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Data Completeness/Quality Report

Author(s): Bruggeman, David Alan
Stanton, Gregory T.
Waight, Kenneth Thomas III
White, Ian Michael
Coronado, Melissa A.

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Los Alamos National Laboratory Meteorology Monitoring Program: 2019 Data Completeness/ Quality Report

Authors: David Bruggeman, Greg Stanton, Kenneth Waight, Ian White, and Melissa Coronado (EPC-CP)

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ABSTRACT

This report summarizes data completeness by tower and by instrument for 2019 and compares that data with the Los Alamos National Laboratory (LANL) and the ANSI/ANS-3.11-2015 standard. This report is designed to make data users aware of data completeness and any data quality issues. LANL meteorology monitoring goals include 95% completeness for all measurements. The ANSI 2015 standard requires 90% completeness for all measurements. This report documents instrument/tower issues as they impact data completeness.

INTRODUCTION

LANL operates four mesa-top meteorology towers: Technical Area (TA) 06, TA-49, TA-53, and TA-54. An additional tower is located in Mortandad Canyon (TA-5 MDCN), and a rain gauge at North Community (NCOM).

A description of the meteorology monitoring network is found in Dewart and Boggs (2014). Mesa-top towers are instrumented at 1.2 meters (m), 11.5 m, 23 m, and 46 m. In addition, TA-06 is instrumented at 92 m. The TA-5 MDCN tower is 10 m in height and is instrumented at 1.2 m and 10 m. Data are collected every 15 minutes. Range checking is done on each measurement every 15 minutes; data that are beyond normal ranges are eliminated from the data set and replaced by a code for missing data. In addition, data are reviewed weekly by meteorologists to identify bad data not identified by range checking. The data steward eliminates these data from the data set and replaces them with a code for missing data. The instrument technicians also review that data and schedule instrument replacement as required. Data completeness is determined by the number of total 15-minute records available versus the total number of possible measurements for the entire year. As a rule, the meteorologists do not attempt to estimate data that are eliminated as bad data. Original datalogger records, containing bad data, can be recalled from program archival storage.

The majority of missing data occur for short periods of time as a result of:

- towers down for instrument swap out/calibration,
- tower hoist inspections,
- power failures/network communication issues,
- wind propellers freezing in snowstorms,
- temperature probe aspiration fan failure, and
- battery failure for solar/terrestrial radiation instruments

Only other primary instrumentation failures will be documented in this report.

RESULTS

Summary of 2019 data completeness for all stations to meet 90% annual completeness

Sensor	Level*	TA-06	TA-49	TA-53	TA-54	TA-05	NCOM
Wind Speed	1	99.83%	99.89%	99.92%	99.77%	99.29%	
	2	99.83%	99.93%	99.91%	99.86%		
	3	99.83%	99.93%	99.91%	99.88%		
	4	99.83%					
Wind Direction	1	99.83%	99.89%	95.86%	99.77%	99.29%	
	2	99.83%	96.49%	99.89%	99.86%		
	3	99.83%	99.93%	99.92%	99.88%		
	4	99.83%					
Vertical Speed	1	98.77%	99.10%	99.22%	98.97%	99.39%	
	2	98.68%	99.10%	98.75%	98.97%		
	3	98.68%	99.11%	99.33%	98.91%		
	4	98.65%					
Temperature	0	99.97%	99.95%	99.97%	99.97%	99.69%	
	1	99.83%	99.90%	99.92%	99.88%	99.35%	
	2	99.83%	99.90%	99.92%	99.88%		
	3	98.46%	99.90%	99.42%	99.88%		
	4	99.83%					
Pressure	0	99.97%			97.98%		
Relative Humidity	0	99.77%	99.74%	99.92%	99.98%		
Dew point	0	99.76%	99.95%	99.91%	99.97%		
Precipitation	0	99.99%	99.99%	99.98%	99.98%		99.96%
Snow depth	0	99.54%					
Shortwave ↓	0	99.97%	99.93%	99.98%	99.98%	99.68%	
Shortwave ↑	0	99.97%			99.98%		
Longwave ↓	0	99.97%			99.98%		
Longwave ↑	0	99.97%			99.98%		
Net Radiation	0	99.97%			99.96%		
Maximum		99.99%	99.99%	99.98%	99.98%	99.69%	99.96%
Minimum		98.46%	96.49%	95.86%	97.98%	99.29%	99.96%

*Levels correspond to height. Level 0 at 1.2 m, 1 at 11.5 m, 2 at 23 m, 3 at 46 m, and 4 at 92 m.

= met 90% data completeness
= did not meet 90% data completeness
= sensor not located at that station

DESCRIPTION

All stations (i.e., TA-06, TA-49, TA-53, TA-54, TA-05 MDCN, and NCOM) instruments exceeded the 90% data completeness in 2019.

Based on the June 2020 calibration tests, wind directions at TA-49 and TA-53 failed calibration that resulted in the lowest completeness at approximately 96%. The wind direction at TA-49 level 2 failed at 330 degrees by 7 degrees. The wind direction at TA-53 level 1 failed calibration at 30 degrees by 6.1 degrees. Thus, the wind directions from these failed directions were eliminated from the October 2019 to June 2020 data set.

REFERENCES

ANSI/ANS 3.11-2015, *Determining Meteorological Information for Nuclear Facilities*, American Nuclear Society, 2015.

Dewart, J. and M. Boggs 2014: "Meteorological Monitoring at Los Alamos," Los Alamos National Laboratory report LA-UR-14-23378.