diameter bin	log10(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	meters above mean sea level

bin_diameters_width	Width of diameter bins	mm
bin_velocities_width	Width of velocity bins	ms^-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 issues with missing or suspect data that affected specific days. The Parsivel recorded many small particles (D < 1 mm) during some periods when no precipitation was indicated by the co-located MRR-2 radar and NYSM CHAZ Pluvio weighing precipitation gauge. The most notable periods are indicated in Table 3. In some cases, this may be due to blowing snow. In other cases, the spurious precipitation seems to be measured near the time of peak insolation on clear days and may be associated with scattered sunlight.

Table 3: Summary of missing and suspect data

Date (YYYY-MM-DD)	Notes
2022-01-08	Light precipitation recorded by Parsivel when no precipitation was recorded by MRR-2 or NYSM Pluvio. Possibly blowing snow.
2022-01-16	Light precipitation recorded by Parsivel when no precipitation was recorded by MRR-2 or NYSM Pluvio.
2022-01-18	Light precipitation recorded by Parsivel after 1000 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio. Possibly blowing snow.
2022-01-26	Light precipitation recorded by Parsivel from ~1500–1900 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio.
2022-02-01	Light precipitation recorded by Parsivel from ~1800–2200 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio.

2022-02-02	Light precipitation recorded by Parsivel from ~0100–0900 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio.
2022-02-05	Light precipitation recorded by Parsivel from ~1200–2100 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio. Possibly blowing snow.
2022-02-06	Light precipitation recorded by Parsivel from ~1600–0000 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio. Possibly blowing snow.
2022-02-16	Partial missing data (data logging PC down)
2022-02-17	Partial missing data (data logging PC down)
2022-02-26	Light precipitation recorded by Parsivel from ~1400–2200 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio. Possibly blowing snow.
2022-03-04	Light precipitation recorded by Parsivel from ~1500–2100 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio.
2022-03-16	Partial missing data (data logging PC down)
2022-03-17 – 2022-03-20	Missing data (data logging PC down)
2022-03-21	Partial missing data (data logging PC down)
2022-03-30	Light precipitation recorded by Parsivel from ~1300–2000 UTC when no precipitation was recorded by MRR-2 or NYSM Pluvio.
2022-04-16	Light precipitation recorded by Parsivel from ~1500–1800 UTC when no precipitation was recorded by MRR-2.
2022-04-20	Partial missing data (data logging PC down)

6. References

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.

7. 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