

Texas Tech University (TTU) Mobile Radiosonde Data

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1.0 Data Set Overview

Research radiosonde data from the VORTEX-SE field campaign from the TTU mobile sounding system.

Time period: 1 March 2017 - 1 May 2017

Location: Mobile, Northern Alabama and Southern Tennessee. See each data file for sounding launch location.

2.0 Instrument Description

The sounding system used was a Vaisala DigiCORA III MW31. The system was mounted in the back of a mobile laboratory van with a roof-mounted 400 MHz and base station GPS antenna enabling data collection while the vehicle was in motion.

The radiosonde used was a Vaisala RS-92-SGPD, operated in the 400 MHz band, and using GPS for wind finding. Documentation concerning the instrument performance characteristics as stated by the manufacturer are included in the attached PDF, *RS92SGP-Datasheet-B210358EN-F-LOW.pdf*.

3.0 Data Collection and Processing

Data collection was during the VORTEX-SE field experiment and sounding launch locations were coordinated with the mission operations center. Prior to storms the TTU soundings participated in a geographically distributed mesoscale sounding pattern in cooperation with other sounding teams. Once storms were present, the TTU sounding vehicle frequently chased with the Purdue sounding team, attempting to stay in the inflow of targeted storms. Nominally, the TTU and Purdue soundings were launched in alternation to stay on an hourly cadence during times of interest, though storm intercept constraints and equipment readiness resulted in some variance from that nominal plan.

The complete quality assurance and control procedures are documented in the enclosed Jupyter / IPython notebook *sounding_read_2017.ipynb*, and a PDF capture of that notebook *sounding_read_28June2017.pdf*. Beginning with the ASCII data produced by the sounding system, derived parameters were calculated and placed in the standardized format described

below. Unidata's MetPy library (<https://github.com/Unidata/MetPy>, version 0.5.1+58.g8053011) was used for calculation of derived parameters such as mixing ratio.

Obvious outliers were removed via manual inspection of Skew-T diagrams and hodographs. In cases where the sounding system was not properly recording the launch location, the latitude and longitude were recalculated using a manually logged launch location and the position deltas reported by the radiosonde. These calculations are shown in the included notebook, in the `recalculate_latlon` function.

No data intercomparisons were performed.

4.0 Data Format

Comma-separated ASCII, with header lines indicating the name and units of each column. A sample of the header two lines of data are provided below. Wind direction uses the meteorological convention with 0° as north and 90° as east. No data quality flags are present, and missing values are blanks between commas. Sampling rate, inherited from the instrument itself, was 2 Hz.

```
# VORTEX-SE TTU Radiosonde Data
# 2016-03-14, 0602 UTC, Lexington, AL
# latitude (deg), longitude (deg), UTC time from launch (HHMMSS), height (m AGL), pressure (mb), temp (deg C), mixing ratio (g/kg), wind speed (m/s), wind direction (deg)
34.961200, -87.370340, 060225, 0.000000, 978.900024, 15.649994, 9.883954, 2.000000, 131.000000
34.961200, -87.370340, 060227, 11.000000, 977.700012, 15.850006, 9.830899, 2.600000, 144.000000
etc. ...
```

5.0 Data Remarks

2017-03-25, 1800:10 UTC: No data above 750 hPa, all thermodynamic data likely bad (temperature too large).
2017-03-28, 0124:22 UTC: No data above 750 mb. Saturated, dry adiabatic layer in last ~50 mb of thermodynamic data is likely faulty.
2017-03-30, 1605:56 UTC: GPS lost shortly after launch; few wind observations.
2017-03-30, 1813:25 UTC: No data above 220 hPa.
2017-03-30, 2148:04 UTC: No data above 220 hPa.
2017-03-31, 0002:03 UTC: No data above 220 hPa.
2017-04-03, 2001:16 UTC: No data above 490 hPa.
2017-04-05, 1124:20 UTC: Very sharp temperature inversion at surface. Cross-comparison with nearby temperature sensors is recommended.
2017-04-05, 2319:23 UTC: No data above 250 hPa.
2017-04-30, 1629:41 UTC: No data above 600 hPa.

Original data files from the sounding system are available upon request.

6.0 Publications

None.