Title: CCOPE-2015 Parsivel disdrometer data

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1.0 Data Set Overview:

This dataset contains data from a Parsivel disdrometer deployed during CCOPE. Information on the overall goals of CCOPE, deployment strategy, and some results are found in Massmann et al. (2017). All data were collected at Curanilahue, Chile (CRL). During most of the winter storms, CRL is located upstream of the Nahuelbuta Mountains, in coastal southern Chile. The location of the site is provided in Table 1 and Figure 1 below.

Time period covered: 22 May 2015 – 10 August 2015

Table 1: Summary of location of Parsivel deployment

Abbreviated name	Full name	Latitude [deg.]	Longitude [deg.]	Elevation [m, MSL]
CRL	Curanilahue	-37.4753	-73.3423	137

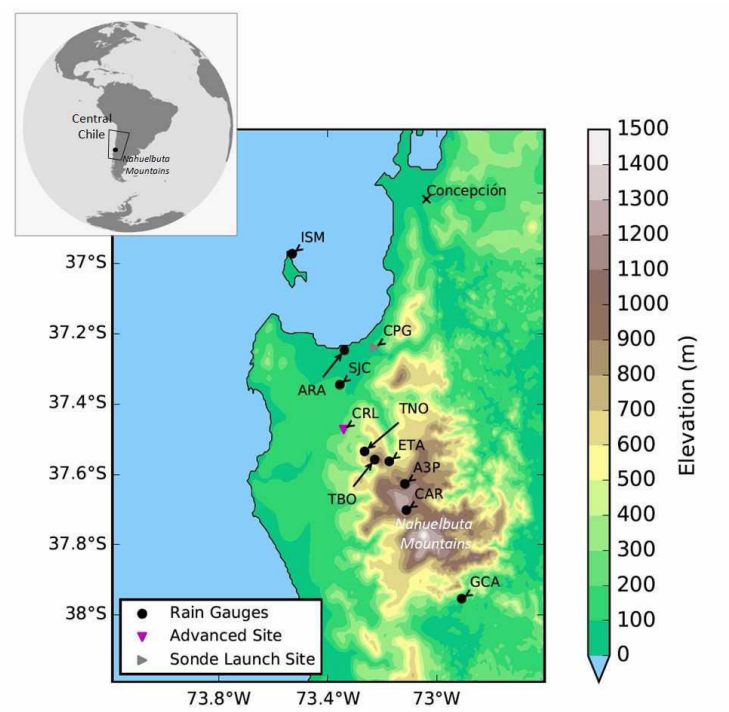

Figure 1: Location of Curanilahue (CRL) Parsivel deployment location as well as other CCOPE observations sites. Adapted from Massmann et al. (2017).

2.0 Instrument Description:

One OTT Parsivel optical disdrometer was deployed at CRL. The instrument optically senses precipitation size and fall speed using laser light (Löffler-Mang and Joss 2000). It classifies hydrometeors into joint histograms of size and fall speed with dimensions of 32 by 32 bins.

Some basic technical data on the Parsivel is included in Table 2. Figure 2 shows photos of the Parsivel as deployed at CRL.

Table 2: Parsivel measurement attributes [from: OTT, Operating Instructions: Present Weather Sensor Parsivel]

Wavelength	650nm
Ouput power (peak)	0.2mW
Measuring surface (WxD)	180 x 30 mm
Measuring range (size of liquid drops)	0.2 – 8 mm

Measuring range (particle velocity)	0.2 – 20 m/s

Figure 2: Photos showing the Parsivel as deployed at CRL


3.0 Data Collection and Processing:

Raw counts of particle size and velocity classes were logged every 10 seconds. Data are only logged for sampling intervals when at least one particle is detected. They are stored in files that include all observations for a given hour. No quality control / quality assurance (QC/QA) was applied to the data in these files. Note: additional QC/QA was applied before the analysis presented in Massmann et al. (2017).

4.0 Data Format:

The files are named with the following format:

Parsivel_raw_CRL_YYYYDDD_HH.txt

where "raw" denotes that this is the raw data without post-processing applied, "CRL" is the abbreviated site name (as in Table 1), "YYYY" is the year, "DDD" is the day of the year, and "HH" is the hour of the day (UTC). Each file contains the data for all 10-second samples collected in that hour. Data are only logged when at least one particle is detected.

The data are stored as comma delimited text. The data are formatted as follows:

Line 1 (header)

MM/DD/YY OTT Parsivel (SN: SSSSSSS)

MM = two-digit month (in UTC)
DD = two-digit day (in UTC)
YY = two-digit year (in UTC)
SSSSSSS = serial number

Lines 2 ... n (data)

Field 1: MMSSmmm

MM = minute, SS = second, and mmm = millisecond at the time the sample was acquired from the serial port (in UTC).

Field 2: RRRR.RRR

Precipitation intensity; units: millimeter per hour

Field 3: AA.AA

Accumulated precipitation since last raw sample; units: millimeter

Field 4: ZZ.ZZZ

Radar reflectivity factor; units: decibel

Field 5: NNNNN

Number of detected particles since the last raw sample

Field 6: S

Sensor status.
0 = Sensor working correctly
1 = Laser protective glass is dirty, but measurements are still possible.
2 = Laser protective glass is dirty, partially covered. No further usable measurements are possible.
3 = Laser damaged.

Field 7: EEE

Error Code. 0 = no errors.

Field 8 - 39: N.NNN,

N(d); units: per meter cubed millimeter

NOTE: Missing data values are format filled with -9's.

Field 40 - 71: V.VVV,

v(d); unitless

Field 72 - 1095: P,

Number of particles detected for each particle-diameter/velocity bin combination (32 x 32 matrix). The 32 particle-diameter blocks are listed from left to right for each incremental velocity class. For example:

Velocity1-PartDiam1...Velocity1-PartDiam32
Velocity2-PartDiam1...Velocity2-PartDiam32
...
Velocity32-PartDiam1...Velocity32-PartDiam32

The particle diameters and velocities are as follows:

BIN	PartDiam(mm)	BIN	Velocity(m/s)
B1	0.062	B1	0.05
B2	0.187	B2	0.15
B3	0.312	B3	0.25
B4	0.437	B4	0.35
B5	0.562	B5	0.45
B6	0.687	B6	0.55
B7	0.812	B7	0.65
B8	0.937	B8	0.75
B9	1.062	B9	0.85
B10	1.187	B10	0.95
B11	1.375	B11	1.10
B12	1.625	B12	1.30
B13	1.875	B13	1.50

B14	*2.125*	*B14*	*1.70*
B15	*2.375*	*B15*	*1.90*
B16	*2.750*	*B16*	*2.20*
B17	*3.250*	*B17*	*2.60*
B18	*3.750*	*B18*	*3.00*
B19	*4.250*	*B19*	*3.40*
B20	*4.750*	*B20*	*3.80*
B21	*5.500*	*B21*	*4.40*
B22	*6.500*	*B22*	*5.80*
B23	*7.500*	*B23*	*6.00*
B24	*8.500*	*B24*	*6.80*
B25	*9.500*	*B25*	*7.60*
B26	*11.000*	*B26*	*8.80*
B27	*13.000*	*B27*	*10.40*
B28	*15.000*	*B28*	*12.00*
B29	*17.000*	*B29*	*13.60*
B30	*19.000*	*B30*	*15.20*
B31	*21.500*	*B31*	*17.60*
B32	*24.500*	*B32*	*20.80*

All other missing data values are format filled with -9's.

5.0 Data Remarks:

Missing data

Power outages occurred, which likely resulted in missing Parsivel data, during part of the day on:

- 7 July 2015
- 9 August 2015

Instrument problems and potential biases

As discussed in Massmann et al. (2017):

- 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 (Sandra Yuter, personal communication, 2015).

Thus, drops with diameters < 0.37 mm are likely poorly characterized by this instrument.

6.0 References*:*

Löffler-Mang, M. and Joss, J., 2000: An optical disdrometer for measuring size and velocity of hydrometeors. *Journal of Atmospheric and Oceanic Technology*, **17**(2), 130-139. https://doi.org/10.1175/1520-0426(2000)017<0130:AODFMS>2.0.CO;2

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OTT, Operating Instructions: Present Weather Sensor Parsivel, document number: 70.200.005.B.E 05-0406, 48 pp.