Title: CCOPE-2015 Curanilahue raw MRR profiling radar data

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1.0 Data Set Overview:

This dataset contains data from two vertically profiling K-band METEK Micro Rain Radars (MRRs) 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: 21 May 2015 – 14 August 2015

Table 1: Summary of location of MRR deployment

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

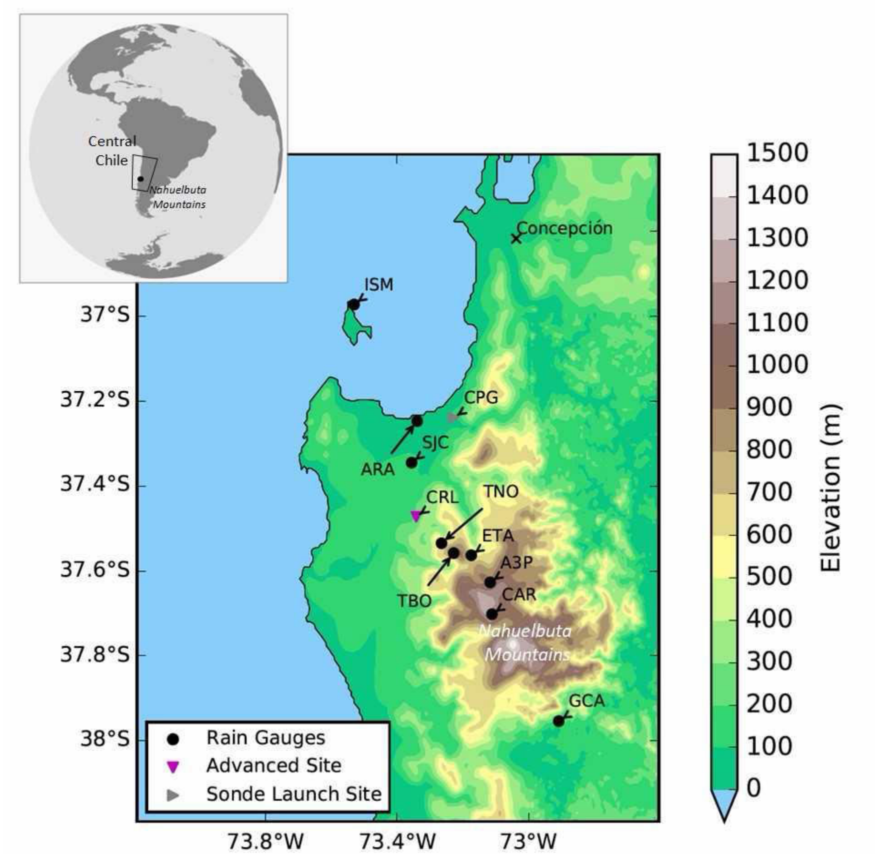

Figure 1: Location of Curanilahue (CRL) MRR deployment as well as other CCOPE observations sites. Figure adapted from Massmann et al. (2017).

2.0 Instrument Description:

Two METEK K-band FM-CW Micro Rain Radar 2s (MRRs, http://metek.de/product/mrr-2/) were deployed at CRL, making measurements with different range resolutions. The attributes of the MRRs are summarized in Table 2. Table 3 summarizes the identifying information and range-resolution settings for the two radars. More detailed technical information on the MRR2 is available in METEK (2012). Figure 2 shows photos of the MRRs as deployed as CRL.

Table 2: Sensor attributes for METEK MRR2

Frequency	24 GHz
Number of range gates (evenly spaced)	32
Transmit power (nominal)	50 mW
Beam-width	2 degrees

Table 3: identifying information and range resolutions of CCOPE MRRs deployed at CRL.

Identifier	Institution	Make-model	Range resolution	Maximum range	Operating dates
JRM	UAlbany	METEK-MRR2	200 m	6000 m	21 May 2015 – 14 August 2015
RDG	U. de Chile	*METEK-MRR2*	50 m	1550 m	22 May 2015 – 14 August 2015

Figure 2: MRRs at CRL

3.0 Data Collection and Processing:

Data are collected by logging onto a Windows PC using the METEK software as described in METEK (2012,2013). No post-processing is applied to this dataset. A complimentary dataset, "CCOPE-2015 Curanilahue post-processed MRR profiling radar data" includes additional derived variables and quality control procedures.

Prior to deployment at CRL the JRM MRR was deployed at Cazadero, California for comparison with an S-Band profiling radar. Results of this comparison are described in Appendices A-B of Massmann et al. (2017).

4.0 Data Format:

The files are named with the following format:

MRR_raw_CRL_NNN_YYYYMMDD.raw

where "raw" denotes that this is the raw datafile output by the METEK software, "CRL" is the abbreviated site name (as in Table 1), "NNN" is the identifier for the specific MRR (as in Table 3), and "YYYYMMDD" denotes the date (UTC). Each file contains the data for one day.

Data are stored as ASCII text according to the METEK "raw spectra" format. As described in METEK (2013), each sample is recorded as a data block.

The first line of each data block contains the following fields:

Field
Identifier for MRR data
date/time stamp in format YYMMDDhhmmss
Device version number (firmware)
Device serial number
Bandwidth
Calibration constant
Micro Rain Radar Data quality: percentage of valid spectra, number of valid spectra and number of total spectra
Identifier for data type (raw)

According to METEK (2013):
"The next data lines contains the measuring heights. It begins with the capital letter H (H means height) and two space characters. The following numbers (9 digits decimal each) represent the measuring heights in meters.

The height line is followed by the line of the transfer function. It starts with the capital characters TF (Transfer Function) and one space character. The rest of that line represents the values of the transfer function for each height step (9 digits decimal each).

The line of the transfer function is followed by 64 data lines. Each one starts with the capital character F and a 2-digit number of the spectra line (0 to 63). The rest of these lines represent the received spectral signal power in engineering units for each height step (9 digits decimal each).

The raw spectra include the receiver noise floor."

5.0 Data Remarks:

Missing data

Both MRRs had periods of downtime and missing data due to power outages on:

- 7 July 2015
- 9 August 2015

Instrument problems and potential biases

MRR reflectivity is subject to attenuation at high rain rates, which affects the vertical reflectivity structure during heavily precipitating storms. For more discussion of this, and comparison with a minimally attenuating radar, see Massmann et al. (2017).

During non-precipitating periods, low-amplitude artifacts were found in some MRR profiles near 800m AGL. An example is shown below in Figure 3. These artifacts may be due to ground clutter from side-lobes, interference between the two MRRs, or some other local RF source. They do not appear in all data and do not appear to appreciably affect measurements during precipitation.

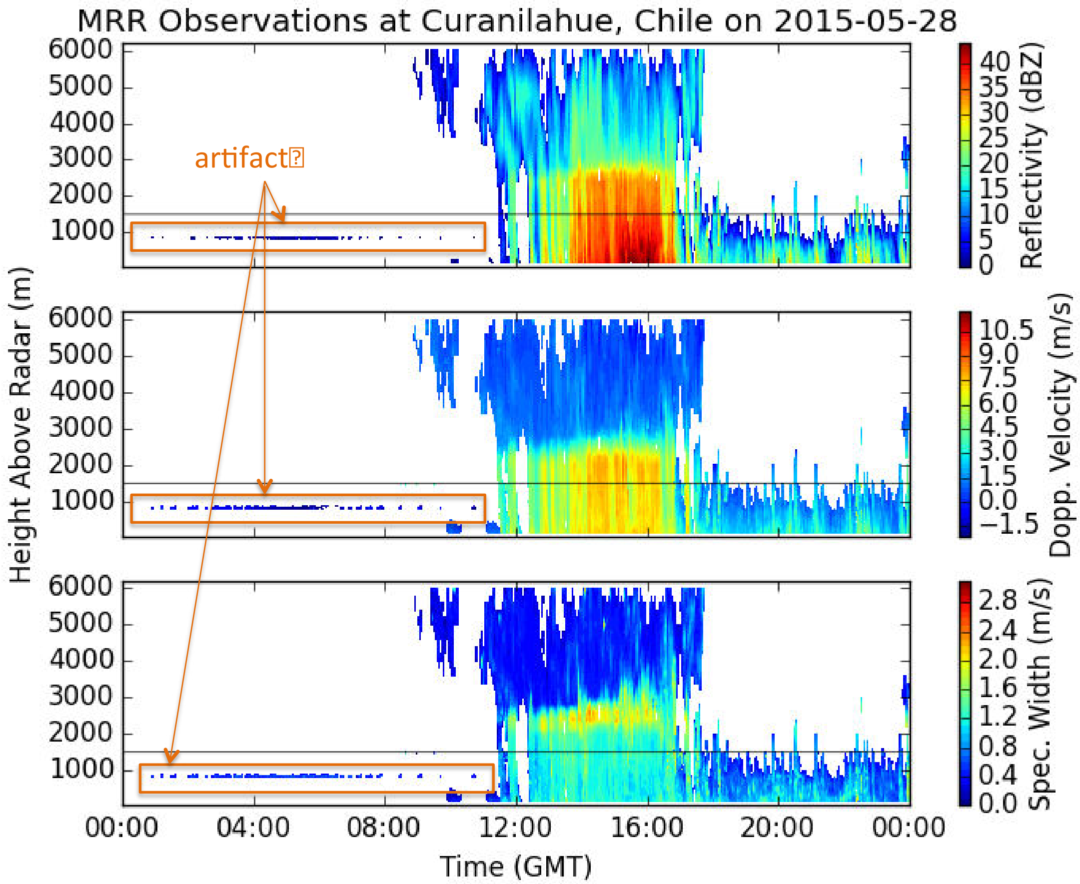

Figure 3: Example of MRR artifacts near 800 m AGL in clear air.

6.0 References*:*

METEK GmbH, 2012: MRR physical basis. 13 March 2012 version, Elmshorn, 20 pp.

METEK GmbH, 2013: Micro Rain RADAR User Manual. 25 February 2013 version, Elmshorn, 59 pp.

Massmann, A.K., J.R. Minder, R.D. Garreaud, D.E. Kingsmill, R.A. Valenzuela, A. Montecinos, S.L. Fults, and J.R. Snider, (Accepted-2017): The Chilean Coastal Orographic Precipitation Experiment: Observing the influence of microphysical rain regime on coastal orographic precipitation. *J. Hydrometeor.*, *https://doi.org/10.1175/JHM-D-17-0005.1*