

# UNIVERSITY OF LOUISIANA AT MONROE (ULM) MICROWAVE PROFILER RADIOMETER (MPR) DOCUMENTATION FOR VORTEX-SE 2017

location: North Alabama Horticulture Research Station in Cullman, AL  
lat/lon: 34.194030, -86.79669  
last updated: 5 July 2017  
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## 1.0 Dataset Overview

This README file provides information on the ULM MPR data set from the VORTEX-SE 2017 project.

ULM operated a fixed site MPR in Cullman, AL during VORTEX-SE 2017. The MPR was operated on a continuous, 24/7 basis beginning 3 March 2017 through 8 May 2017, with gaps in data on four days. The data set includes the processed, real-time retrievals of temperature (K), water vapor ( $\text{g m}^{-3}$ ), relative humidity (%), and liquid water ( $\text{g m}^{-3}$ ) profiles from the surface to 10 km AGL, as well as direct measurements of surface temperature (K), surface relative humidity (%), and pressure (mb).

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## 2.0 MPR Background

The MPR measures downwelling microwave radiance in 35 calibrated channels. The temperature profiling subsystem utilizes sky brightness temperature observations at 14 frequencies between 51 and 59 GHz. The water vapor profiling subsystem utilizes sky brightness temperature observations at 21 frequencies between 22 and 30 GHz. An artificial neural network (trained for Birmingham, AL) was used to determine profiles of temperature, water vapor, and liquid water from the sky brightness temperatures. Surface meteorological sensors are included to measure air temperature, relative humidity, and barometric pressure. An internally mounted, zenith-pointed infrared thermometer improves the measurement of water vapor and cloud liquid water profiles. Profiles are retrieved from the surface to 10 km AGL. Above approximately 7 km, the atmospheric water vapor density and temperature approach the climatological mean values.

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## 3.0 Data Set Details

The data set is comprised of daily NetCDF files of the processed profile retrievals and surface met data. In one instance, a day was split between two separate files. Raw, unprocessed data and/or files that contain brightness temperatures for each channel are not provided here, but are available upon request.

Profiles are output at 58 height levels, starting with 50 m steps from the surface up to 500 m, then 100 m steps to 2 km, and 250 steps from 2 to 10 km. Temporal resolution is approximately 2 minutes.

The MPR was calibrated with liquid nitrogen upon installation at the Cullman, AL site in early March.

→ FILENAME

ULM\_MPR\_YYYYMMDD\_HHmms.nc

where YYYY - year; MM - month; DD - day; HH - start hour; mm - start minute; ss - start second

→ DATA

The following data are provided in the daily NetCDF files:

Variable Name	Variable Long Name	Units	Array Structure
altitude	Altitude above Sea Level from GPS	m	-
cloudBaseHeight	Cloud Base Height	km	1D (time)
dataQualityTag	Data Quality Flag	Binary (0 or 1), 1 = Good Data	1D (time)
epochTime	Seconds Since 00 UTC 1970 01 01	seconds	1D (time)
height	Height above ground level	km	1D (height)
integratedLiquidWater	Column Integrated Liquid Water	mm	1D (time)
integratedWaterVapor	Column Integrated Water Vapor	cm	1D (time)
irTemp	Surface IR Temperature	K	1D (time)
latitude	degrees North	degrees	-
liquidWater	Liquid Water Content	$\text{g m}^{-3}$	2D (time, height)
longitude	degrees East	degrees	-
rainTag	Flag for Rain	Binary (0 or 1), 0 = no rain	1D (time)
relativeHumidity	Relative Humidity	%	2D (time, height)
sfcRH	Surface Relative Humidity	\$	1D (time)
surfacePressure	Surface Pressure	mb	1D (time)
surfaceTemp	Surface Temperature	K	1D (time)
temperature	Temperature	K	2D (time, height)
time	UTC Time in decimal hours from 00 UTC	hours	1D (time)
vaporDensity	Water Vapor Density	$\text{g m}^{-3}$	2D (time, height)

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#### 4.0 Known Issues

- 10 March 2017 - No data available
- 16 March 2017 - Two data files; data gap from 2043 to 2158 UTC
- 30 March 2017 - No data after 1601 UTC
- 5 May 2017 - No data available