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Los Alamos Climatology 2016 Update

Los Alamos
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EST. 1943

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ACRONYMS AND ABBREVIATIONS

AGL	above ground level
ENSO	El Niño Southern Oscillation
KLAM	Los Alamos County Airport
LANL	Los Alamos National Laboratory
mb	millibar
MDCN	Mortandad Canyon
mph	miles per hour
MSL	above mean sea level
NCOM	North Community
PDO	Pacific Decadal Oscillation
PJMT	Pajarito Mountain
SODAR	Sound detection and ranging
TA	Technical Area

1.0 INTRODUCTION

The Los Alamos National Laboratory (LANL or the Laboratory) operates a meteorology monitoring network to support LANL emergency response, engineering designs, environmental compliance, environmental assessments, safety evaluations, weather forecasting, environmental monitoring, research programs, and environmental restoration. Weather data has been collected in Los Alamos since 1910. Bowen (1990) provided climate statistics (temperature and precipitation) for the 1961–1990 averaging period, and included other analyses (e.g., wind and relative humidity) based on the available station locations and time periods. This report provides an update to the 1990 publication *Los Alamos Climatology* (Bowen 1990).

Since 1990, the LANL meteorological monitoring network has evolved through the retirement and installation of monitoring locations. The most significant changes include:

- Installation of 46-meter (150-foot) towers at Technical Area (TA) 53 and TA-54,
- Installation of a 10-meter (33-foot) tower in Mortandad Canyon (TA-5 MDCN),
- Retirement of the TA-41 tower, and 10-meter towers at Area G and East Gate, and
- Relocation of the 92-meter (300-foot) tower from TA-50 to TA-6.

Climate statistics for this report have been updated to 1981–2010, and other parameters (e.g., wind, relative humidity) have been updated to include 20 years of data when available. In addition, this document presents evaluations of climate trends measured at LANL.

2.0 OVERVIEW OF LOS ALAMOS CLIMATOLOGY

2.1 Site Description

LANL is located in north central New Mexico, approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe (Figure 2-1). The 39-square-mile Laboratory is situated on the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep east-to-west oriented canyons cut by streams. Mesa tops range in elevation from approximately 7800 feet above mean sea level (MSL) on the flanks of the Jemez Mountains to approximately 6200 feet MSL at the edge of White Rock Canyon. The Laboratory is bounded on the north by the Los Alamos townsite; on the west by the Santa Fe National Forest; on the south by Bandelier National Monument; and to the east by San Ildefonso Pueblo, the community of White Rock, and the Rio Grande.

2.2 Los Alamos Climate

The World Meteorological Organization defines climate normal as the arithmetic average of a climate element (e.g., temperature) over a 30-year period (WMO 1989). A 30-year period is long enough to filter out any interannual variation or anomalies, but short enough to be able to show longer climatic trends. The 30-year climate normals are updated every 10 years. The current climate normal data presented in this report are calculated from January 1, 1981 to December 31, 2010.

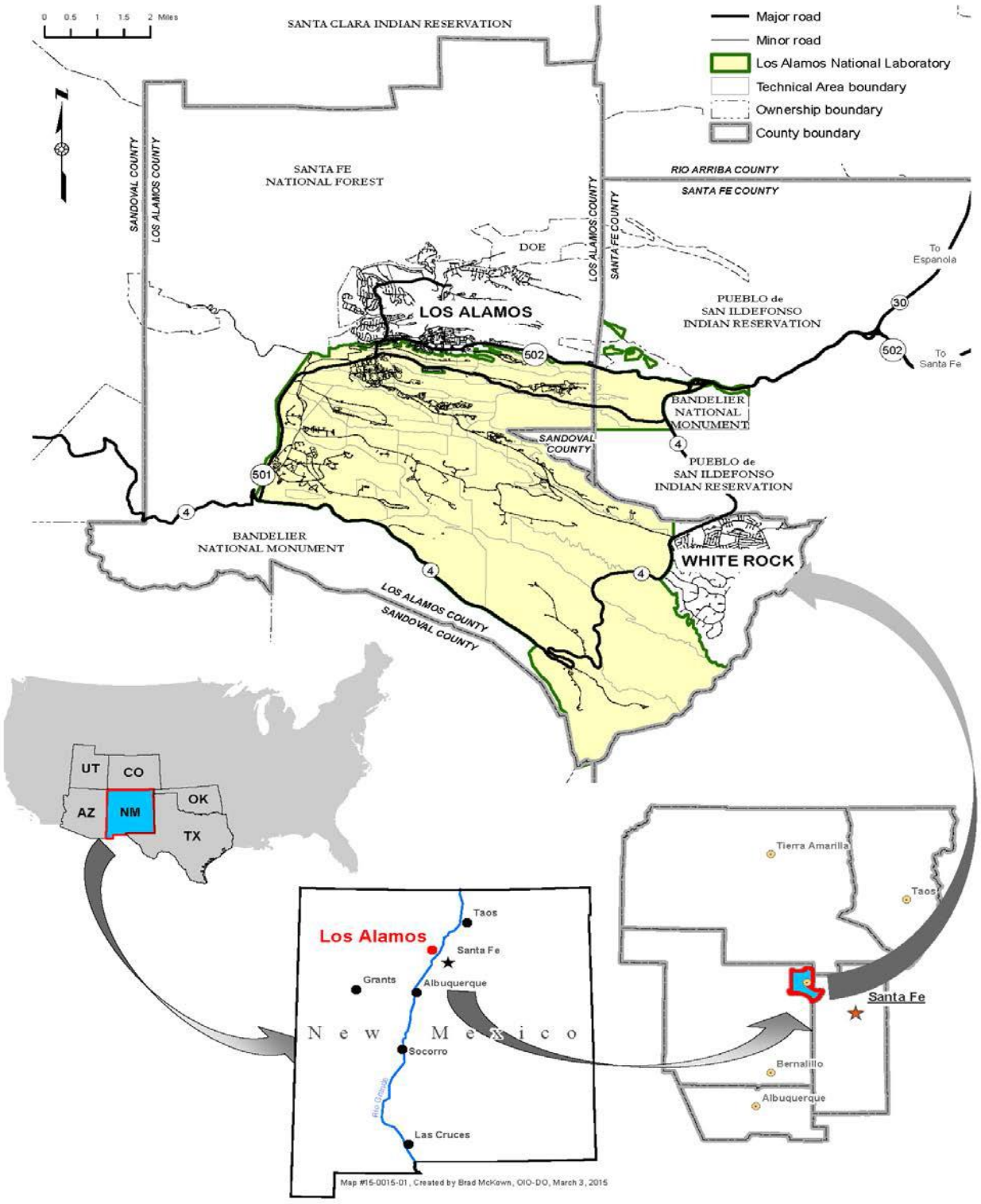

Figure 2-1: Regional location of Los Alamos.

The climate of Los Alamos is driven by our southern midlatitude location (approximately 36°N), distance from the Pacific Ocean and Gulf of Mexico (approximately 700–800 miles), and the altitude (6200–7800 feet MSL across the Laboratory). During the fall, winter, and spring, Los Alamos is impacted by midlatitude westerly storms that produce only 8–12 inches of precipitation annually. During the summer, New Mexico experiences a seasonal wind shift, with winds coming from the south. These southerly winds, known as the North American Monsoon (Adams and Comrie 1997), bring warm, moist air and produce an additional 4 inches of rain annually. The annual average rainfall (measured at 7400 feet MSL) of approximately 19 inches falls into the semi-arid range (Peel et al. 2007).

Daily temperatures are highly variable as a result of the limited amount of moisture in the air. On average, winter temperatures range from 35–50°F during the day and from 20–25°F during the night. The Sangre de Cristo Mountains to the east of the Rio Grande valley act as a barrier to wintertime arctic air masses that descend into the central United States, which cause infrequent local subzero temperatures. Average summer temperatures range from 75–85°F during the day and from 50–55°F during the night.

The complex topography of the Pajarito Plateau (Figure 2-2) influences local wind patterns. Often a distinct diurnal cycle of wind occurs. Daytime winds measured in the Los Alamos area are predominately from the south to south-southwest, consistent with the typical upslope flow of heated daytime air moving up the Rio Grande valley. Nighttime winds on the Pajarito Plateau are light and typically from the west to northwest as a result of downslope flow of cool air from the Jemez Mountains.

Los Alamos is a light wind site, with the annual average of approximately 7 miles per hour (mph). Spring (April, May, and June) is the windiest season, on average, with low pressure systems strengthening as they flow downstream from the Rocky Mountains. The highest wind gust recorded at a LANL meteorology tower was 85 mph in May 2007.

Severe storms (i.e., life-threatening) are infrequent on the Pajarito Plateau. However, during a typical summer monsoon season, thunderstorms are observed every three to four days. These thunderstorms are often accompanied by strong wind gusts (>40 mph), lightning, and occasionally hail. Dust devils have also been observed periodically in Los Alamos County with winds up to 50 mph.

3.0 LANL METEOROLOGICAL MONITORING

A National Weather Service cooperative weather station began operation in Los Alamos in November 1910, operated by a local rancher (Machen et al. 2014). The station was eventually taken over by the Los Alamos Ranch School, and then subsequently by the Laboratory. The cooperative station records include measured daily maximum and minimum temperature, midnight temperature and relative humidity, 24-hour rainfall, and 24-hour snowfall. The Los Alamos cooperative weather station has moved several times over 100 years, but the locations have not varied by more than 2 miles and 200 feet in elevation.

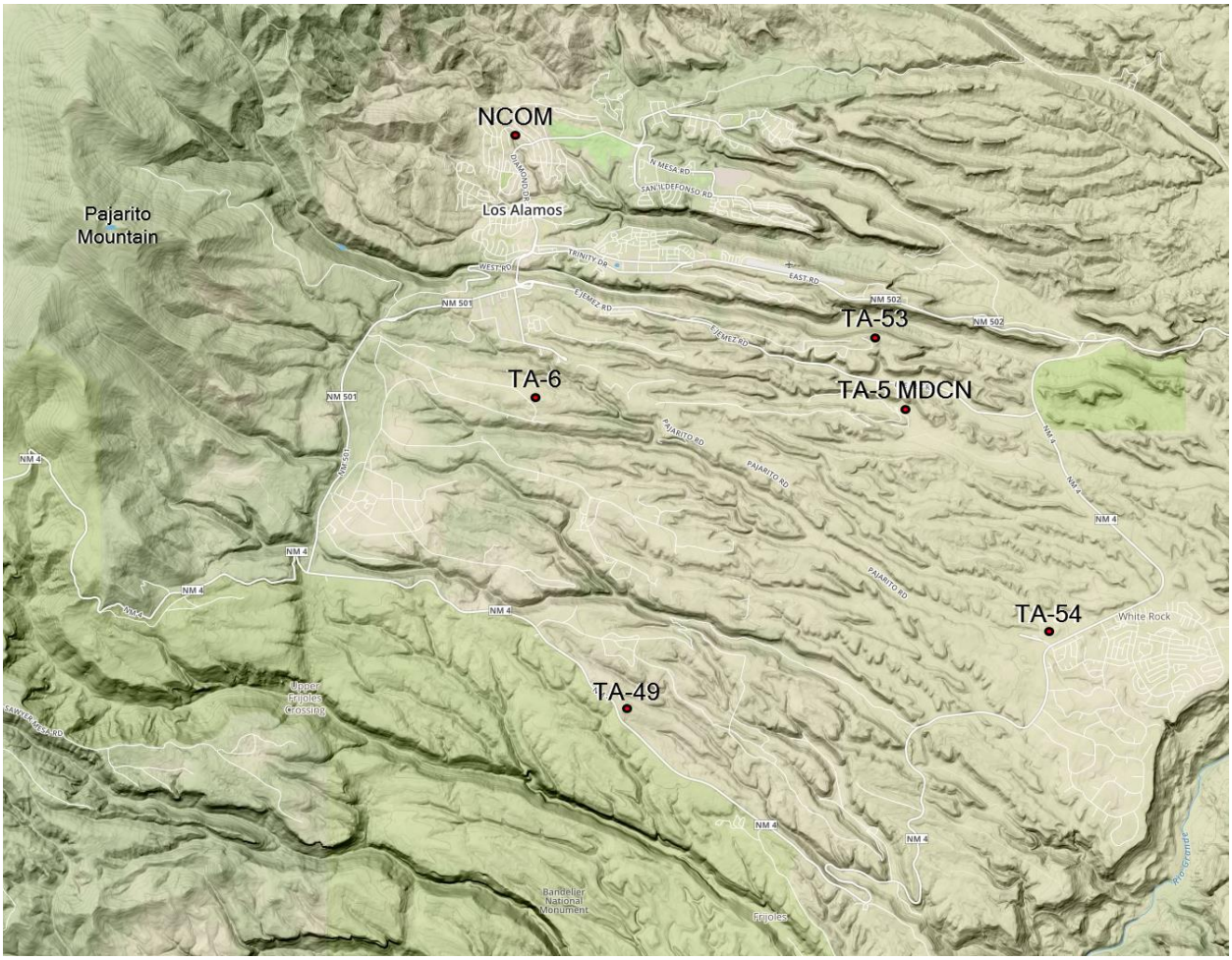

Figure 2-2: Topography of Los Alamos and vicinity. Current meteorology monitoring stations are shown along with the Los Alamos and White Rock residential areas.

The modern digitally-recorded meteorology monitoring began in 1979 and has been revised and expanded since that time (Dewart and Boggs 2014). The tower locations used in this report are presented in Figure 3-1 and described in Table 3-1. TA-6 is the official meteorological station for Los Alamos and the Laboratory. Included in this report are two stations that have a significant operational history but are no longer operated (TA-41 and PJMT [Pajarito Mountain]). LANL has operated meteorology towers at other locations than those presented in Table 3-1 and Figure 3-1. These locations are summarized in Dewart and Boggs (2014). The data from these active and historic locations continues to be available through the LANL Weather Machine website on the internal site, http://weather.lanl.gov, and on the public site, http://environweb.lanl.gov/weathermachine/.

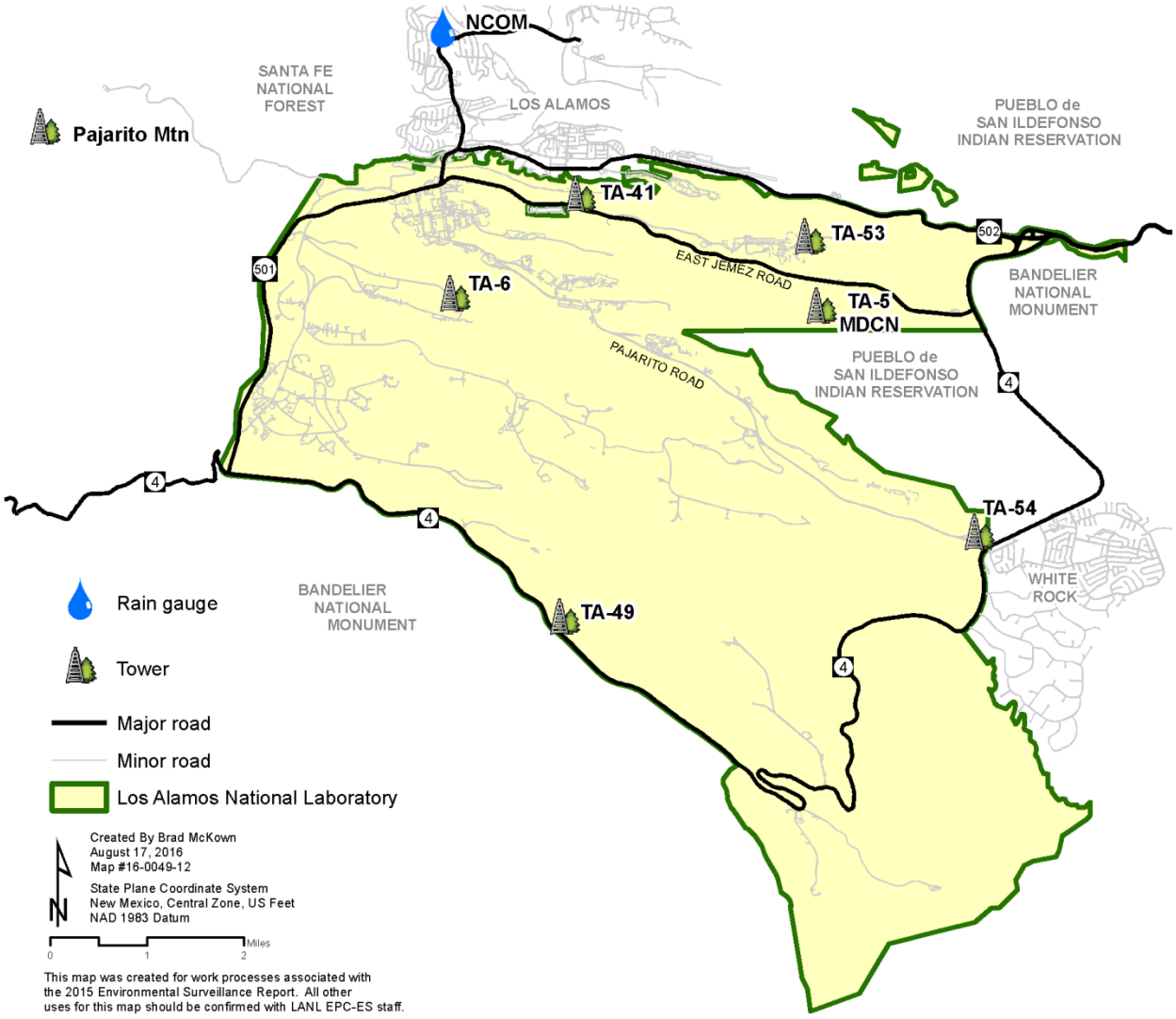

Figure 3-1: Location of meteorological monitoring stations at Los Alamos. TA-41 and Pajarito Mountain are no longer operational.

Table 3-1: Meteorological Monitoring Stations and Summary of Meteorological Measurements at Each Location

Station Name	Alternate Name(s)	LANL Structure Number	Latitude/Longitude Coordinates (°)		Elevation (feet)	Surface Measurements (at 1.5 meters)	Tower Levels of Measurements (meters)	Tower Measurements	Record of Observations
			Latitude	Longitude					
TA-6	Los Alamos	TA-06-0078	35.8615	106.3195	7424	Temperature, pressure, humidity, shortwave radiation, longwave radiation, precipitation	12, 23, 46, 92	Wind speed, wind direction, temperature	Feb 1990–present
TA-6 SODAR[a]	SODAR	TA-06-0100	35.8615	106.3187	7417	N/A[b]	100–1000[c]	Wind speed, wind direction, temperature	Dec 2014–present
TA-49	Bandelier	TA-49-0123	35.8133	106.2993	7045	Temperature, humidity, shortwave radiation, precipitation	12, 23, 46	Wind speed, wind direction, temperature	Jun 1987–present
TA-53	LANSCE[d]	TA-53-1020	35.8701	106.2543	6990	Temperature, humidity, shortwave radiation, precipitation	12, 23, 46	Wind speed, wind direction, temperature	Feb 1992–present
TA-54	White Rock	TA-54-0088	35.8259	106.2232	6548	Temperature, pressure, humidity, shortwave radiation, longwave radiation, precipitation	12, 23, 46	Wind speed, wind direction, temperature	Jan 1992–present
TA-5 MDCN	Mortandad Canyon	TA-05-0061	35.8597	106.2522	6750	Temperature, solar radiation	10	Wind speed, wind direction	Oct 2002–present
NCOM	North Community	N/A	35.9009	106.3216	7420	Precipitation	~10[e]	N/A	Jan 1996–present
TA-41[f]	Los Alamos Canyon	N/A	35.8764	106.2964	6914	Temperature, solar radiation	12, 23	Wind speed, wind direction, temperature	Nov 1993–Oct 2015
PJMT[f]	Pajarito Mountain	N/A	35.8864	106.3948	10,360	Temperature, precipitation	36	Wind speed, wind direction, temperature	Aug 1997–Aug 2013

[a] SODAR = Sound detection and ranging.
[b] N/A = not applicable.
[c] Measurements every 20 meters depending upon current weather conditions.
[d] LANSCE = Los Alamos Neutron Science Center
[e] Located on the rooftop.
[f] Station no longer in operation.

In addition to the five active meteorology towers, LANL installed a SODAR (Sound detection and ranging) instrument at the TA-6 meteorology tower site in 2014. The SODAR produces sound waves projected vertically into the atmosphere to measure wind speed, direction, and temperature above the tower measurement levels. Under certain meteorological conditions, data can be collected as high as 1 kilometer above the surface. SODAR data will be analyzed and presented in future publications.

LANL meteorological instrumentation is required to meet specifications in the Department of Energy handbook *Environmental Radiological Effluent Monitoring and Environmental Surveillance* (DOE 2015). The handbook adopts the American National Standards Institute (ANSI 2010) and Environmental Protection Agency (EPA 2000) guidance for meteorology monitoring. LANL measures meteorology parameters once every 3 seconds, averages these measurements over 15 minutes, and calculates 24-hour means and extremes from the 3-second data. Quality assurance review of the data is performed using automated range checks and visual inspections of trend plots on a daily, weekly, monthly, and annual basis by the project meteorologists. LANL meteorology data are made available to customers via the LANL Weather Machine.

As noted earlier, the long-term climatological averages presented in this report are for Los Alamos and White Rock data collected from 1981–2010. To make comparisons across the Pajarito Plateau, the 1994–2013 period was selected to allow the comparison of data from all of the mesa-top towers (TA-6, TA-54, TA-49, and TA-53). This period is drier and warmer than the 1981–2010 period, thus the focus on these site-wide comparisons will be the relative differences rather than the absolute differences in meteorology parameters. Data are also analyzed for two canyon locations, TA-41 and TA-5 MDCN (Figure 3-2), and on Pajarito Mountain to compare with the mesa-top tower data. TA-41 has complete data available for 1994–2013, TA-5 MDCN for 2003–2013, and PJMT for 1998–2012.

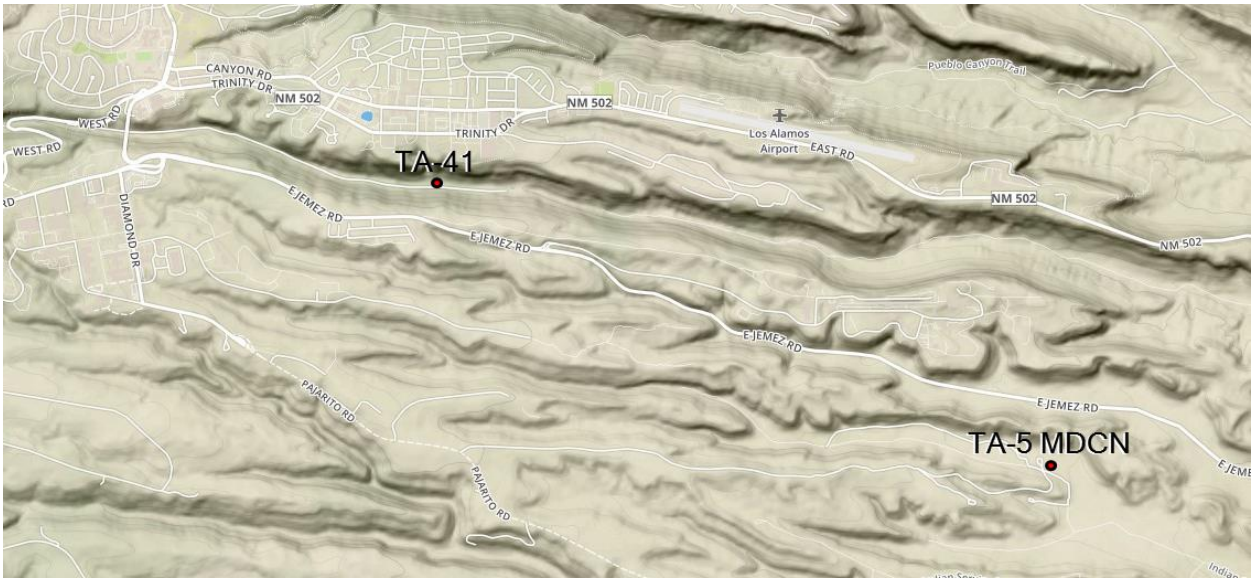

Figure 3-2: Canyon locations of meteorology towers.

4.0 TEMPERATURE

Various temperature measurements are available in Los Alamos going back to 1918. Complete years of temperature measurements are available for Los Alamos since 1924 and in White Rock since 1964. These data are used to characterize the basic temperature patterns on the Pajarito Plateau. The expansion of the meteorological tower network during the late 1980s and early 1990s has provided more data for characterizing temperature differences across the Laboratory.

4.1 Average Temperatures

Surface temperatures (at approximately 1.5 meters above ground level [AGL]) are influenced by the time of day, large scale weather patterns, and local geography. The local influences on temperature include length of day, altitude, topography, vegetation, cloud cover/humidity, and wind speeds. Therefore, the temperatures vary significantly across LANL. The 1981–2010 average temperatures are presented for Los Alamos and White Rock (Table 4-1 and Figure 4-1) as these stations represent the primary LANL monitoring locations; additional station data are presented in Section 4.5 to demonstrate the temperature variability across LANL.

Table 4-1: Monthly Average Temperatures for Los Alamos and White Rock in °F (1981–2010)

	Los Alamos			White Rock		
	Max. Temp.	Min. Temp.	Ave. Temp.	Max. Temp.	Min. Temp.	Ave. Temp.
January	39.8	18.9	29.4	42.9	16.1	29.5
February	43.7	22.1	32.9	47.9	20.6	34.2
March	51.3	27.5	39.4	55.9	26.7	41.3
April	59.8	33.9	46.8	64.2	33.2	48.7
May	69.2	42.8	56.0	73.9	42.0	57.9
June	78.8	51.4	65.1	83.6	50.1	66.8
July	81.3	55.1	68.2	86.3	55.2	70.8
August	78.0	53.5	65.8	83.3	54.1	68.7
September	72.3	47.3	59.8	77.0	46.4	61.7
October	61.4	36.9	49.2	65.5	34.9	50.2
November	49.0	26.7	37.9	52.5	24.4	38.5
December	39.7	19.2	29.4	42.6	16.2	29.4
Annual	60.4	36.3	48.3	64.6	35.0	49.8

Average temperatures in White Rock are a few degrees higher than Los Alamos throughout the year. During the summertime, daily average high temperatures in White Rock are as much as 5°F warmer than Los Alamos. On average, White Rock is warmer than Los Alamos as a result of the drier and less cloudy conditions in White Rock, White Rock receives more incoming solar radiation (insolation), and White Rock's lower elevation results in higher air density. This higher air density, which produces warmer temperatures as a result of more longwave radiation from the earth's surface, can be absorbed by the air in White Rock compared with the air in the Los Alamos townsite. The resulting annual average difference in temperature between Los Alamos in White Rock is 1.5°F.

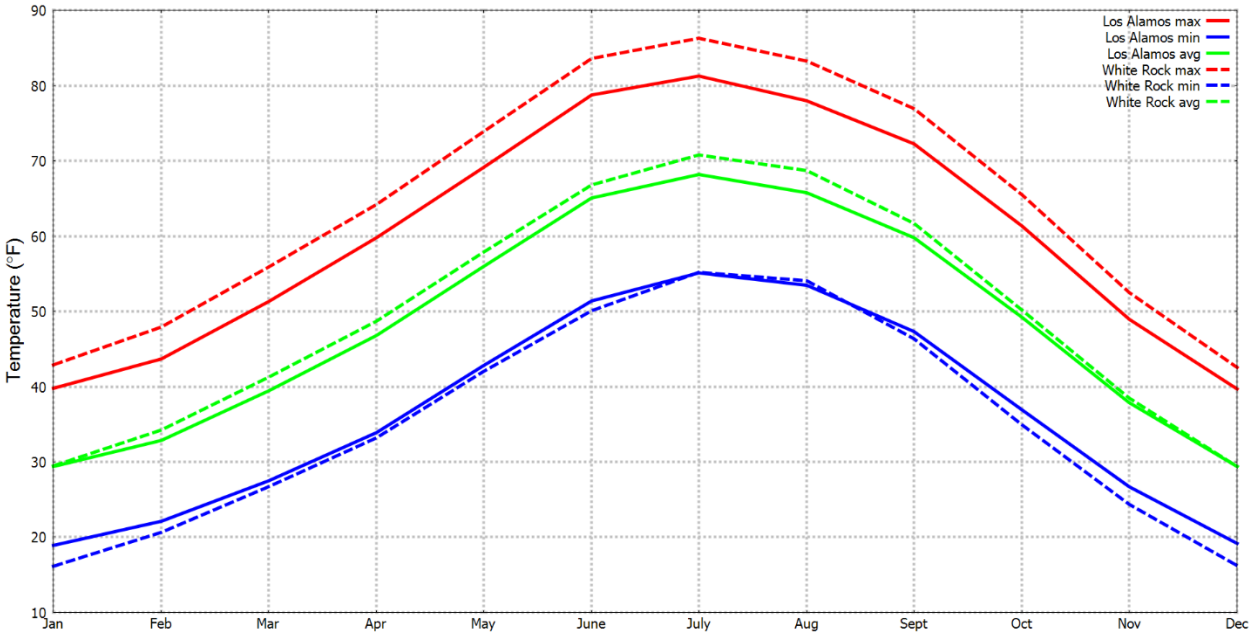

Figure 4-1: Monthly average temperatures for Los Alamos and White Rock (1981–2010).

The overnight low temperatures in White Rock during the fall, winter, and spring months are colder than Los Alamos. Colder temperatures in White Rock are produced during calm nights, when cold air drains off the Jemez Mountains, and pools in White Rock where the topography levels out. Since White Rock is less cloudy than Los Alamos, the surface cools off more at night than in Los Alamos, and this also contributes to the colder air temperatures at night. On average, White Rock is as much as 3°F colder than Los Alamos on winter nights. Monthly average temperatures for Los Alamos (1951–2015) and White Rock (1965–2015) are presented in the appendix.

The differences in temperature from day to night reflect the significant amount of days with clear skies and generally low humidity. Since the skies are often clear, solar radiation heats up the surface of the earth and the air next to the ground is heated. At night, with few clouds and low humidity, the ground radiates heat away and the air next to the ground cools off quickly. The average day/night fluctuation in temperatures is 20–30°F, depending upon the time of year.

On average in Los Alamos, there were three days per year with high temperatures of 90°F or greater, with a range from no days above 90°F (multiple years) to 22 days above 90°F during 1980. During 1980, the large number of days with high temperatures above 90°F was the product of a very weak (dry) monsoon season. Total precipitation during the summer monsoon season of 1980 was 3.5 inches, compared with the average of 9.95 inches. In White Rock, there were 35 days per year with high temperatures of 90°F or greater, with a range of four days above 90°F (1992) to 50 days above 90°F during 2002. During 2002, the large number of days with high temperatures above 90°F was also the product of a weak monsoon season. Total precipitation in White Rock during the summer of 2002 was 5.32 inches, compared with the average of 6.91 inches.

Los Alamos had 1.5 days per year with an overnight low temperature of 0°F or below, ranging from no days below 0°F (multiple years) to eight days with temperatures below 0°F during 1963. These episodes are usually produced by a cold arctic air outbreak that has pushed from eastern New Mexico into Los Alamos; typically, the Sangre de Cristo Mountains protect Los Alamos from these cold air

intrusions. For White Rock, there are two days per year with low temperatures at and below 0°F, ranging from no days (multiple years) to 13 days during 1967.

4.2 Temperature Extremes

The warmest temperatures in Los Alamos and White Rock are observed during dry periods of June or July. The coolest temperatures are observed on calm, clear winter nights, often with snow on the ground. These nights may be accompanied by cold air outbreaks when artic air from the eastern plains pushes westward across New Mexico. The record high temperatures in Los Alamos and White Rock are 96°F and 101°F, respectively. The record low temperatures in Los Alamos and White Rock are -18°F and -29°F, respectively. A summary of Los Alamos and White Rock extreme temperatures are presented in Tables 4-2 and 4-3.

Table 4-2: Monthly Extreme Temperatures for Los Alamos (1910–2016)

	Highest Temperature (°F)	Date of Highest Temperature	Lowest Minimum Temperature (°F)	Date of Lowest Temperature
January	64	1/12/1953	-18	1/13/1963
February	69	2/25/1986	-16	2/3/2011
March	74	3/31/2012	-3	3/11/1948
April	80	4/23/1950	5	4/9/1928
May	92	5/31/2002	22	5/3/2013
June	96	6/19/2016	28	6/3/1919
July	95	7/11/1935	37	7/7/1924
August	92	8/11/2012	38	8/24/1918
September	90	9/3/1948	23	9/29/1936
October	84	9/1/1980	6	10/30/1993
November	72	11/1/1950	-14	11/28/1976
December	69	12/2/1927	-12	12/9/1978

Table 4-3: Monthly Extreme Temperatures for White Rock (1964–2016)

	Highest Temperature (°F)	Date of Highest Temperature	Lowest Minimum Temperature (°F)	Date of Lowest Temperature
January	65	1/19/1986	-29	1/7/1971
February	73	2/25/1986	-22	2/3/2011
March	80	3/24/2015	-5	3/3/1971
April	84	4/26/2000	12	4/5/1983
May	96	5/31/2002	18	5/2/1967
June	101	6/19/2016	33	6/14/2001
July	100	7/12/1971	41	7/4/1995
August	98	8/6/1977	38	8/27/1992
September	94	9/13/1990	27	9/25/2000
October	90	10/1/1980	9	10/30/1993
November	73	11/13/1967	-14	11/28/1976
December	65	12/5/1965	-17	12/9/1978

When the maximum temperature does not get above freezing for consecutive days, it can be an engineering design concern for buildings and evaporation ponds. Each year since 1951 in Los Alamos (with the exception of 1998, 1999, 2000, and 2003) there were several occurrences of multiple consecutive days with temperatures at or below freezing. These events occur between late November and early March. The maximum number of consecutive days with temperatures below freezing was 11, from December 24, 1987, through January 3, 1988.

4.3 Heating and Cooling Degree Days

Average temperatures are used to estimate fuel use for heating and cooling buildings. A "degree day" refers to the difference between the daily average temperature and a reference temperature for indoor comfort (65°F). For example, if the average temperature for a day is 70°F, a building would require cooling by 5°F to reach 65°F and thus that day counts as five cooling degree days. Conversely, if the average temperature for a day is 60°F, a building would require warming by 5°F and that day counts as five warming degree days.

The monthly average heating and cooling degree days for Los Alamos and White Rock are presented in Table 4-4 and Figure 4-2. The annual average heating and cooling degree days are typical for the southern Rocky Mountain region (NEO 2016). The greatest difference between the two sites occurs in mid-summer as a result of the significantly warmer temperatures in White Rock.

Table 4-4: Monthly Average Heating and Cooling Degree Days for Los Alamos and White Rock (1981–2010)

	Los Alamos		White Rock	
	Heating Degree Days	Cooling Degree Days	Heating Degree Days	Cooling Degree Days
January	1105	0	1103	0
February	906	0	868	0
March	794	0	737	0
April	545	0	490	0
May	288	8	232	11
June	69	73	42	100
July	15	114	3	183
August	35	60	9	124
September	167	11	119	25
October	491	0	456	0
November	813	0	799	0
December	1102	0	1096	0
Annual	6330	266	5954	443

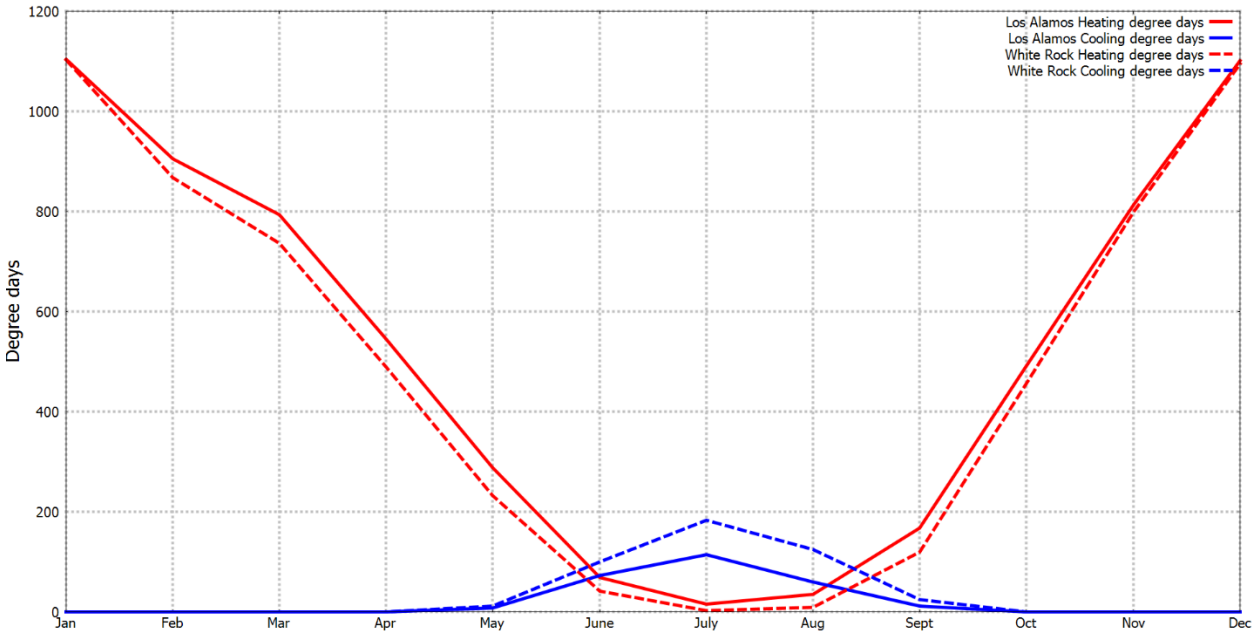

Figure 4-2: Monthly average heating and cooling degree days for Los Alamos and White Rock (1981–2010).

4.4 Growing Season

The growing season is defined as the number of days between the last day with freezing temperatures in the spring and the first day with freezing temperatures in the fall. Typically, in Los Alamos and White Rock, the last day with freezing temperatures occurs in early May and the first day with freezing temperatures occurs in early October. At 32°F, plants can be damaged depending upon the amount of moisture in the air and the length of time the temperature is at or below 32°F. A hard freeze, when almost all plants will be damaged, is considered to be 28°F.

The date of the average first freeze in the fall, the date of the last freeze in the spring, and the length of the growing season for Los Alamos and White Rock are presented in Table 4-5. The averages for 1961–1990 are from Bowen (1990). The Los Alamos growing season appears to have shifted forward (earlier) by three to four days for the 1981–2010 period, but the total number of days in the growing season are similar to the 1961–1990 climate averaging period. For White Rock, the growing season has increased by four days, with the last freeze being recorded earlier in the spring with the date of the last fall freeze remaining about the same.

Table 4-5: Average Spring and Fall Freeze Dates

	Los Alamos		White Rock	
	1961–1990	**1981–2010**	**1961–1990**	**1981–2010**
Date of last freeze in the spring	May 7	May 4	May 11	May 4
Date of earliest freeze in the fall	October 11	October 7	October 7	October 6
Number of days in the growing season	156	155	155	152

The latest and earliest freeze dates on record are presented in Table 4-6. The dates are not strictly comparable between Los Alamos and White Rock since records for Los Alamos date from 1924 and records for White Rock date from 1964.

Table 4-6: Record Dates of Last Freeze in the Spring and Earliest Freeze in the Fall

	Los Alamos	White Rock
Date of last freeze in the spring	June 11, 1975	May 31, 2011
Date of earliest freeze in the fall	September 9, 1941	September 17, 1968

4.5 Temperature Variation Across the Laboratory

LANL currently operates four meteorology towers (TA-6, TA-49, TA-53, and TA-54) on the mesa tops. Data were collected for the years 1994–2013 at each of these towers; temperature averages are taken from these 20 years for comparison. TA-5 MDCN began data collection in late 2002, so for this analysis, the years 2003–2013 are included (11 years). Data for the full years 1998–2012 are available for PJMT (15 years). The data for TA-5 MDCN and PJMT compared with the other sites will not have the same years as the other towers and this will be considered in making comparisons.

The annual average daily maximum and minimum temperatures at each tower are presented in Tables 4-7 and 4-8 and Figures 4-3 and 4-4. Highest summertime and wintertime maximum temperatures occur at the lowest elevations (TA-54 and TA-5 MDCN), the lowest temperatures occur at PJMT (3000–4000 feet higher in altitude than other LANL monitoring locations). Daily maximum temperatures at PJMT are 10–20°F lower than the other locations.

The lowest summertime minimum temperatures occur at the highest elevations (PJMT) and in canyons and lower elevations where nighttime cold air drainage occurs (TA-5 MDCN, TA-41, and TA-54). The lowest wintertime minimum temperatures occur in the lowest elevations (TA-54 and TA-5 MDCN) and at TA-41 as a result of nighttime cold air drainage.

Table 4-7: Monthly Average Maximum Temperatures in °F

	TA-6	TA-54	TA-53	TA-49	TA-41	TA-5 MDCN	PJMT
January	40.1	43.3	41.4	41.4	37.7	44.9	32.8
February	43.4	47.6	45.4	45.2	43.3	47.1	33.2
March	52.6	57.0	54.9	54.7	54.5	58.1	40.0
April	60.0	64.4	62.3	62.1	62.9	65.4	46.6
May	70.2	75.1	72.9	72.6	73.7	75.5	57.2
June	80.3	85.2	83.3	82.7	83.7	86.8	67.5
July	82.1	87.1	85.6	85.0	85.4	89.7	70.2
August	79.2	84.2	82.4	82.1	82.3	85.7	66.4
September	72.9	77.6	75.8	75.7	75.6	79.1	60.4
October	61.4	65.4	63.4	63.6	61.8	67.3	49.8
November	49.9	53.2	51.9	51.4	47.5	56.0	40.5
December	39.6	42.4	40.9	40.9	36.7	43.4	31.9
Annual	61.0	65.2	63.3	63.1	62.1	66.6	49.7

Table 4-8: Monthly Average Minimum Temperatures in °F

	TA-6	TA-54	TA-53	TA-49	TA-41	TA-5 MDCN	PJMT
January	19.6	15.6	22.5	22.1	14.6	12.8	18.6
February	22.0	19.8	25.4	24.5	18.6	16.4	17.7
March	28.3	26.0	31.9	30.7	25.7	23.6	23.4
April	34.1	32.4	37.8	36.3	31.9	29.5	28.3
May	43.7	41.3	47.9	46.1	40.8	38.1	38.2
June	52.7	50.0	56.7	54.8	48.9	46.7	46.8
July	56.0	55.2	59.9	58.2	54.1	52.7	50.6
August	54.4	53.9	58.2	56.4	52.8	52.1	49.1
September	48.0	46.2	52.1	50.5	45.6	43.2	43.1
October	37.2	34.2	41.0	39.8	34.0	31.9	34.1
November	27.6	23.6	31.0	30.1	24.0	20.5	26.1
December	19.5	15.6	22.6	22.1	15.0	12.7	17.9
Annual	36.9	34.5	40.6	39.3	33.8	31.7	32.8

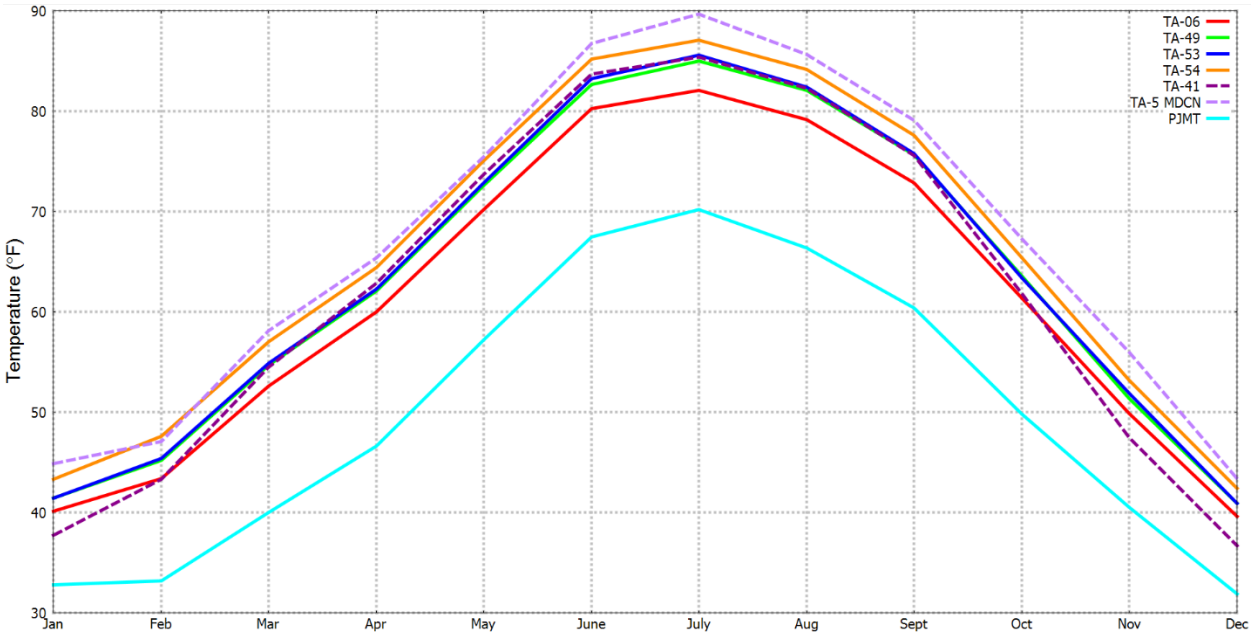

Figure 4-3: Monthly average maximum temperatures across Los Alamos County.

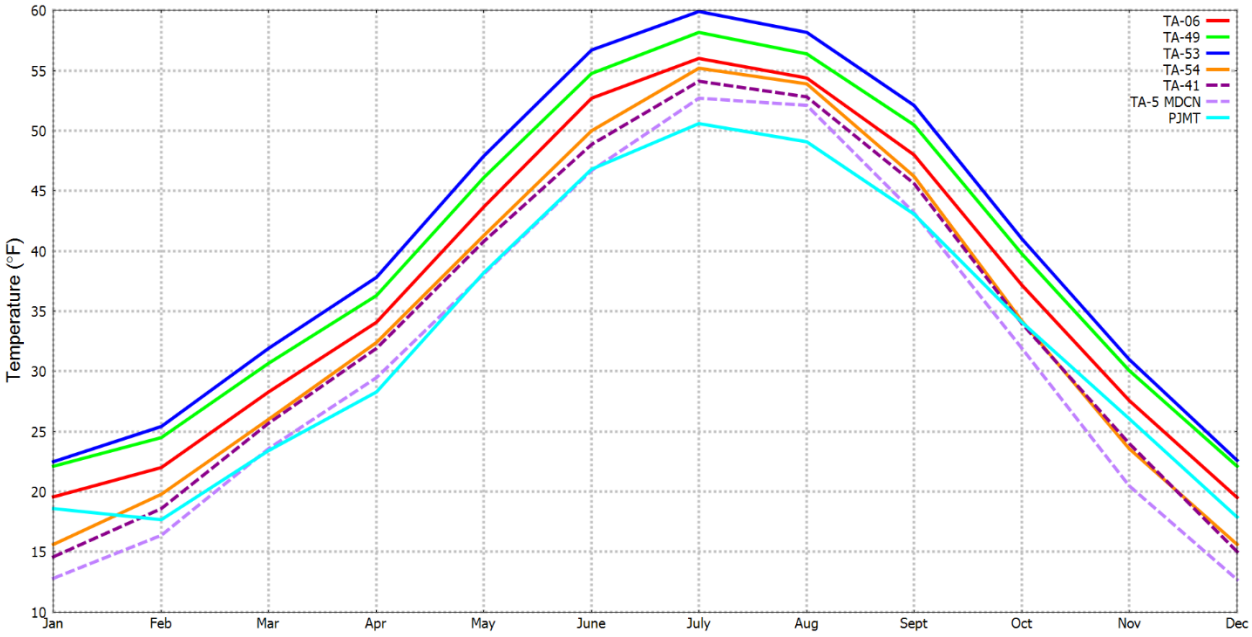

Figure 4-4: Monthly average minimum temperatures across Los Alamos County.

5.0 PRECIPITATION AND ATMOSPHERIC MOISTURE

Collection of rain and snowfall data began in November 1910 on the Pajarito Plateau by a scientifically-minded dryland farmer (Machen et al. 2014). However, the data collected during the early years include many months/years with incomplete data. Thus, statistics are presented as early as 1951 where complete years of data are generally available.

In addition to rain and snowfall measurements, atmospheric humidity parameters have been collected at all tower locations from 1987–1992. These data are the precursors of precipitation.

5.1 Average Precipitation

The annual average precipitation (rain plus melted snow) in Los Alamos is 18.97 inches (Table 5-1 and Figure 5-1). Approximately 50% of the annual precipitation falls during the summer monsoon season (June 15–September 30). White Rock has a similar annual distribution of precipitation, but at 75% of the Los Alamos averages, with an annual average of 14.17 inches. Precipitation in October is often enhanced by the impact of moisture carried into New Mexico from hurricanes or tropical storms off the coast of Mexico in the Eastern Pacific.

Table 5-1: Monthly Average Precipitation and Snowfall in Inches for Los Alamos and White Rock (1981–2010)

	Los Alamos Average Precipitation	Los Alamos Average Snowfall	White Rock Average Precipitation
January	0.95	13.3	0.66
February	0.86	10.9	0.62
March	1.20	10.4	0.95
April	1.06	3.4	0.84
May	1.39	0.3	1.07
June	1.51	0.0	1.06
July	2.82	0.0	1.92
August	3.61	0.0	2.39
September	2.01	0.0	1.54
October	1.55	2.2	1.51
November	0.98	4.9	0.83
December	1.10	12.2	0.78
Annual	18.97	57.6	14.17

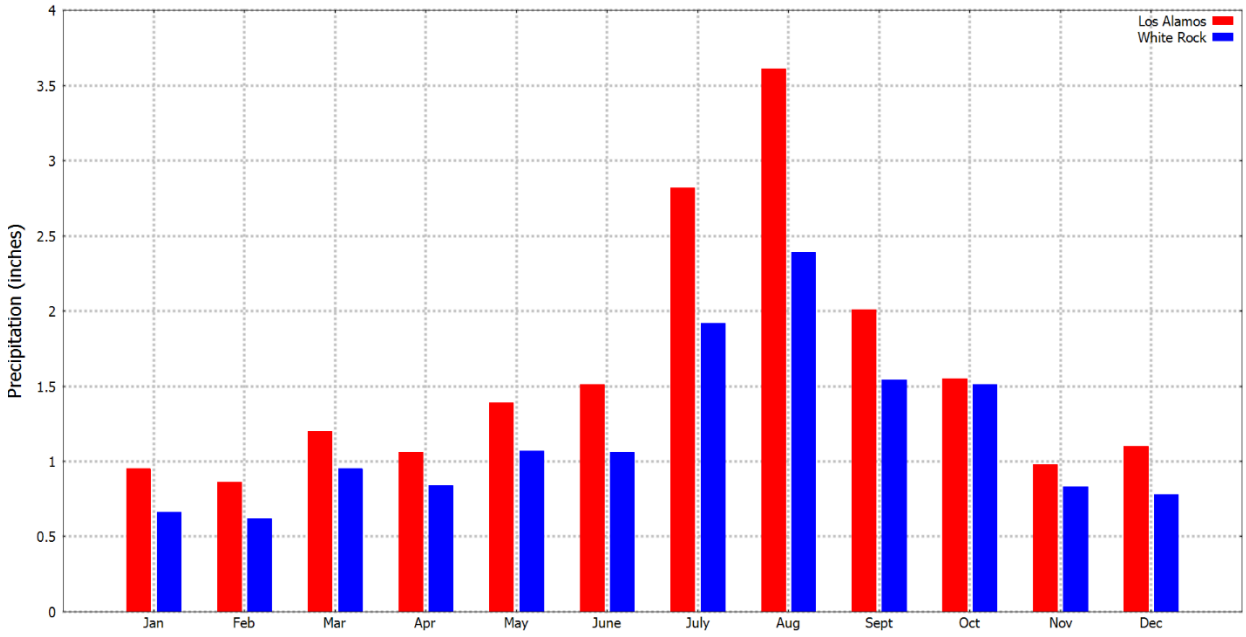

Figure 5-1: Monthly average precipitation for Los Alamos and White Rock (1981–2010).

Winter season precipitation generally falls as snow. Los Alamos receives about 57 inches of snow per year (Figure 5-2). Snow has been recorded in every month of the year, except for June, July, and August. Measureable snow (>0.1 inches) has fallen as early as September 18 (1971) and as late as May 17 (1986). The average first measureable snow is November 10 and the average last date for measureable snow is April 5. A typical snowfall to precipitation (melted snow) ratio is between

10 inches of snow to 1 inch of rain and 20 inches of snow to 1 inch of rain. In the colder winter months of December, January, and February (when the capacity of the air to hold moisture is less), the snowfall to precipitation ratio is typically 20 to 1 and sometimes higher. In the warmer winter months of November, March, and April, the snowfall to precipitation ratio is closer to 10 to 1.

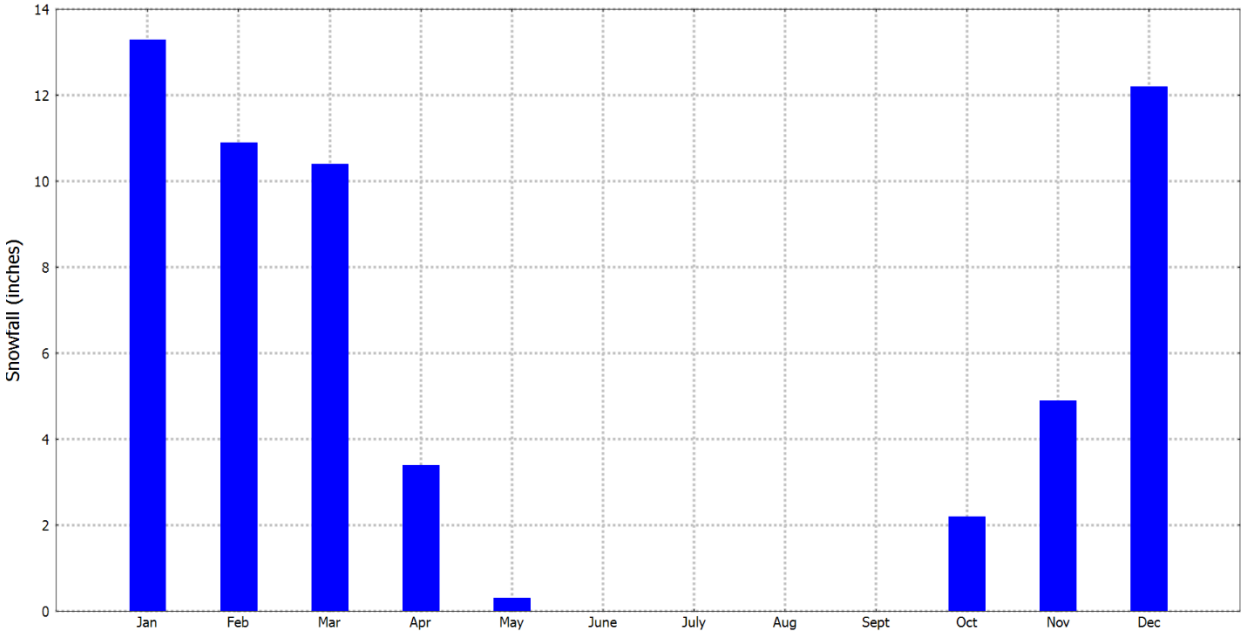

Figure 5-2: Monthly average snowfall in Los Alamos (1981–2010).

The greatest snowstorm and total snowfall for the year occurred in 1986–1987. On January 15–17, 1987, Los Alamos measured 48 inches of snow. The snowfall to precipitation ratio for this storm was 33 to 1 because the average temperature over these three days was 18°F. Another storm on February 18–19, 1987, produced 26 inches of snow. For the 1986–1987 winter season, a total of 153 inches of snow fell, more than 250% of normal.

5.2 Monsoon Season Precipitation

Precipitation is brought to New Mexico via the midlatitude westerly winds during the fall, winter, and spring. As the jet stream moves north in the late spring/early summer, Los Alamos typically comes under the influence of the North American Monsoon weather pattern (Adams 1997). During the summer months, the Bermuda high pressure moves west into the Gulf of Mexico and the central high plains of the United States and a low pressure area is created by the high temperatures of the Phoenix, Arizona–Las Vegas, Nevada areas. These circulations combine to bring moisture into Mexico, and produce southerly winds that bring this moisture into Arizona and New Mexico (Figure 5-3). In 2008, the National Weather Service defined the North American Monsoon season as June 15 to September 30 (Sampson and Pytlak 2008). This report uses this definition even though significant rainfalls that have a moisture source in Mexico typically begin during the first week in July in Los Alamos.

The 1981–2010 average monsoon precipitation in Los Alamos is 9.28 inches and has ranged from as low as 3.15 inches in 1956 to as high as 17.58 inches in 1952. The 1981–2010 average monsoon

precipitation in White Rock is 6.46 inches and has ranged from as low as 1.66 inches in 1980 and as high as 13.33 inches in 2013.

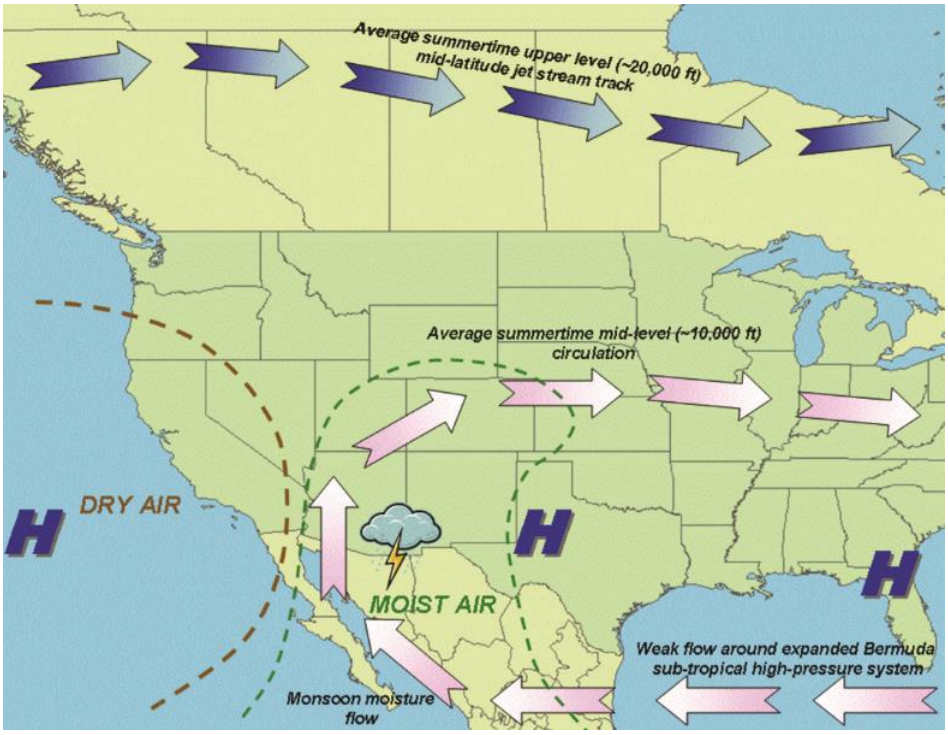

Figure 5-3: Schematic of surface wind patterns during the North American Monsoon (Crimmins 2006).

5.3 Precipitation Across Los Alamos

Precipitation across the site varies with altitude and distance from the steep rise of the terrain just west of LANL. When the wind blows from the east or from the south, air is lifted by the mountains (known as orographic lifting), causing the air to cool and promoting cloud and rain or snow formation. Thus, the highest average total precipitation (rain and melted snow) occurs at the stations with highest altitude and closest to the mountains (TA-6 and NCOM). The average precipitation across the Laboratory is presented in Table 5-2 and Figure 5-4. TA-49 and TA-53 are at similar altitudes, but TA-49 is about 1 mile closer to the mountains than TA-53, and this produces higher precipitation. TA-54 is located at the lowest elevation and is the farthest distance from the mountains, resulting in the lowest average precipitation. All stations record the highest average precipitation during the summer monsoon season. The NCOM station is missing a significant amount of data during the summer of 2005, so the NCOM averages for August and September are biased low.

The spatial pattern is similar for the summer monsoon season; precipitation is greatest at the stations with the highest altitude and closest to the mountains (Figure 5-5). There are two interesting exceptions, precipitation at the NCOM station in 2001 and 2011 dropped in comparison with other stations. This may have been a result of reduced soil moisture following the Cerro Grande and Las Conchas fires. The NCOM station is the closest station to areas with significant burns during these fires, and the severe burns produced hydro-phobic soils. Since these soils cannot hold moisture, there is no recycling of soil moisture after rainstorms to support the next rainstorm.

Table 5-2: Monthly Average Precipitation Across the Laboratory in Inches (1994–2013)

	TA-6	TA-54	TA-53	TA-49	NCOM
January	0.82	0.55	0.66	0.77	0.76
February	0.76	0.52	0.64	0.71	0.73
March	0.89	0.75	0.80	0.83	0.89
April	1.10	0.86	0.94	1.02	1.14
May	1.02	0.69	0.88	0.91	1.00
June	1.18	1.01	0.85	0.96	1.26
July	2.33	1.95	1.71	2.05	2.67
August	3.33	2.51	2.56	2.77	3.42*
September	2.30	1.85	1.72	2.17	1.76*
October	1.69	1.51	1.46	1.66	1.76
November	0.79	0.66	0.64	0.80	0.74
December	0.90	0.64	0.74	0.84	0.81
Annual	17.11	13.49	13.61	15.50	17.11*

*These data are biased low due to a significant amount of data missing in 2005.

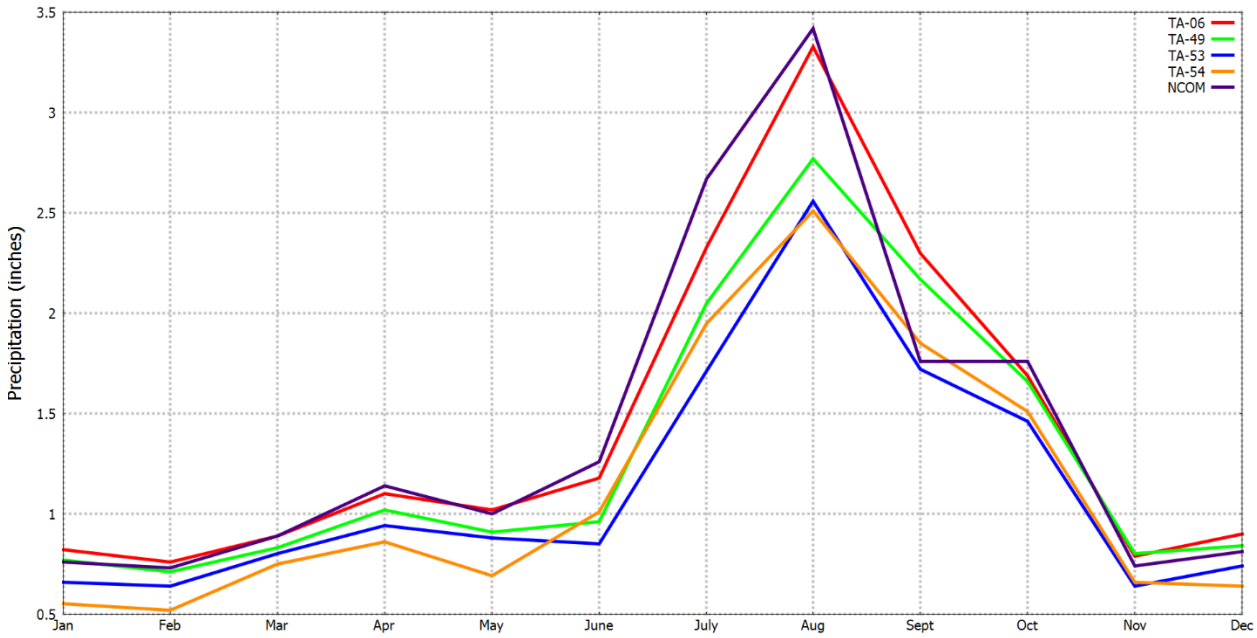

Figure 5-4: Monthly average precipitation across the Laboratory (1994–2013). NCOM August and September averages are low due to missing data during 2005, but the available data are left in the figure for context.

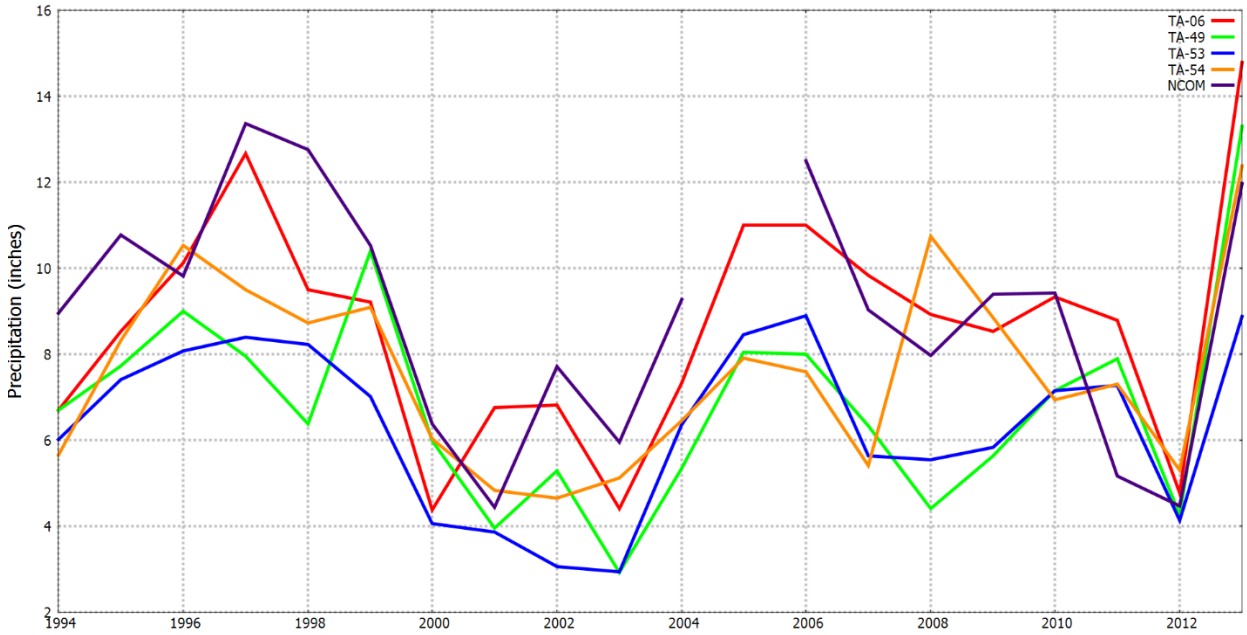

Figure 5-5: Annual average monsoon season precipitation (1994–2013). A significant amount of data is missing for NCOM for August–September 2005; this point was eliminated from the graph.

5.4 Heavy Precipitation Events

Daily precipitation totals greater than 0.5 inches can be considered heavy rainfalls with the potential to cause local flooding and property or infrastructure damage. The annual average number of days in Los Alamos recording greater than 0.5 inches of precipitation is 16 days, and in White Rock is 10 days. The majority of these days (55%) occur during the summer monsoon season. The average monthly distribution of heavy rainfall events is presented in Table 5-3. The record for highest daily precipitation occurred on September 13, 2013, when Los Alamos measured 3.52 inches and White Rock measured 2.49 inches (a description of the September 2013 rainfall event is found in Bruggeman 2016). The 10 greatest daily rainfall totals on record for Los Alamos and White Rock are presented in Table 5-4. The majority of these rain events occurred during the summer monsoon season, but a few have occurred in the spring and winter. Note that due to the much longer record for Los Alamos, there are only two days where the Los Alamos and White Rock stations recorded the highest precipitation on the same dates.

Table 5-3: Monthly Average Number of Days with Precipitation Greater Than 0.5 Inches

	Los Alamos	White Rock
January	0.7	0.2
February	0.4	0.2
March	0.7	0.4
April	1.0	0.5
May	1.1	0.8
June	1.4	0.7

	Los Alamos	White Rock
July	2.5	1.4
August	3.1	2.2
September	1.9	1.4
October	1.5	1.5
November	0.9	0.6
December	0.8	0.5
Annual	15.9	10.4

Table 5-4: Top 10 Greatest 1-day Rainfall Events for Los Alamos and White Rock

Los Alamos		White Rock	
Rainfall in inches (1910–2013)	**Date**	**Rainfall in inches (1964–2013)**	**Date**
3.52	September 13, 2013	2.49	September 13, 2013
3.48	October 5, 1911	2.11	June 17, 1999
2.51	June 10, 1913	1.93	October 31, 1989
2.47	July, 31, 1968	1.88	July, 31, 1968
2.45	January 27, 1916	1.79	September 12, 2013
2.26	August 1, 1951	1.75	April 11, 1969
2.25	March 30, 1916	1.71	August 18, 2000
2.23	August 23, 1957	1.61	September 28, 2005
2.21	December 19, 1918	1.60	December 11, 1965
2.21	September 22, 1929	1.60	July 17, 1975

The Laboratory is required to design nuclear facilities to withstand severe storms. Extreme value statistics along with the LANL measured precipitation values are used to predict return period rainfall and snowfall (e.g., the 100-year return period 24-hour rainfall event). The predicted return period rainfall, snowfall, and wind speeds are presented in Kelly et al. (2015).

5.5 El Niño/La Niña Influence on Precipitation

The El Niño Southern Oscillation (ENSO) is one of the most important ocean-atmosphere circulations impacting the weather across the planet. The circulation is characterized by above normal (called El Niño) or below normal (called La Niña) equatorial Pacific Ocean sea surface temperatures. The changes in ocean surface temperature impact the wind and precipitation patterns over the equatorial Pacific and North America. These patterns and their impact on weather in the United States are illustrated in Figure 5-6.

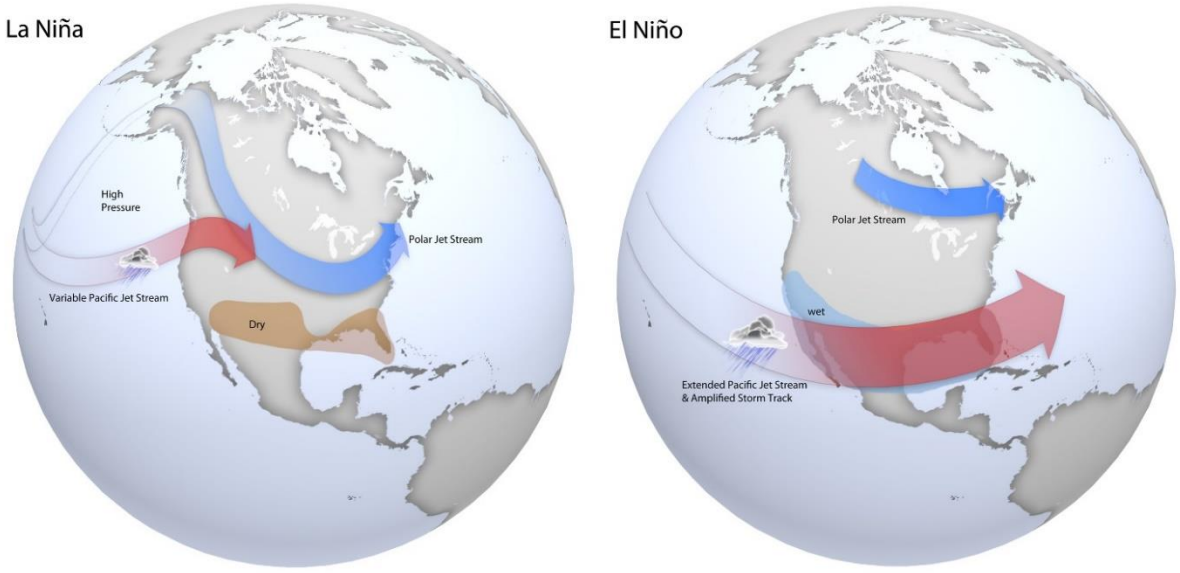

Figure 5-6: Winter atmospheric circulation patterns during El Niño and La Niña winter events (NOAA 2016a).

The presence of an El Niño or La Niña pattern is determined by the three-month average Pacific equatorial sea surface temperature anomaly (difference from the long-term average). El Niño (La Niña) is defined when the three-month average sea surface temperature is greater than 0.5°C above (below) normal. As shown in Figure 5-6, wintertime precipitation in Los Alamos is expected to be above average during El Niño years and below average during La Niña years. Figure 5-7 identifies the month-by-month Pacific Ocean sea surface temperature anomaly. Values between ±0.5°C are considered to be El Niño/La Niña neutral. Since 1950, there have been 17 El Niño events and 12 La Niña events. The other years are known as El Niño/La Niña neutral years. The average length of La Niña events is 16 months and 11 months for El Niño events.

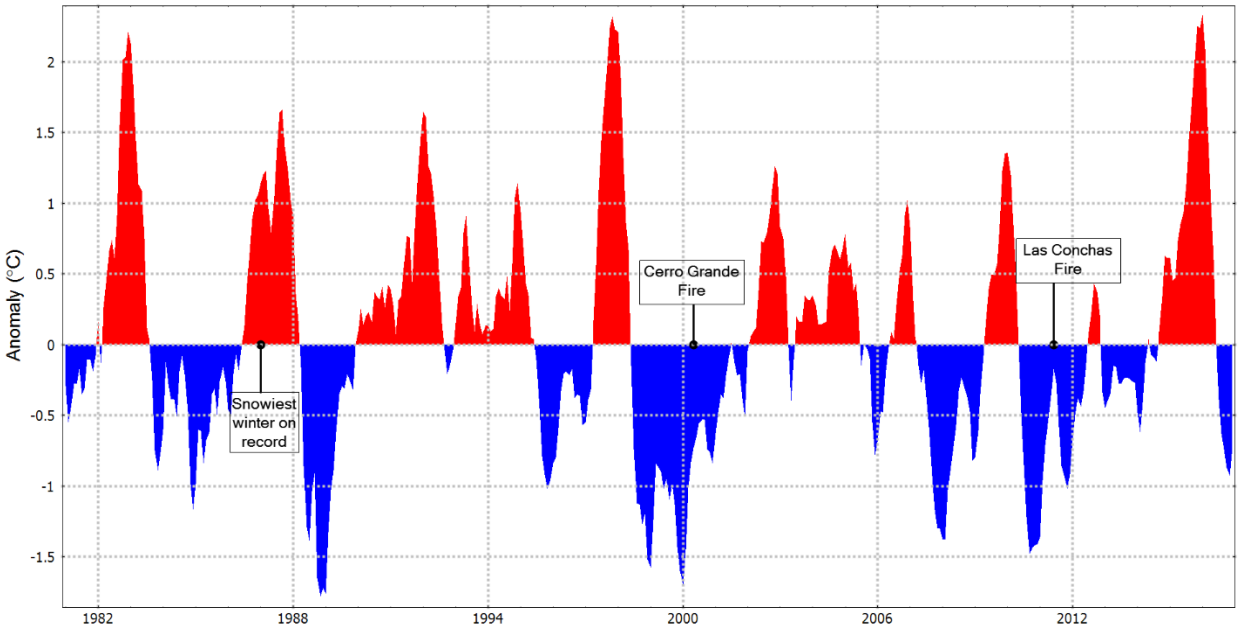

Figure 5-7: Pacific sea surface temperature anomalies (1981–2016) and major Los Alamos weather events.

To compare Los Alamos precipitation during El Niño and La Niña winters, winter precipitation (rain plus melted snow) is summed for each year between November 1 and March 31. The average winter precipitation for Los Alamos from 1951–1980 is 4.75 inches; from 1981–2010 it is 5 inches. During the El Niño winters for this same period, the average precipitation was 5.35 inches; during the La Niña winters, the average precipitation was 3.78 inches. There is a tendency for Los Alamos to receive slightly greater than normal precipitation in El Niño years and much less than average precipitation in La Niña years. These data, including the winters from 1952–2016, are presented in Figures 5-8 and 5-9. The data demonstrate that an El Niño year is not a guarantee of a wet winter and a La Niña winter is not a guarantee of a dry winter.

Los Alamos average winter precipitation during El Niño/La Niña neutral years is 4.71 inches, slightly below climatological averages. Los Alamos winter precipitation during neutral years are presented in Figure 5-10. Precipitation during neutral years has a larger variability than in either El Niño or La Niña winters. That is, winter precipitation during an El Niño/La Niña neutral winter can be well above or below normal.

Other factors impact winter precipitation in Los Alamos beyond the ENSO circulation. The Pacific Decadal Oscillation (PDO) impacts the amount of winter precipitation received in Los Alamos (Gutzler et al. 2016). The PDO is a cycle of Pacific seas surface temperatures in the middle latitudes. In years when the PDO is positive and El Niño is present, New Mexico tends to receive more winter precipitation. In cases when La Niña is present and the PDO is negative, New Mexico tends to receive less winter precipitation. However, the PDO does not explain each Los Alamos winter when high winter precipitation occurs in La Niña years or when low winter precipitation occurs in El Niño years.

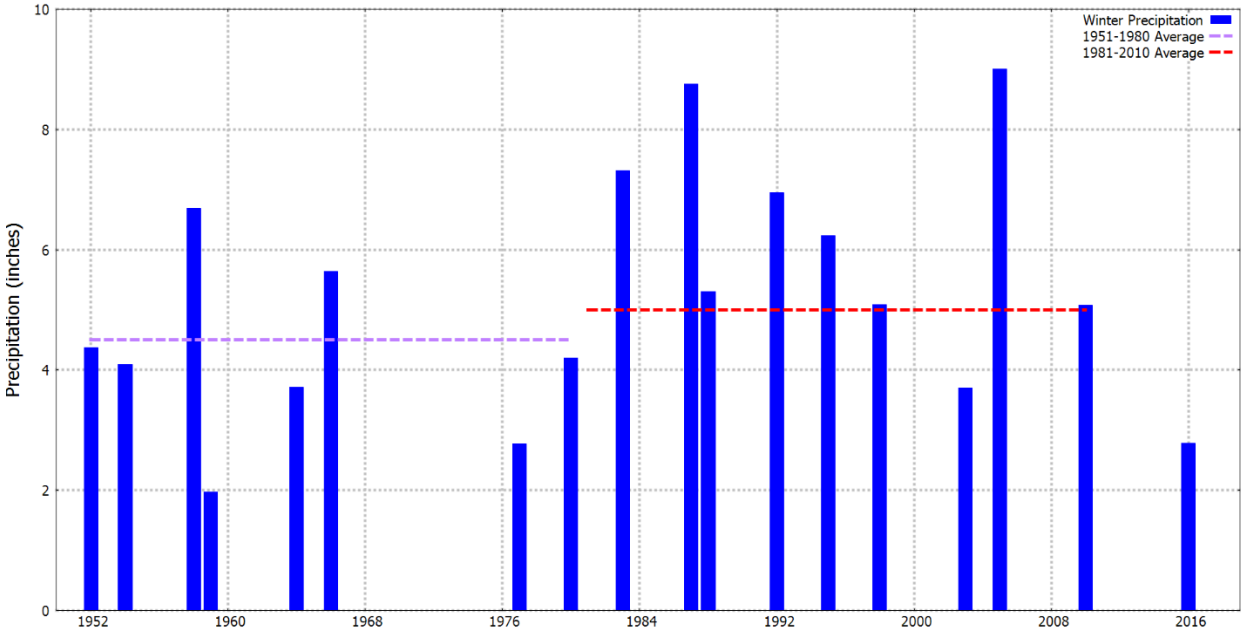

Figure 5-8: Los Alamos precipitation during El Niño winters. The year represents the year of the end of the winter (e.g., 2016 is the winter of 2015–2016).

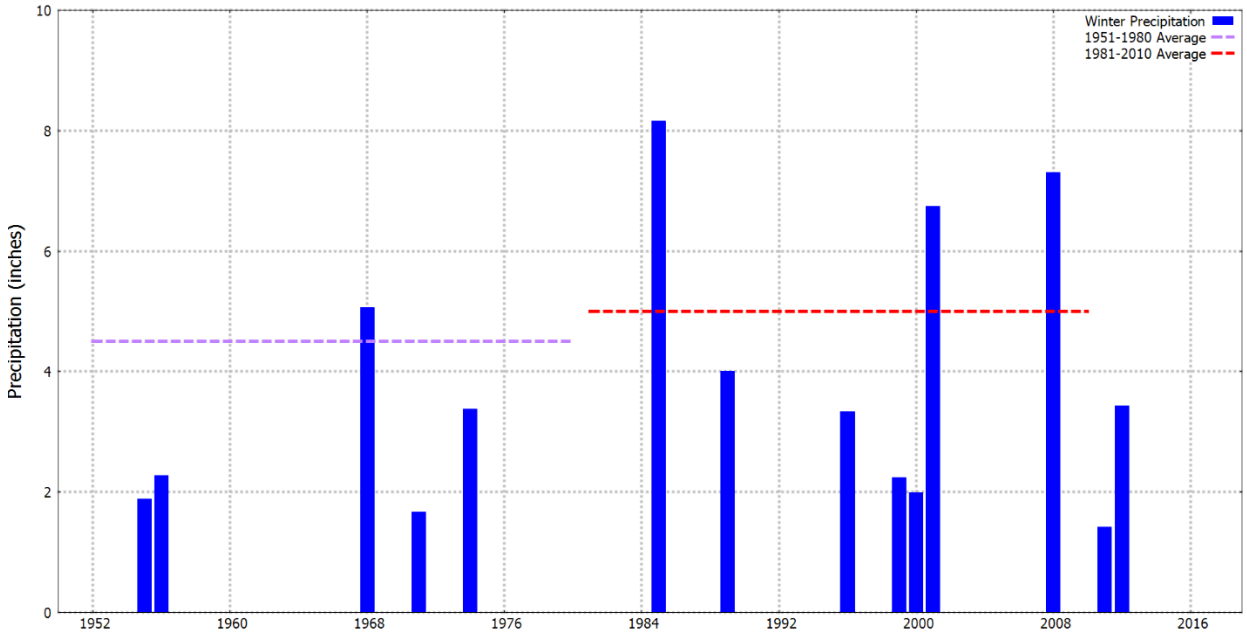

Figure 5-9: Los Alamos precipitation during La Niña years. The year represents the year of the end of the winter (e.g., 2016 is the winter of 2015–2016).

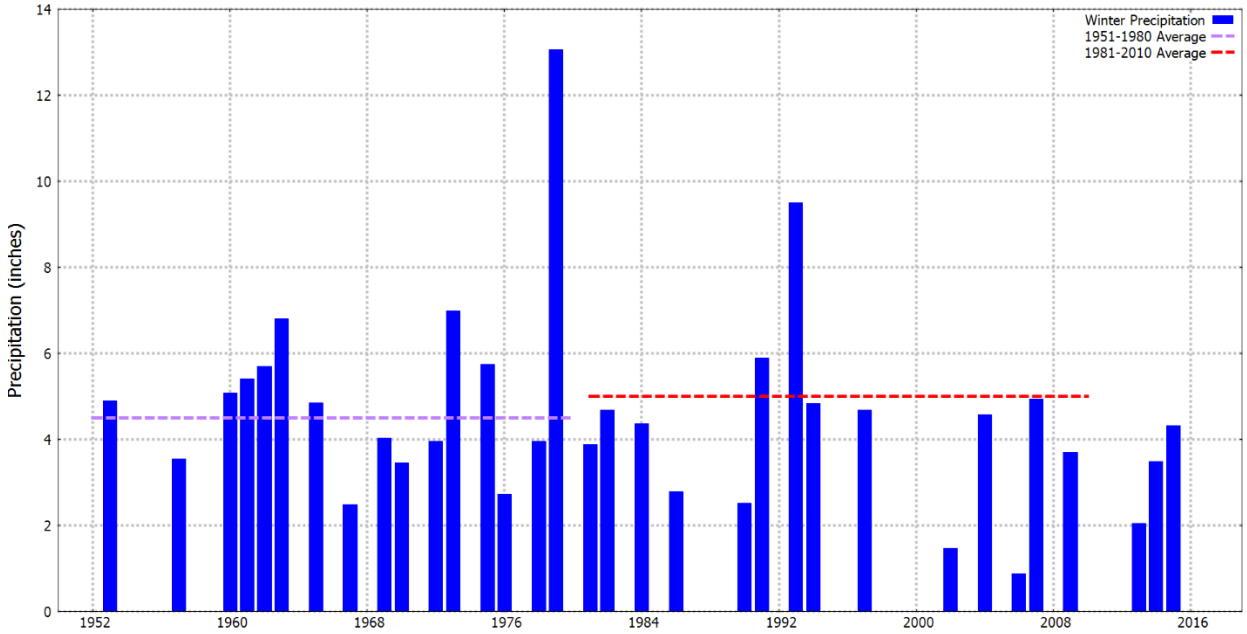

Figure 5-10: Los Alamos precipitation during El Niño/La Niña neutral years. The year represents the year of the end of the winter (e.g., 2016 is the winter of 2015–2016).

The analysis of monsoon precipitation (June 15–September 30) following an El Niño or La Niña event is inconclusive. For the monsoon season following the 17 El Niño winters from 1981–2010, average precipitation was 9.66 inches compared with the 30-year average of 9.31 inches. For the monsoon season following the seven La Niña winters between 1981 and 2010, average precipitation was 8.53 inches compared with the 30-year average of 9.31 inches. Gutzler (2000) identifies a negative correlation between Colorado spring snowpack and the Southwestern summer monsoon. A high spring season snowpack in Colorado produces a lower summer monsoon season precipitation total in the southwest. Other factors should be considered in future evaluations of monsoon variability in Los Alamos.

5.6 Atmospheric Moisture

The dew point temperature provides an estimate of the total amount of water vapor in the atmosphere at a specific pressure (or altitude). Relative humidity also provides an estimate of the water content of the atmosphere, but, as the name implies, it is a relative measurement. Relative humidity is a percentage of the total possible moisture that the atmosphere can hold. Table 5-5 and Figure 5-11 present monthly average dew point temperatures for the LANL mesa-top towers for 1994–2013. TA-49 dew point measurements are only available from 2000–2013. Table 5-6 and Figure 5-12 present the monthly average humidity for the LANL mesa-top towers.

Table 5-5: Monthly Average Dew Point Temperatures in °F (1994–2013)

	TA-6	TA-54	TA-53	TA-49
January	13.9	15.0	15.2	14.2
February	15.1	16.8	16.2	14.4
March	17.7	18.8	18.2	16.2
April	19.9	20.6	20.3	18.6
May	25.2	25.6	25.5	23.8
June	30.7	31.0	30.9	28.8
July	44.5	45.5	45.1	44.4
August	46.2	47.4	46.8	44.8
September	38.6	39.8	39.0	36.7
October	27.9	29.1	28.5	28.4
November	19.1	20.3	19.9	19.0
December	14.7	15.5	15.8	15.0

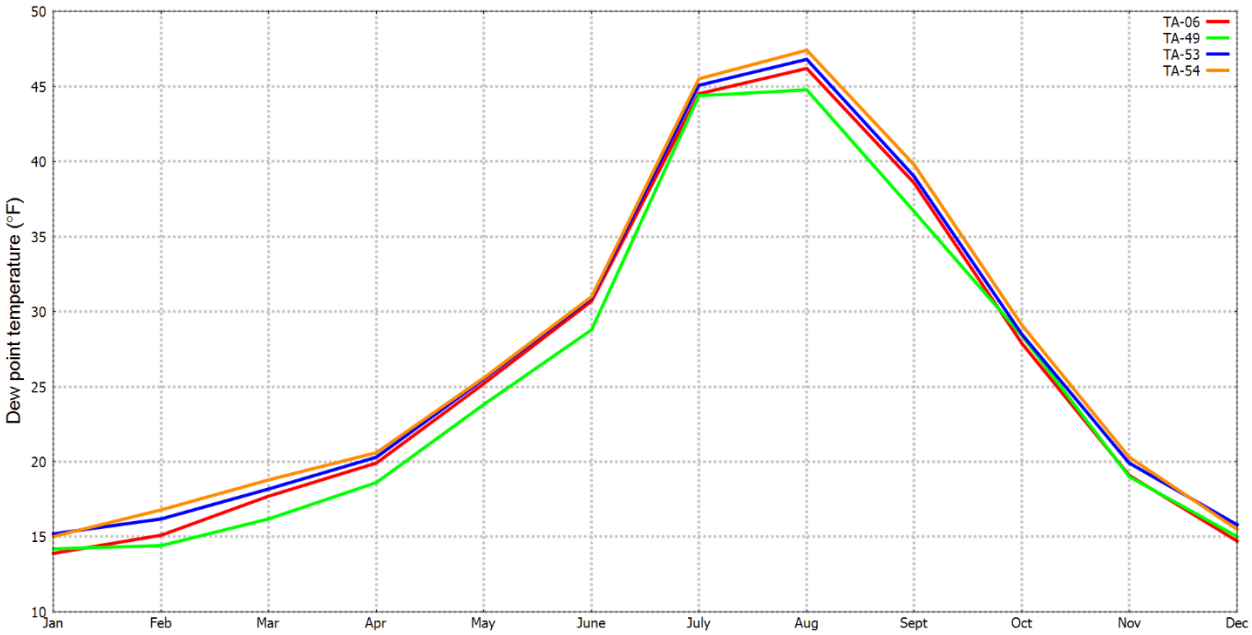

Figure 5-11: Monthly average dew point temperatures (1994–2013).

Table 5-6: Monthly Average Relative Humidity in Percent (1994–2013)

	TA-6	TA-54	TA-53	TA-49
January	53.8	59.7	53.4	51.6
February	51.9	54.4	50.6	48.9
March	45.1	46.4	43	41.9
April	40.1	40	37.8	37.3
May	35.9	35.6	33.9	33.1
June	32.8	32.5	30.9	31.3
July	48.6	47.5	45.1	45.5
August	54.2	53.5	50.6	50
September	50.2	50.6	47	46
October	48.9	51.9	46.7	45.9
November	49.2	54.4	47.5	46.5
December	55.6	61.7	55.2	53.8

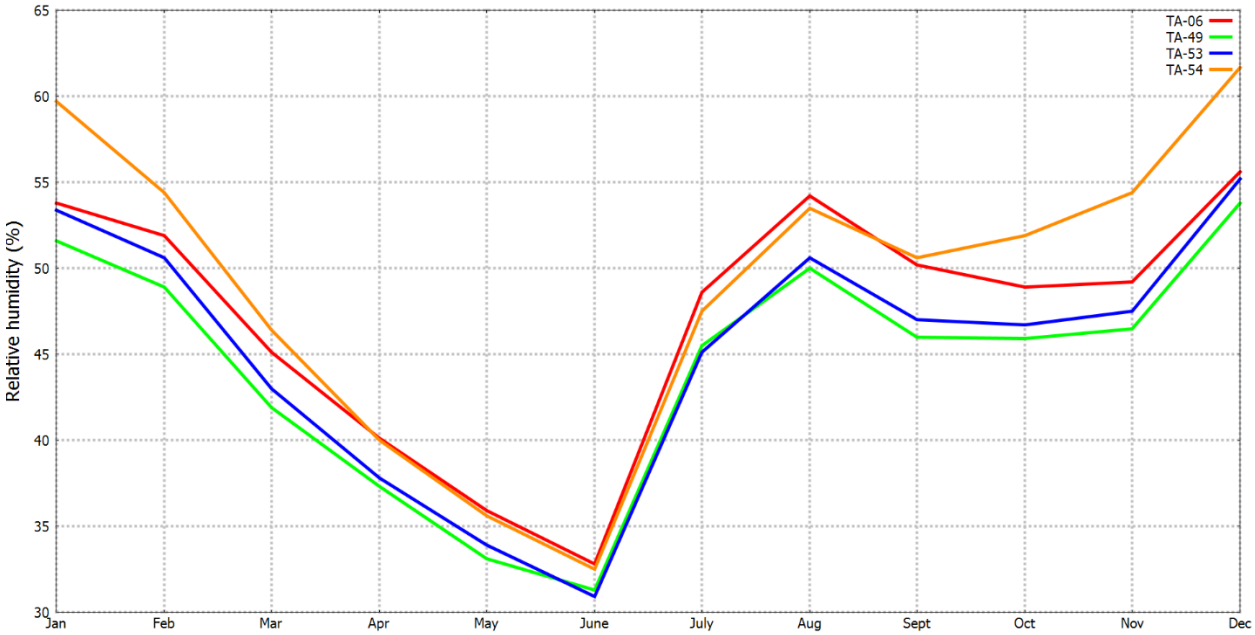

Figure 5-12: Monthly average relative humidity (1994–2013).

Los Alamos has a fairly dry atmosphere due to the large distance from the Gulf of Mexico (approximately 750 miles) and the Pacific Ocean (approximately 650 miles). The highest dew point temperatures occur in July and August, averaging over 40°F, with September only slightly lower at ~38°F. These are the months of the summer monsoon season when Los Alamos records as much as 50% of the annual precipitation. Daily dew point temperatures can reach into the mid 60's during the monsoon season. Lowest values occur in the winter and early spring, with average values between 15°F and 20°F. Very low dew point temperatures of 10°F occur on many days of the winter.

Since relative humidity is dependent upon temperature, it has a near inverted annual distribution (Figure 5-12 and Table 5-6) when compared with the average dew point temperature (Figure 5-11). In warmer temperatures the atmosphere has a greater capacity to hold moisture, so the lowest average humidity is measured on the warmest days in May and June, before the summer monsoon season. Daily minimum relative humidity values can be less than 10% during the warm spring months. Relative humidity increases during July and August as a result of moisture brought into New Mexico by southerly winds from Mexico. Relative humidity increases during the winter months due to colder temperatures when the air can hold less water vapor. Relative humidity is measured above 90% on many winter nights.

6.0 WIND

6.1 Average Wind Speed

Los Alamos is a light wind site; annual average wind speeds on the mesas (measured at 12 meters) range from 6.2–7.4 mph. The highest average wind speeds occur during April, May, and June (Table 6-1 and Figure 6-1) when low-pressure systems deepen as they move east of the Rocky Mountains. The highest speeds, excluding Pajarito Mountain, are measured at TA-49 due to the more open nature of this tower location, with very few trees to cause less frictional drag on the wind.

Wind speeds at TA-53 are also higher than average for mesa top locations, due to the very narrow aspect of the mesa where the tower is located. Wind speeds at the TA-53 location reflect the deep canyons to the north and south of the tower, where very little surface friction impacts the wind speed. Wind speeds within the canyons (TA-41 and TA-5 MDCN) are as much as 50% lower than at mesa top locations because the canyon bottom locations are often protected from high mesa top wind speeds. This effect is greatest at TA-41, since Los Alamos Canyon is a much deeper and narrower canyon at the TA-41 tower location than Mortandad Canyon where the TA-5 MDCN tower is located. The TA-41 tower is protected because

- it is well below the mesa top (~250 feet below mesa top level),
- the canyon bottom has a heavy tree cover which slows wind speeds due to friction, and
- mesa top peak wind speeds are often perpendicular to the WNW/ESE axes of the canyons, so that high mesa top wind speeds do not easily mix downward to the canyon bottom.

Average wind speeds at PJMT demonstrate a much different pattern than mesa top and canyon winds. PJMT winds (measured at 10,000 feet) represent winds produced by the large-scale synoptic weather patterns and are not produced by the local topographic influences on wind found on the mesas and within canyons. There are very little surface friction impacts at this height and very little impact from surface heating. (This is in part due to the height of the wind speed measurement at 36 meters, which is much greater than the 12-meter measurement height of the mesa and canyon towers.) The highest average wind speeds are observed in the spring and winter, similar to the mesa top winds, but there is a distinct wind speed minimum during the summer months. This reflects the monsoon circulation that affects the southwestern United States during the summertime. The midlatitude jet stream moves north and is replaced by the Four Corners high-pressure system (Adams and Comrie 1997) characterized by lower wind speeds at 10,000 feet, the height of Pajarito Mountain.

Table 6-1: Monthly Average Wind Speeds at 12 meters AGL in mph

	TA-6	TA-54	TA-53	TA-49	TA-5 MDCN*	TA-41	PJMT*
January	5.1	5.3	5.4	6.0	3.7	3.1	17.0
February	5.9	6.2	6.3	6.9	4.1	3.3	17.4
March	6.8	7.0	7.2	7.9	4.8	3.8	16.8
April	7.9	8.1	8.4	9.1	5.5	4.3	18.0
May	7.7	8.2	8.5	9.1	5.4	4.3	16.8
June	7.4	7.9	8.2	8.7	5.2	4.0	15.6
July	5.7	6.6	6.9	7.5	4.4	3.2	11.3
August	5.4	6.2	6.6	6.9	4.1	3.1	11.1
September	5.8	6.4	6.7	7.2	4.2	3.2	13.8
October	5.8	6.2	6.5	7.0	4.2	3.2	14.9
November	5.4	5.7	5.8	6.5	4.0	3.2	15.9
December	5.0	5.4	5.4	6.0	3.7	2.9	17.1
Annual	6.2	6.6	6.8	7.4	4.4	3.5	15.5

*TA-5 MDCN measurement height is 10 meters AGL and PJMT measurement height is 36 meters AGL.

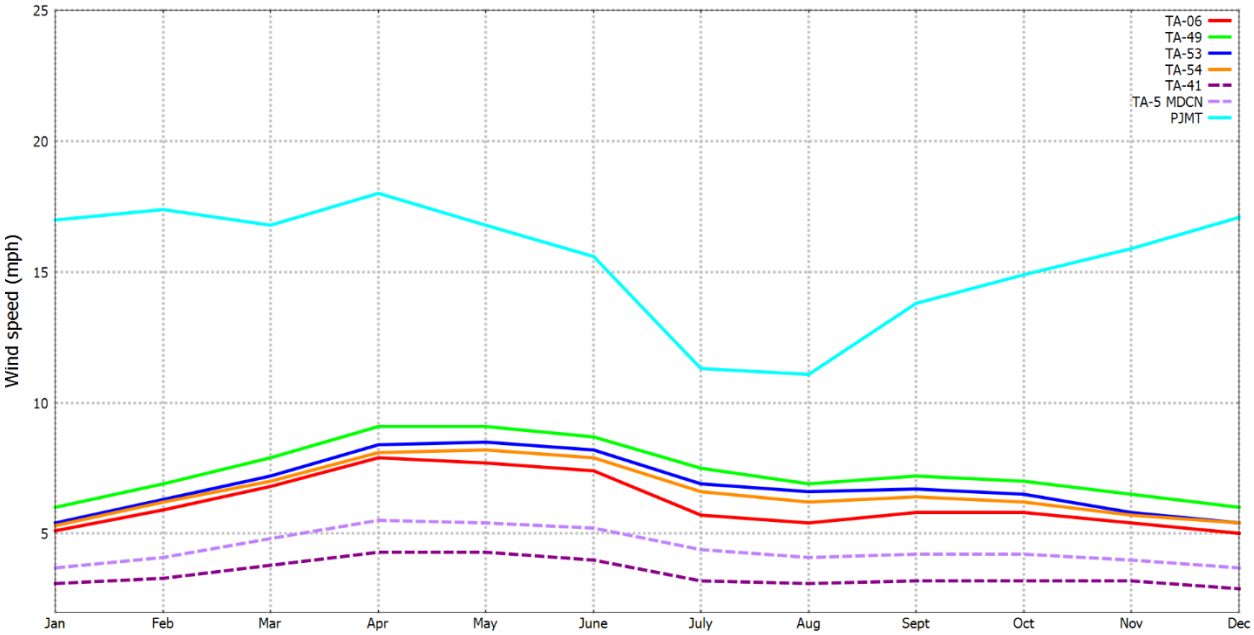

Figure 6-1: Monthly average wind speeds at 12 meters AGL for mesa-top and canyon towers. PJMT is measured at 36 meters AGL.

6.2 Peak Gusts

Average peak gust wind speeds range from 20–33 mph across the Pajarito Plateau (Table 6-2 and Figure 6-2). Average peak gusts are much higher at PJMT, reaching an average of 43 mph in the spring. Peak gusts at each tower site follow a similar pattern to the average wind speeds. Highest average peak gusts occur in the spring and winter.

Table 6-2: Monthly Average Peak Wind Gusts at 12 meters AGL in mph

	TA-6	TA-49	TA-53	TA-54	PJMT*
January	20.9	21.2	21.8	19.9	38.4
February	24.4	25.0	24.8	23.1	40.8
March	26.8	28.1	28.0	26.7	39.5
April	31.3	33.1	32.7	31.5	42.8
May	30.4	32.6	32.8	31.8	40.4
June	29.8	32.0	32.4	31.6	38.3
July	25.4	27.4	29.0	28.0	35.0
August	23.7	26.4	27.3	26.2	29.7
September	23.8	25.5	25.9	24.9	33.4
October	23.2	24.5	24.5	23.3	35.7
November	21.3	21.9	22.1	20.6	36.6
December	20.2	21.0	21.1	19.3	39.2
Annual	25.1	26.6	26.9	25.6	37.5

*PJMT is measured at 36 meters AGL.

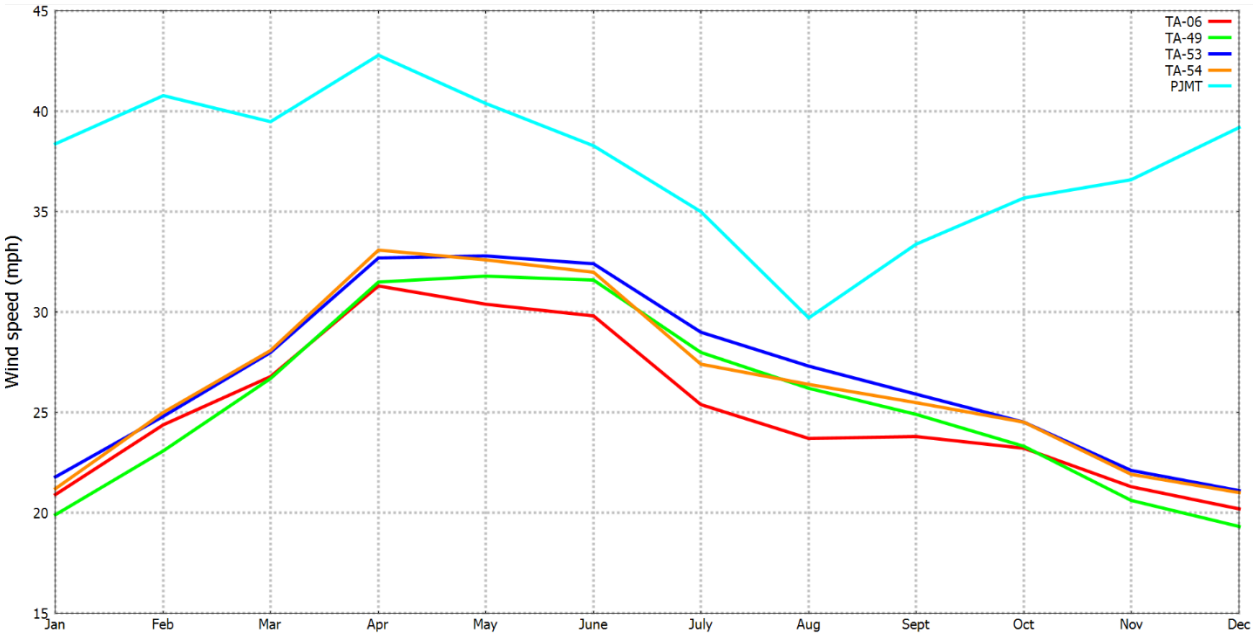

Figure 6-2: Monthly average peak wind gusts at 12 meters AGL. PJMT is measured at 36 meters AGL.

6.3 Wind Direction

Daytime winds (sunrise to sunset) and nighttime winds (sunset to sunrise) are shown in the form of wind roses in Figures 6-3 and 6-4. The wind roses are based on 15-minute-averaged wind observations for 2007 at the four mesa-top stations, PJMT, and the canyon stations. Wind roses depict the percentage of time that wind blows from each of 16 direction bins and the distribution of wind speed. For example, the TA-6 wind rose during the day can be interpreted as measuring winds directly from the south over 12% of the time. The wind speeds range from 2.5 to 5 meters/second under 8% of the time, 5 to 7.5 meters/second over 2% of the time, and exceed 7.5 meters/second only a fraction of 1% of the time. Although not shown here, wind roses from different years are almost identical in terms of the distribution of wind directions, indicating that wind patterns are constant when averaged over a year.

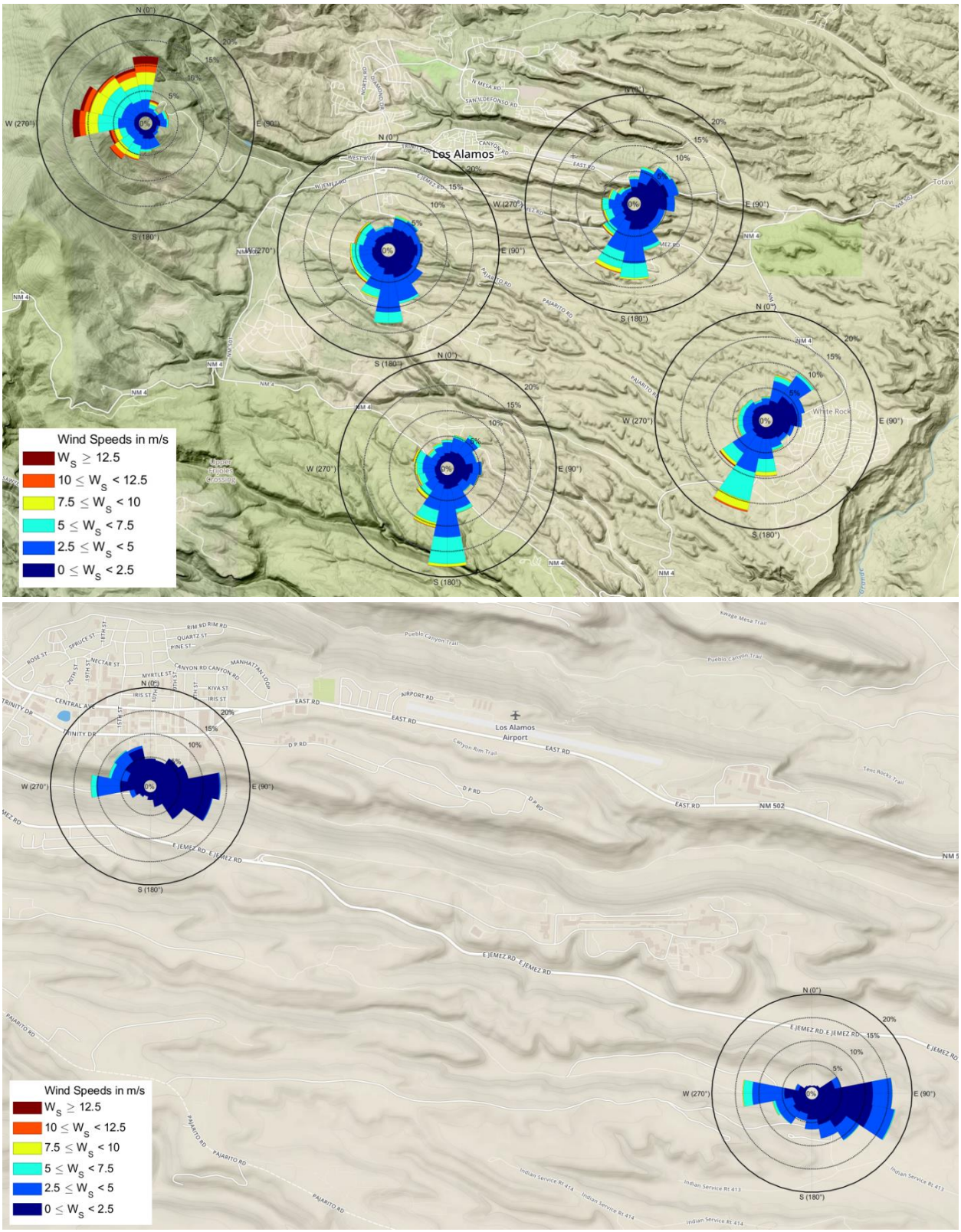

Figure 6-3: Daytime wind roses during 2007.

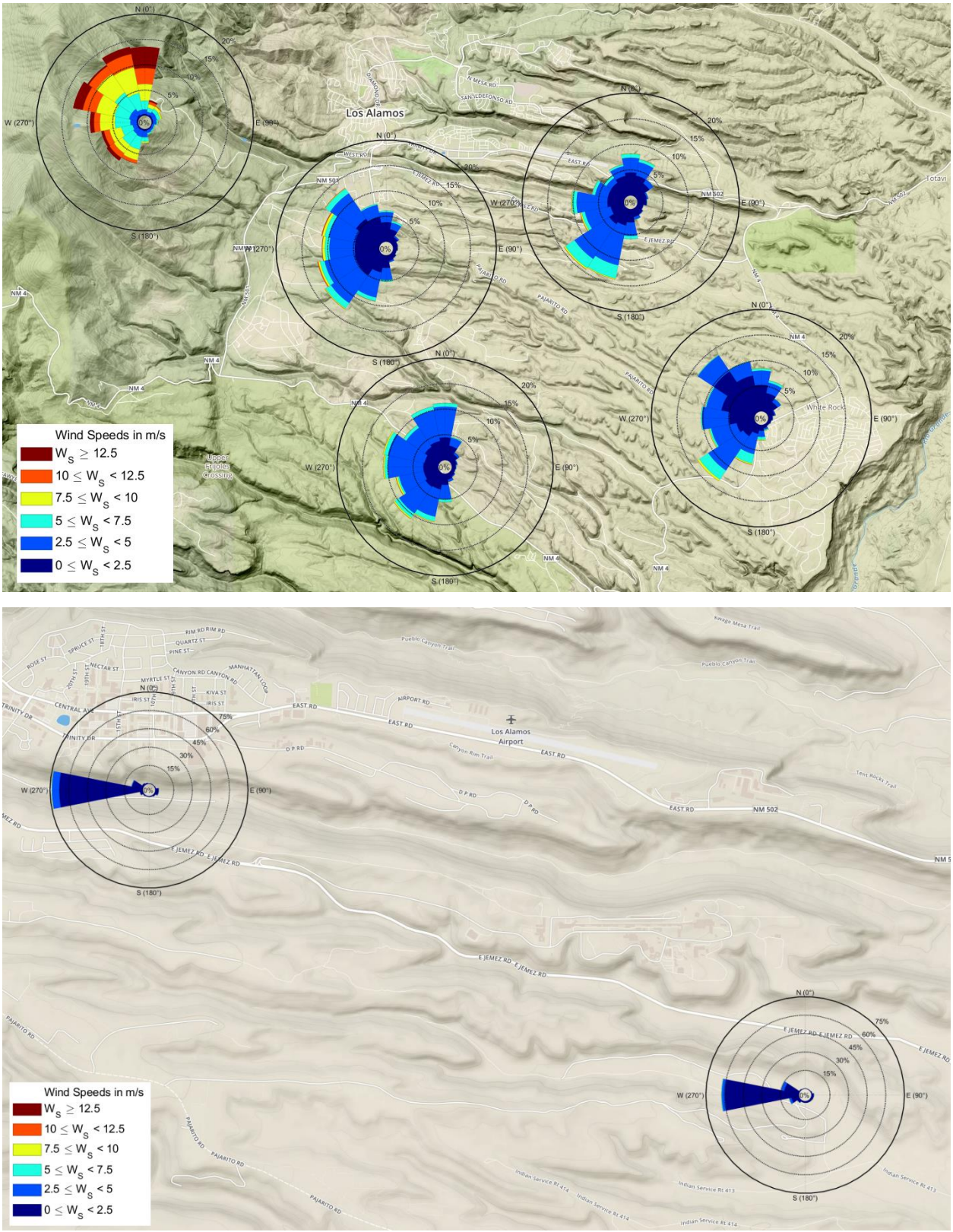

Figure 6-4: Nighttime wind roses during 2007.

7.0 PAN EVAPORATION

Average evaporation rates are used in the designing of LANL evaporation ponds and basins. However, evaporation is not measured at LANL. Since evaporation is a function of temperature, humidity, rainfall, solar radiation, and wind speed, the closest stations that can provide insight into evaporation rates at Los Alamos are at Abiquiu Dam and El Vado Dam. These data are collected by the Army Corps of Engineers and are made available through the National Centers for Environmental Information (formerly known as the National Climatic Data Center) website (NOAA 2016b). Abiquiu Dam is at 6260 feet elevation, 30 miles north of LANL, and El Vado Dam is at 6900 feet elevation, 60 miles north of Los Alamos. Both of these stations have long-term records (50 and 80 years, respectively), and are used for managing the reservoirs behind the dams.

Evaporation rates are measured in a Class A Pan, a cylinder with a diameter of 47.5 inches that has a depth of 10 inches. Evaporation is measured daily as the depth of water (in inches) evaporates from the pan. The measurement day begins with the pan filled to exactly 2 inches (5 centimeters) from the pan top. At the end of 24 hours, the amount of water to refill the pan to exactly 2 inches from its top is measured. If precipitation occurs in the 24-hour period, it is taken into account in calculating the evaporation. Pan evaporation is typically measured between March and October, when the water in the pan will not freeze.

The 1981–2010 average pan evaporation was calculated using daily measured evaporation values. The annual value at Abiquiu Dam is 59 inches and at El Vado Dam it is 47 inches. The value for Abiquiu Dam is similar to an expected value for White Rock since the elevation and summertime temperatures are very similar. The evaporation rate for Los Alamos would be expected to be higher than at El Vado Dam. El Vado Dam has a similar elevation to Los Alamos but the summertime temperatures are slightly cooler and the precipitation is greater than in Los Alamos. The monthly distribution of pan evaporation totals for Abiquiu Dam and El Vado Dam are presented in Figure 7-1. Highest monthly totals occur during the warmest months of the year.

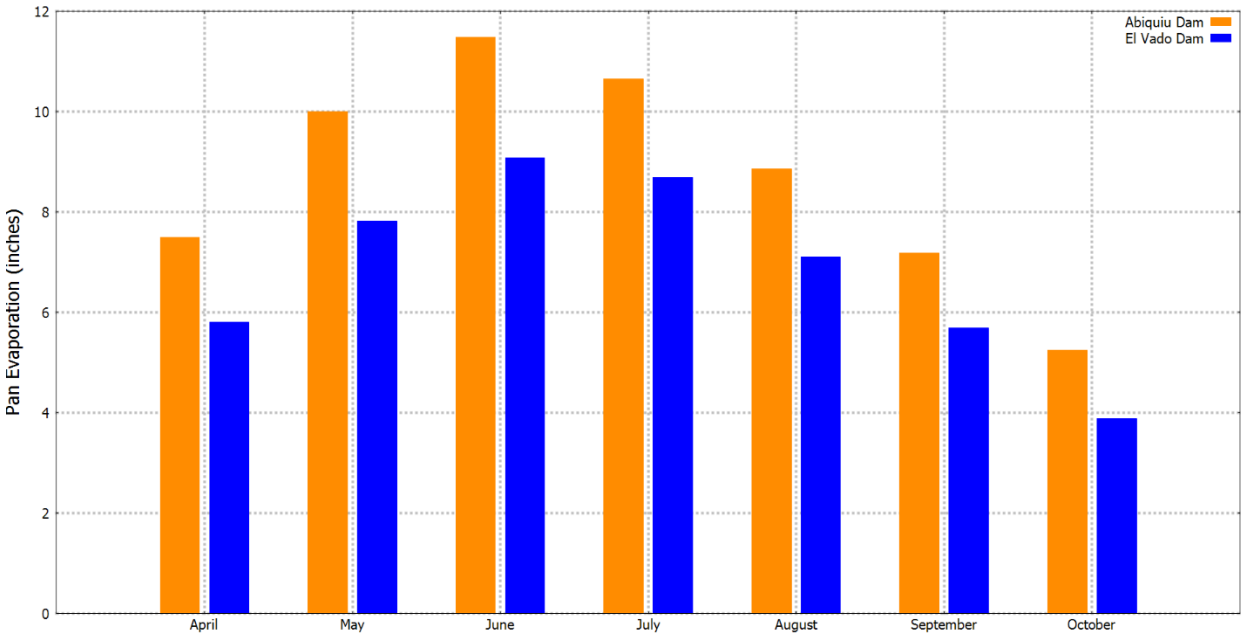

Figure 7-1: Monthly average pan evaporation at Abiquiu Dam and El Vado Dam (1981–2010).

8.0 INSOLATION

LANL measures the radiation components of the earth's surface energy budget (Figure 8-1) at ground level. LANL measures incoming and reflected solar radiation in the visible range of light, from 0.3–2.8 micrometers. Longwave radiation emitted by the atmosphere and the surface of the earth is measured in the infrared range from 3.5–50 micrometers. Incoming longwave radiation represents an integrated temperature of the atmosphere above the monitoring location whereas outgoing longwave radiation represents the temperature of the surface of the earth. Incoming solar radiation is measured at all LANL tower locations for use in LANL solar energy projects. These data can also be used in atmospheric dispersion calculations. Reflected solar radiation and longwave radiation (incoming and outgoing) are also measured at TA-6 and TA-54, and along with incoming solar radiation, can be used in calculating surface energy budgets and estimating evaporation.

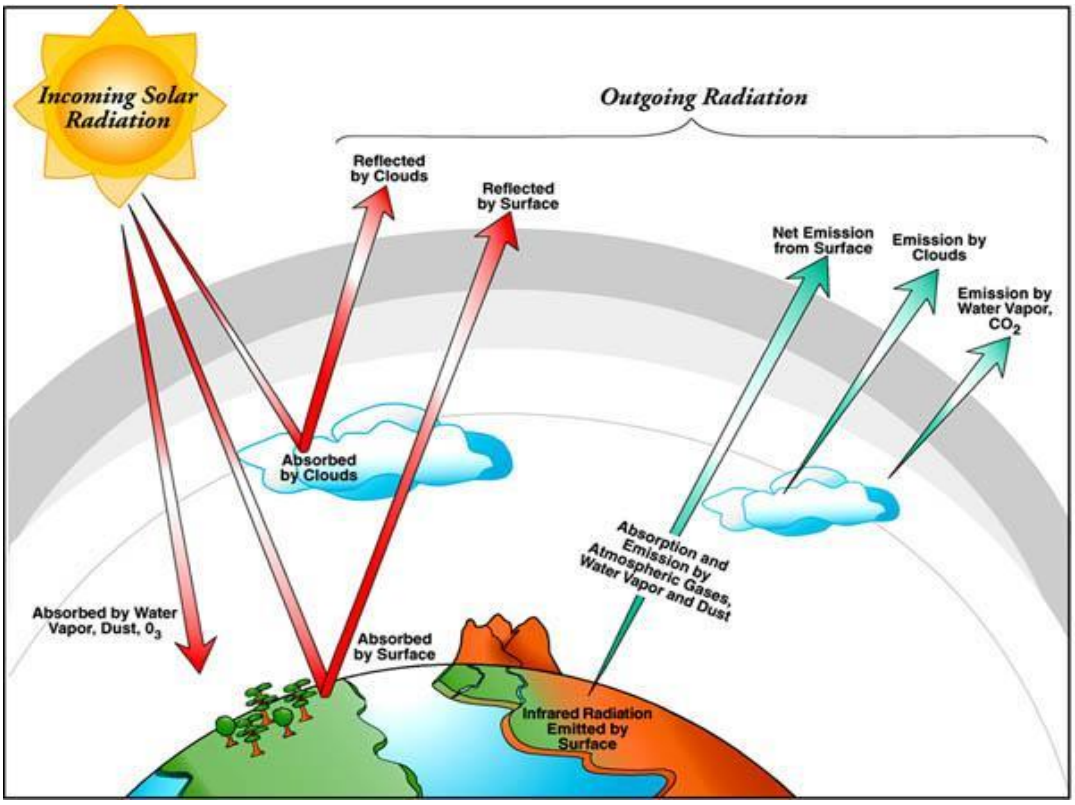

Figure 8-1: Conceptual diagram of incoming solar radiation and outgoing longwave (infrared) radiation (Youngman 2016).

Monthly average incoming solar radiation at all towers is presented in Table 8-1 and Figure 8-2. All of the towers have very similar values, except for TA-41. Los Alamos Canyon, the location of the TA-41 tower, is a very narrow (100 feet) and deep (300 feet) canyon where incoming solar radiation is partially blocked by the canyon walls throughout the year. Although the TA-5 MDCN tower is also located in the bottom of a canyon, Mortandad Canyon is very wide (~700 feet) and fairly shallow (~170 feet deep) at the tower location, so incoming solar radiation is not significantly blocked by canyon walls. TA-54 measures slightly greater amounts of incoming solar radiation in the summer due to less rainfall/cloudiness at this location compared with other tower locations.

Table 8-1: Monthly Average Incoming Solar Radiation in MJ/m²* (1994–2013)

	TA-6	TA-54	TA-49	TA-53	TA-41	TA-5 MDCN
January	11.9	12.1	12.0	11.7	2.7	12.3
February	15.1	15.3	15.2	14.9	8.4	14.9
March	19.6	20.1	19.9	19.4	17.4	19.7
April	23.3	24.0	23.6	23.1	21.3	23.5
May	26.2	27.3	26.9	26.3	23.6	26.1
June	27.6	28.7	28.3	27.9	24.5	27.3
July	23.6	25.0	24.5	24.1	20.3	24.0
August	21.7	23.1	22.6	22.2	18.8	21.9
September	20.2	20.9	20.5	20.1	17.8	20.5
October	16.5	16.9	16.8	16.4	11.3	16.5
November	12.6	12.9	12.7	12.5	3.7	13.0
December	10.6	10.7	10.6	10.4	2.0	10.4

* MJ/m^2 = megajoule per square meter.

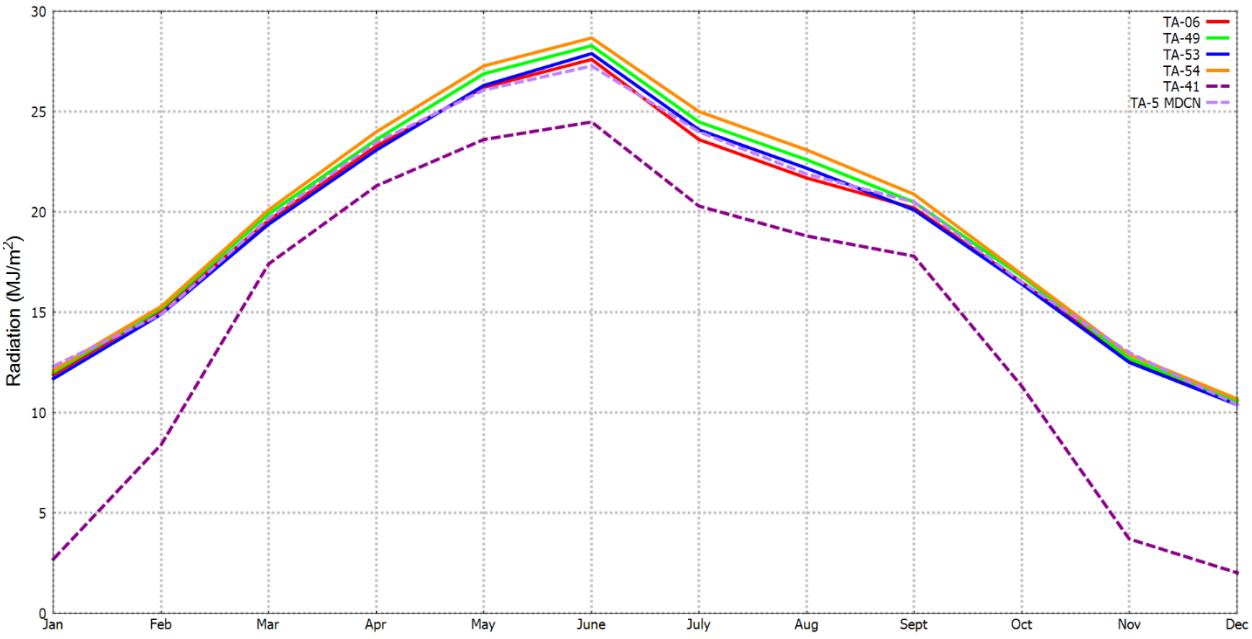

Figure 8-2: Monthly average incoming solar radiation (1994–2013).

The albedo of a surface (a measure of how much light that hits the surface is reflected without being absorbed; the "whiteness" of a surface) is calculated as the ratio of the reflected solar radiation/incoming solar radiation. Bare rocks and soils are more reflective of sunlight than green grasses and trees. The albedo at TA-54, 0.26, is greater than the albedo at TA-6, 0.22, due to the greater prevalence of bare and rocky soils at TA-54, in comparison with the greater amounts of green grasses and trees at TA-6.

The atmosphere and the surface both radiate energy in the long wavelengths, so the energy budget at the surface of the earth is measured as the sum of incoming shortwave and longwave radiation minus the reflected shortwave and outgoing longwave radiation. The monthly average for each radiation measurement at TA-6 and TA-54 are presented in Figures 8-3 and 8-4.

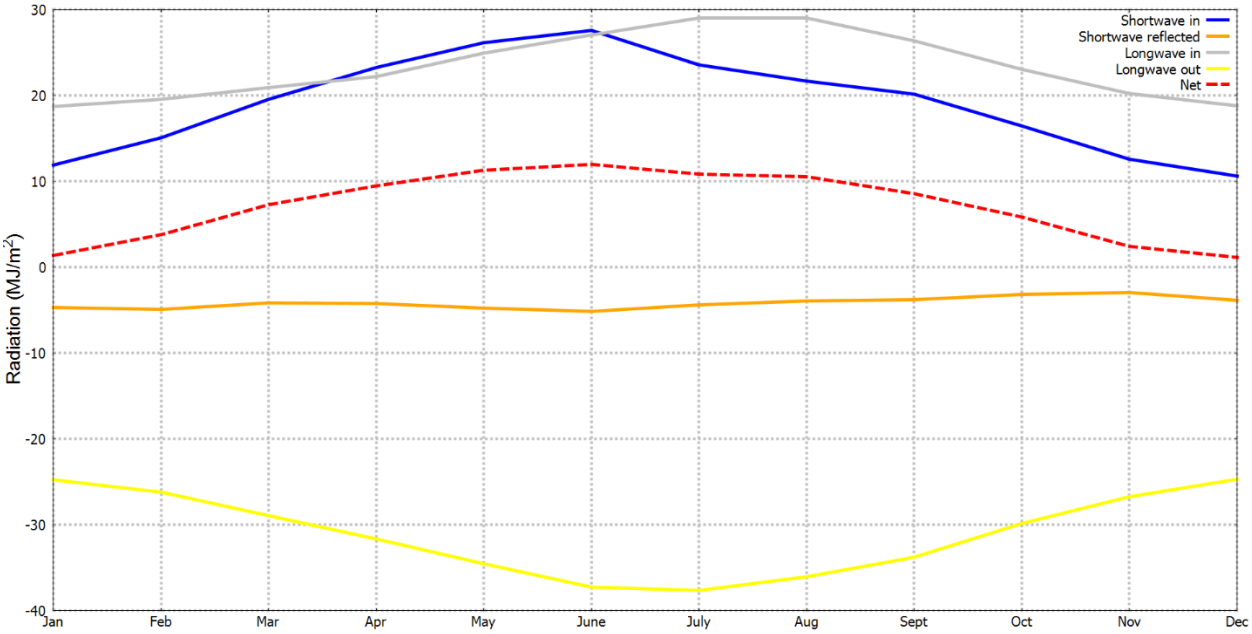

Figure 8-3: Monthly average surface radiation energy balance at TA-6 (1994–2013).

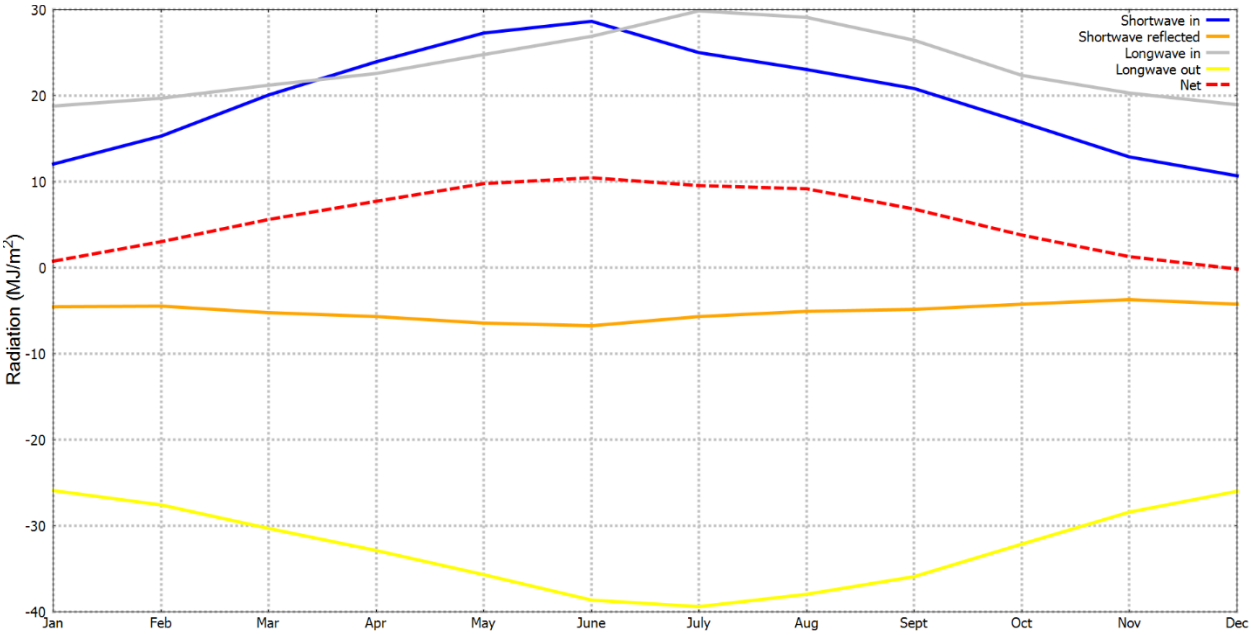

Figure 8-4: Monthly average surface radiation energy balance at TA-54 (1994–2013).

The maximum reflected shortwave radiation follows the pattern of incoming solar radiation, and peaks in June at both TA-6 and TA-54. Longwave radiation is a function of the temperature of the atmosphere or the ground surface and peaks in July as the maximum temperature of the atmosphere

and the surface lags behind the solar maximum. The maximum net positive radiative energy at the surface is measured in June with the net energy approaching zero in the colder winter months.

9.0 PRESSURE

The United States Standard Atmosphere is an atmospheric model of how the pressure, temperature, and density of the Earth's atmosphere changes over a wide range of altitudes or elevations. The standard atmospheric pressure is the weight of a column of air from sea level to the top of the atmosphere. At sea level, this pressure is 29.92 inches of mercury or 1013.3 millibars (mb). As the surface of the earth rises with terrain, there is less atmosphere above the ground, so the pressure at the elevated surface decreases. The standard atmospheric pressure is about 22.73 inches of mercury (770.0 mb) at the TA-6 elevation, 7424 feet above sea level. The air pressure at Los Alamos is ~76% of sea-level pressure. Pressure measurements are available for Los Alamos beginning in 1979 and for White Rock in 1992. Long-term averages are calculated for 1994–2013 following the convention for other meteorology parameters across the Laboratory.

Monthly mean atmospheric pressure is shown in Table 9-1 and Figure 9-1 for TA-6 and TA-54. Because TA-54 is about 900 feet lower than TA-6, the average pressures are about 25 mb higher than at TA-6. There is an annual cycle, with a summer maximum and a spring minimum. The spring minimum is caused by frequent midlatitude low-pressure storms. The summertime maximum is caused by the upper-atmosphere westerlies moving to the north and the subtropical high-pressure systems moving northward into the southern United States. Variations from the mean are greatest in the spring and winter seasons and least during the summer.

Table 9-1: Monthly Average Pressure at TA-6 and TA-54 in mb (1994–2013)

	TA-6	TA-54
January	774.4	800.9
February	773.2	799.4
March	773.1	799.1
April	772.8	798.5
May	774.8	800.2
June	777.0	802.0
July	779.9	804.8
August	780.1	805.1
September	778.8	804.0
October	776.8	802.5
November	776.2	802.3
December	774.4	800.9

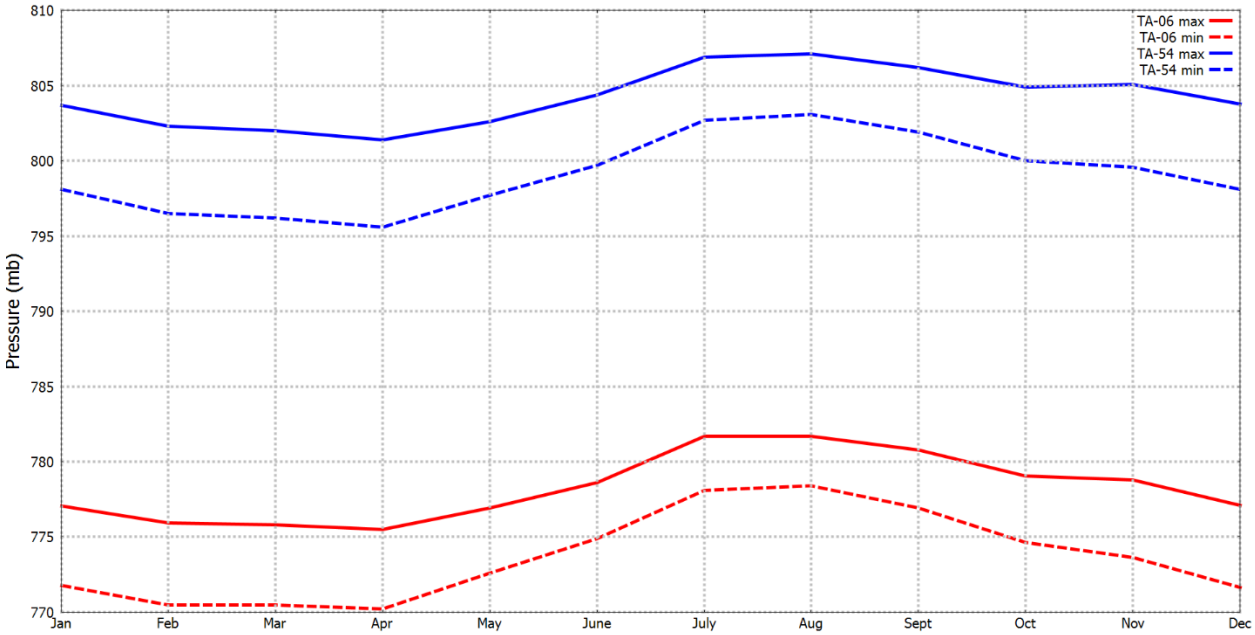

Figure 9-1: Monthly average maximum and minimum pressure at TA-6 and TA-54 (1994–2013).

Even though the average pressure is highest during the summer, the highest 15-minute pressure measurements tend to occur in the wintertime. High wintertime pressure readings can result from cold, arctic air high-pressure systems pushing their way into New Mexico from the Great Plains; the cold air is dense and so produces high pressure values. The highest 15 minute pressure measured at TA-6 is 792 mb; the highest 15 minute pressure measured at TA-54 is 819 mb. The lowest pressures recorded at TA-6 and TA-54 are 739 mb and 771 mb, respectively.

In addition to an annual cycle of pressure, there is a semi-diurnal (12 hour) cycle in pressure measurements, caused by the heating of the upper atmosphere by the sun. Hourly average pressure at TA-6 and TA-54 (minus 25 mb) demonstrate minimum values at 4 AM and 4 PM and maximum values at 9 AM and midnight (Figure 9-2).

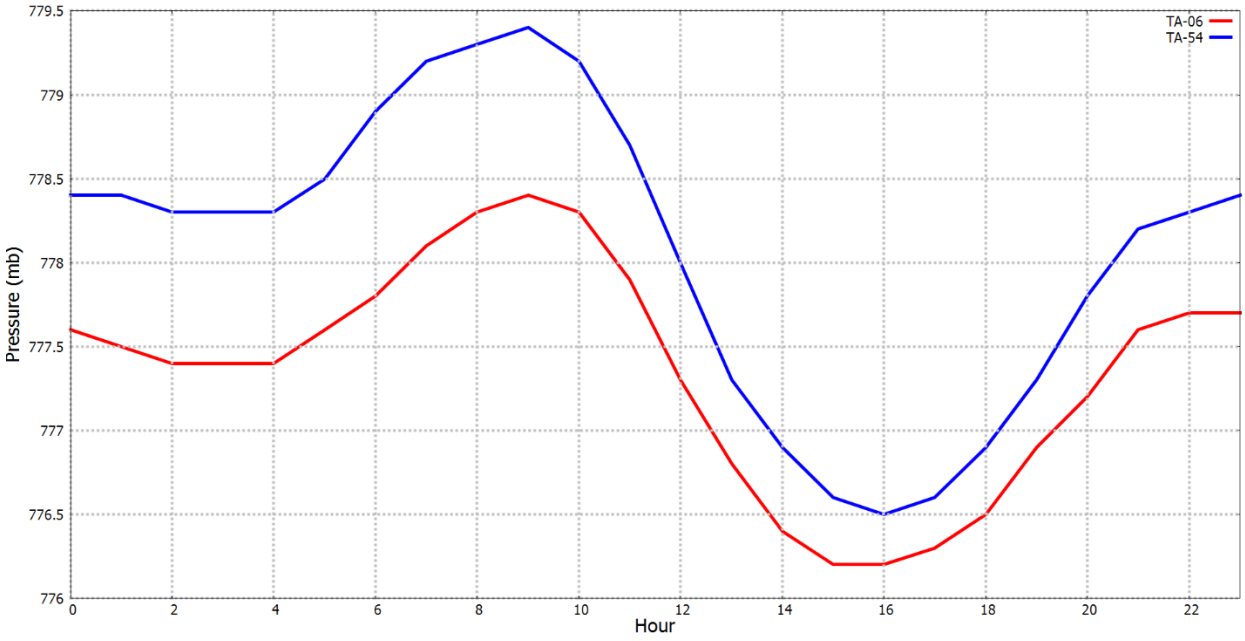

Figure 9-2: Hourly average pressure at TA-6 and TA-54 (minus 25 mb) during 2013.

10. CLIMATE TRENDS

In the last half of the twentieth century, greenhouse gas emissions from human activity have begun to make a long-term impact on the Earth's climate (IPCC 2013). The average combined land and ocean surface temperature has increased by 0.85°C from 1880–2012 and the global mean sea level rose by 0.19 meters from 1901–2010 (IPCC 2013). For the Southwest United States, temperatures from 2001–2010 were nearly 2°F above normal (Garfin et al. 2013). Temperatures are predicted to rise over the next century, snowfall is expected to decrease (due in part to rising temperatures), and extended droughts (with resulting wildland fires) are expected to be more severe (Melillo et al. 2014). In this section, the Los Alamos data are evaluated to determine what climate changes are being measured in Los Alamos. Other LANL data will be available in the future to further characterize climate changes in Los Alamos, including stormwater runoff and locations of bird species with altitude.

10.1 Temperature

Figure 10-1 shows the historical record of temperatures in Los Alamos from 1924–2015. The annual average temperature is the average of the daily high and low temperatures averaged over the year. One-year averages are shown in green in Figure 10-1. To aid in showing longer-term trends, the 5-year running mean (black) is also shown. The 5-year average shows the warm spell during the past 15 years is almost as extreme as the warm spell during the early-to-mid 1950s and is longer-lived.

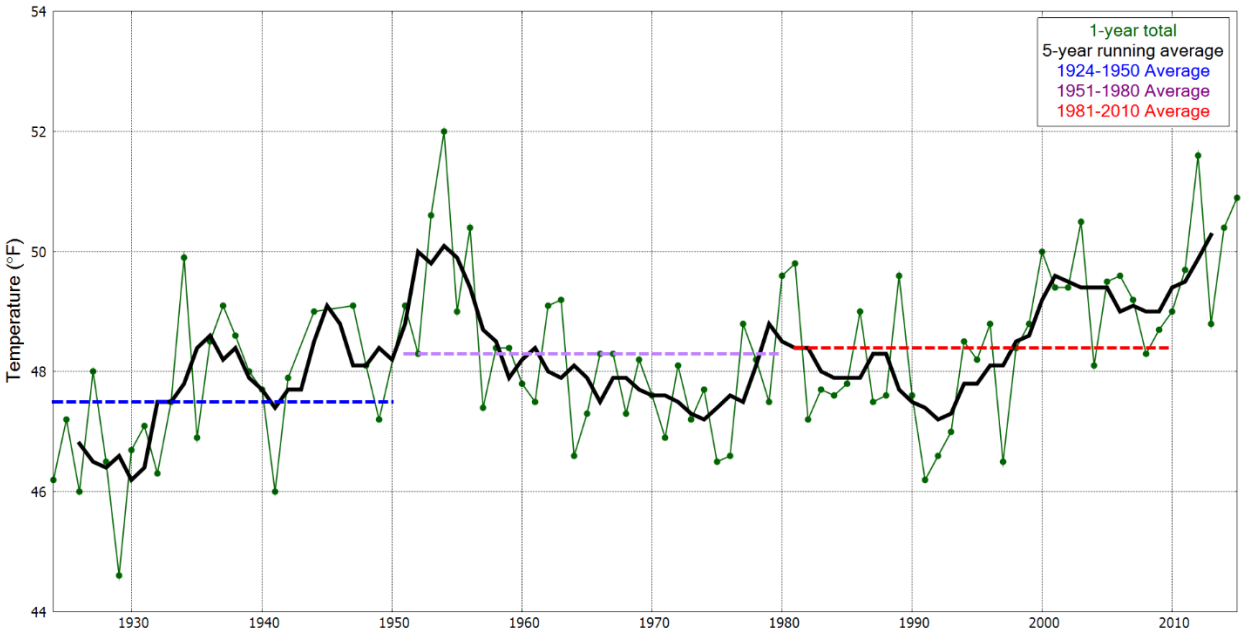

Figure 10-1: Temperature history for Los Alamos (1924–2015).

The average temperatures per decade, along with two times the standard error, are plotted in Figure 10-2 with the annual average temperatures for 2011–2015. Ninety-five percent of the annual average temperatures during each decade are found within the error bars. During the decades between 1960 and 2000, the annual average temperatures in Los Alamos vary only slightly from 48°F. During the 2001–2010 decade, the annual average temperature increased to above 49°F; this value can be considered a statistically significantly higher value than previous decades. The annual average temperatures from 2011–2015 continue to demonstrate a warmer climate for Los Alamos. This is consistent with predictions for a warming climate in the southwestern United States (IPCC 2013).

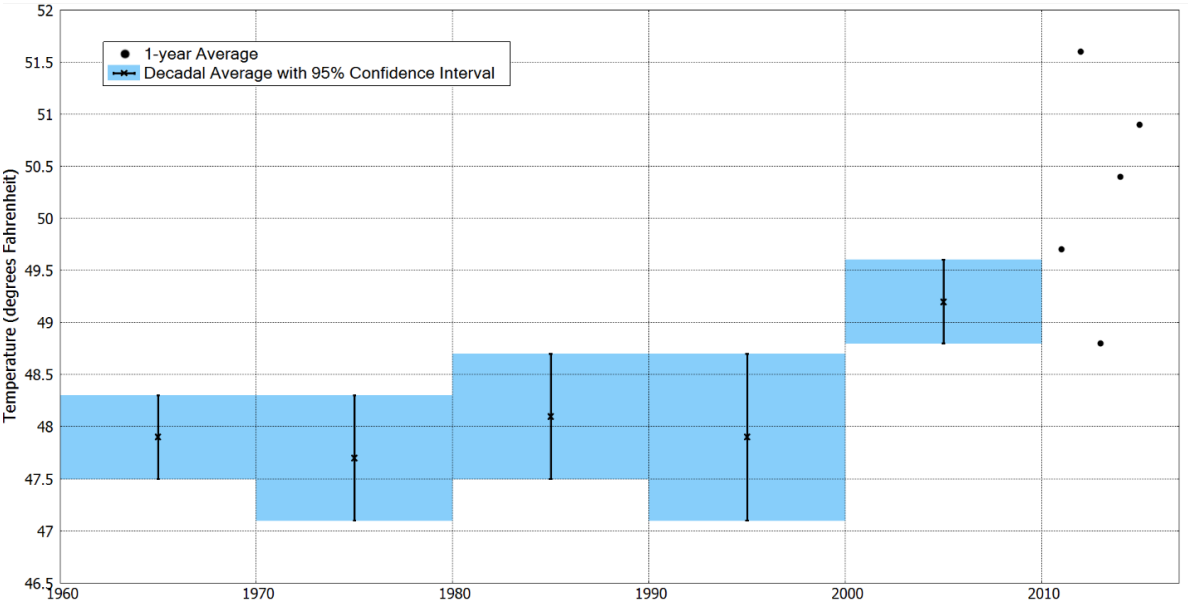

Figure 10-2: Decadal average temperatures and two times the standard error for Los Alamos (1960–2015).

When the seasonal impacts on the trend in annual temperatures are reviewed, no trends are indicated using a Mann-Kendall test in wintertime (December–February) maximum and minimum temperatures. Summertime (June–August) maximum, minimum, and average temperatures since 1990 demonstrate a positive trend (Figure 10-3). Fall and spring temperatures also demonstrate a positive trend, but not as strong as summer temperatures.

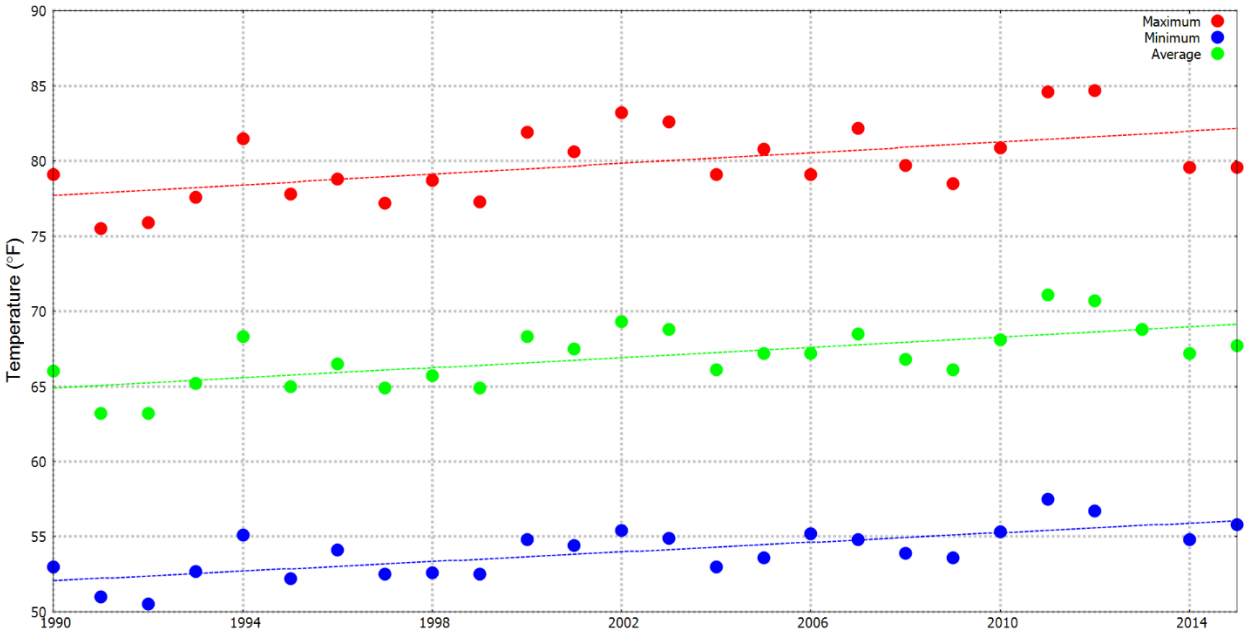

Figure 10-3: Annual average summertime temperatures for Los Alamos (1990–2015).

Five of the hottest summers on record have occurred since 2002. The highest summertime average temperature on record was 71.1°F, recorded during 2011. There is a positive trend (using a Mann-Kendall trend test) in the number of days with a maximum temperature greater than 90°F (Figure 10-4) and a negative trend in the number of days with a minimum temperature less than 0°F (Figure 10-5).

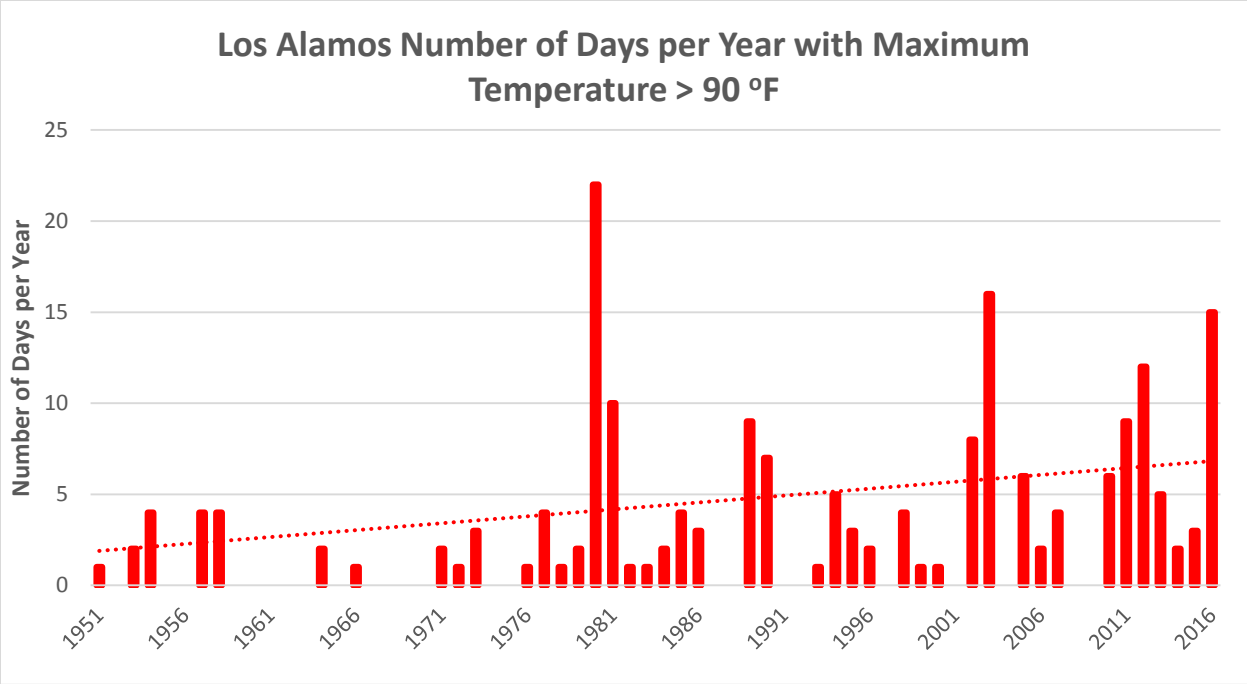

Figure 10-4: Number of days per year with maximum temperature above 90°F for Los Alamos.

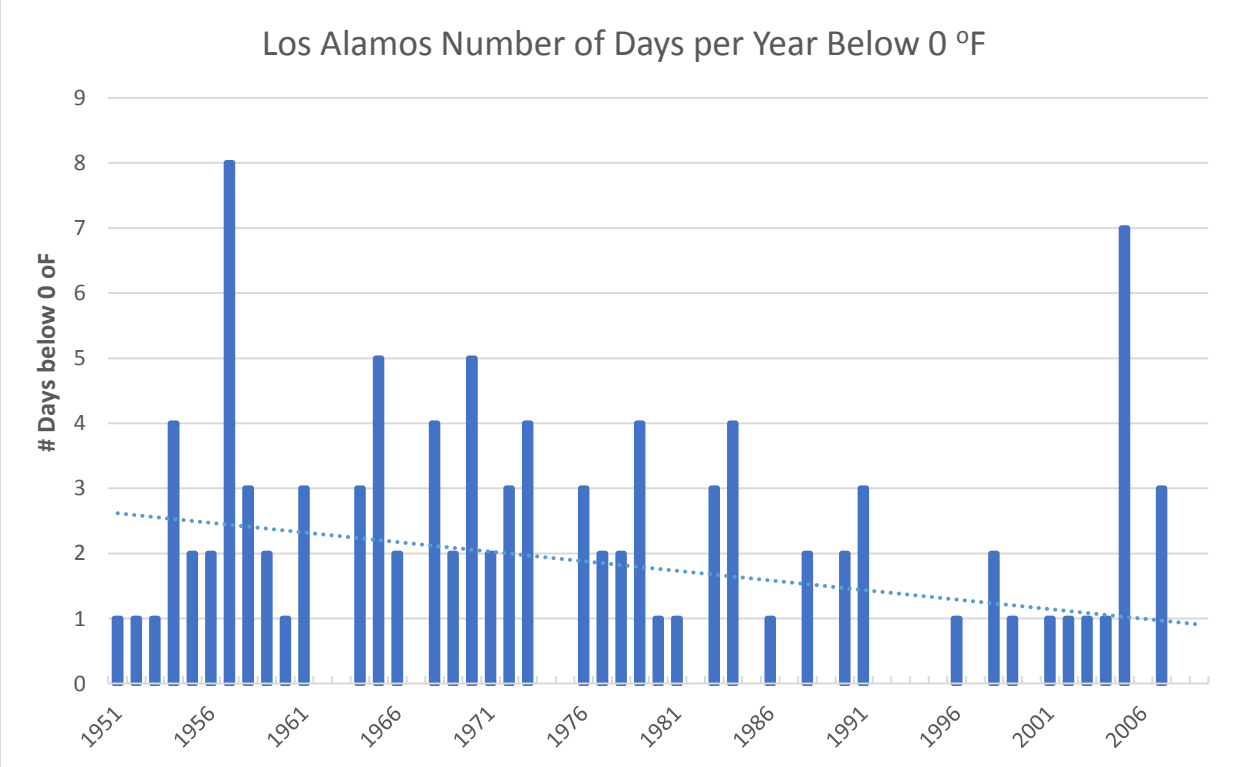

Figure 10-5: Number of days per year with minimum temperature less than 0°F for Los Alamos.

10.2 Precipitation

Figure 10-6 presents the historical record of the annual precipitation at Los Alamos. As with the historical temperature profile, the 5-year running mean and the 30-year normal values are also shown. There is a slight positive trend through the twentieth century followed by drought. The most recent drought spanned the years 1998 through 2014, although near-average precipitation years occurred from 2004–2010.

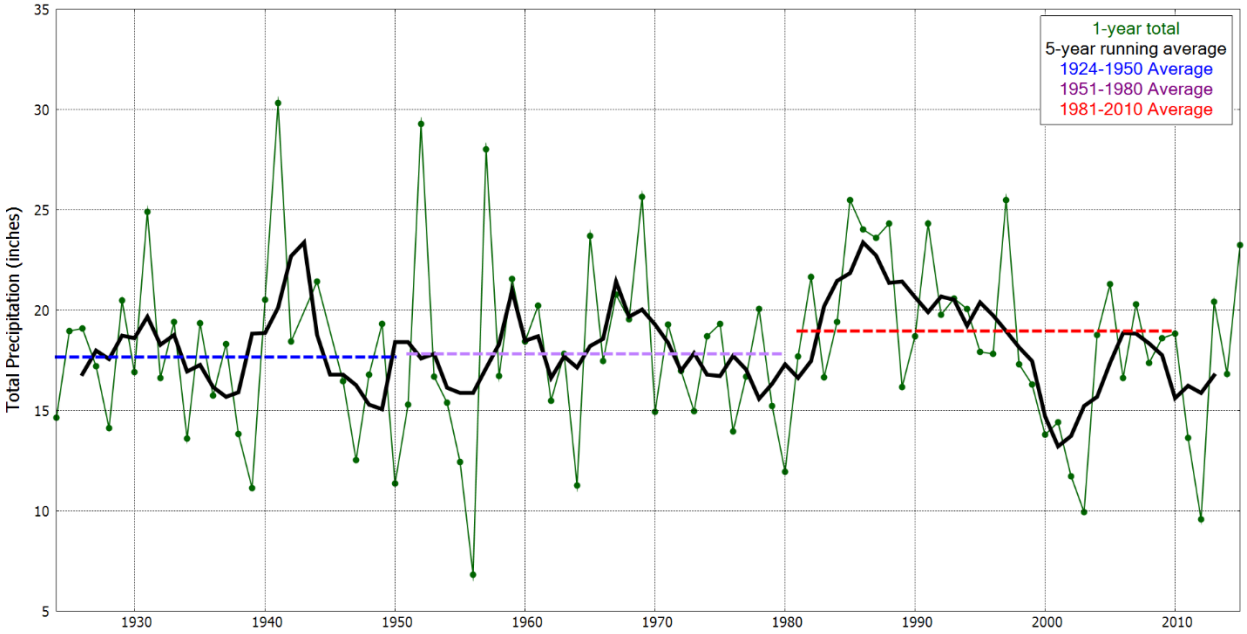

Figure 10-6: Precipitation history for Los Alamos (1924–2015).

Although the 30-year climatological average annual precipitation values have increased over the last century, this is in large part due to the very wet period of 1982 through 1997. Average annual precipitation exhibits a downward trend for 1981 to the present and snowfall (Figure 10-7) exhibits a downward trend for 1951 to the present. This is consistent with the impact of the most recent drought years.

In addition to the total amount of snowfall decreasing over the past 70 years, there is a decrease in the length of the snow season, the number of days between the average first measureable snowfall in the fall and the last measureable snowfall in the spring. Figure 10-8 presents the Julian date of the first and last snowfall of the year. In the early 1980s the first day of snow for the year was about November 4 and the final snowfall of the year was about April 18. Most recently, the first snowfall of the year occurs in late November and the final snowfall of the year occurs at the end of March. The snow season has decreased by about 6 weeks over the past 46 years.

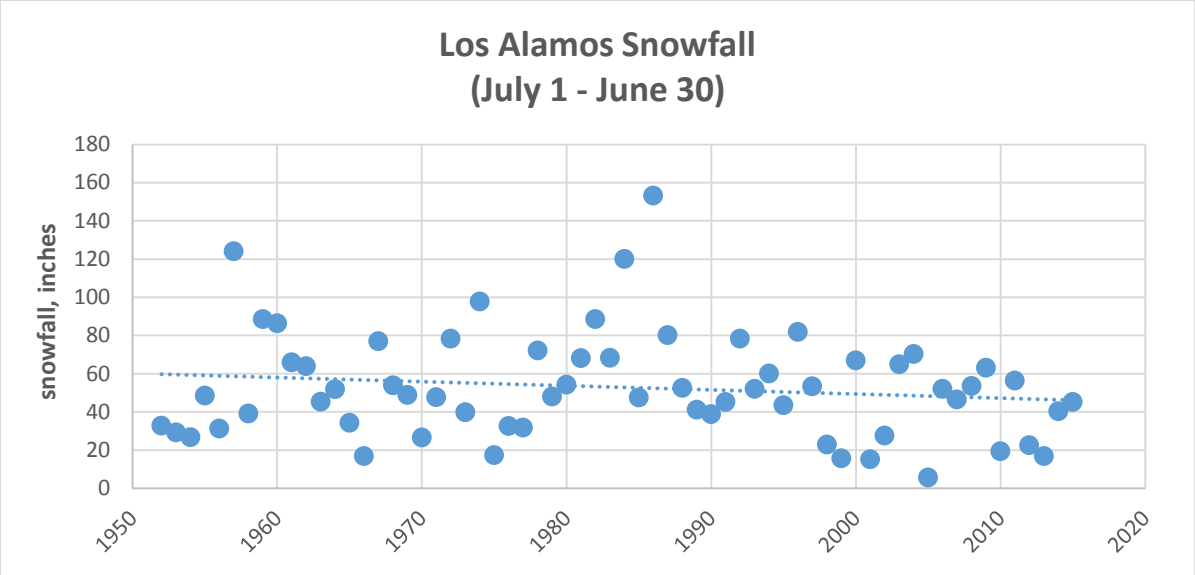

Figure 10-7: Annual snowfall (July 1–June 1) for Los Alamos (1951–2015).

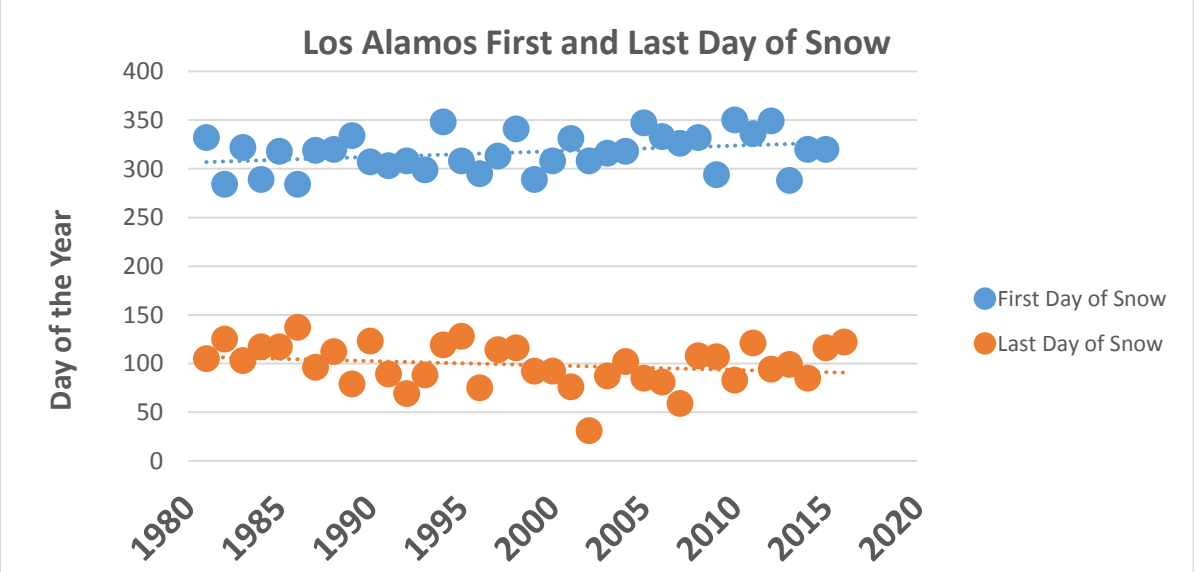

Figure 10-8: First and last day of snow for Los Alamos (1981–2016).

Los Alamos monsoon precipitation (June 15–September 30) does not demonstrate a significant trend from 1951 to the present, as seen in Figure 10-9. White Rock monsoon precipitation also does not demonstrate a significant trend from 1965 to the present.

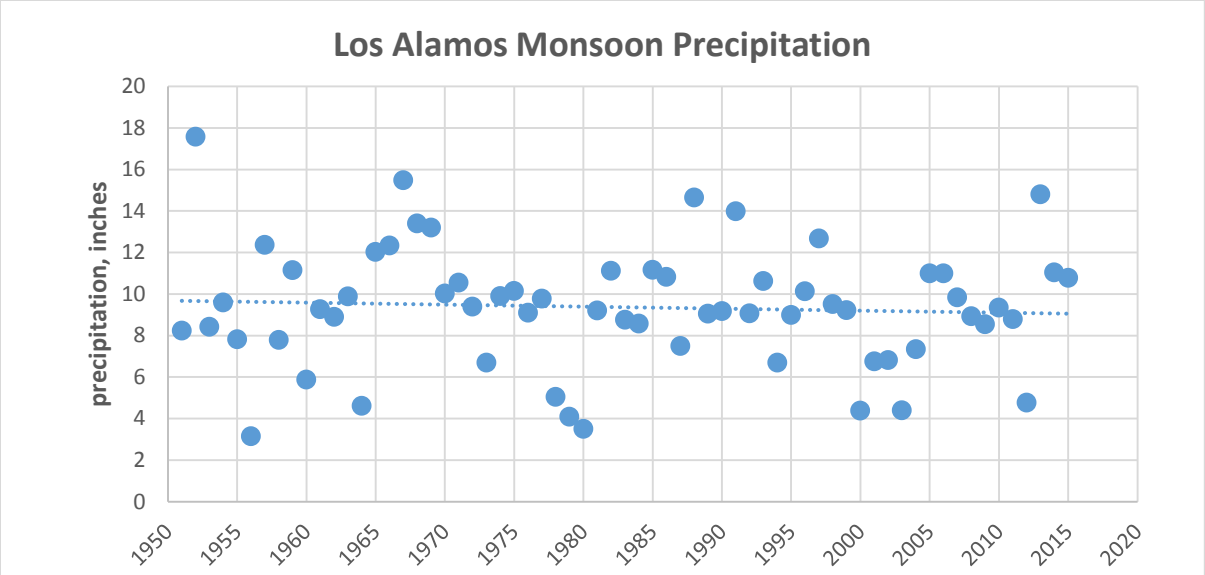

Figure 10-9: Annual monsoon precipitation for Los Alamos (1951–2015).

Heavy precipitation events demonstrate a very slight downward trend for the years 1951–present (Figure 10-10); however, the majority of the trend occurs during the 1981–present time period, reflecting the very wet years of the 1980s and the early 1990s followed by the drought from the late 1990s to 2014. The number of days per year with precipitation greater than 0.75 inches also demonstrates a downward trend. For the years 1951–2010, the number of days with precipitation >1.0 inches has stayed very steady, at about two days per year.

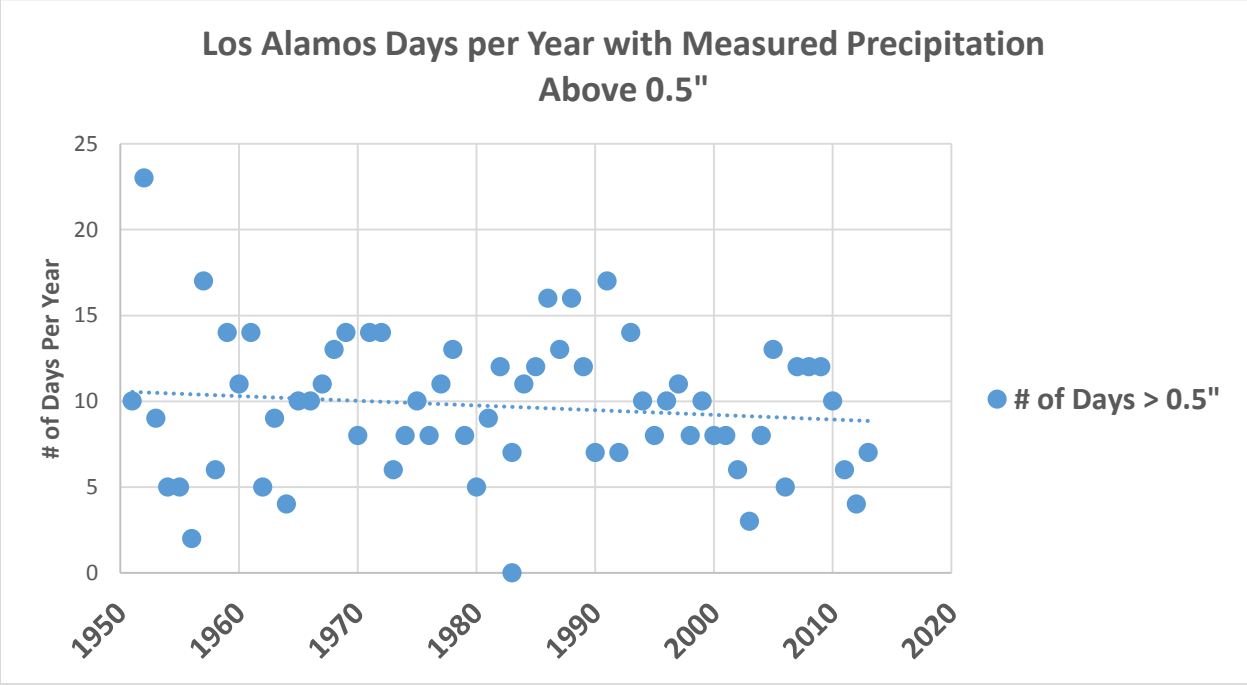

Figure 10-10: Number of days per year with measured rainfall (>0.5 inches) for Los Alamos (1951–2015).

10.3 Wind Speed

Wind speeds are fundamentally driven by temperature differences. The temperatures at the Earth's poles are increasing faster than at the equator, due to the impact of decreasing surface area of ice. This produces a decreased equator to pole temperature difference and this should produce a decrease in average wind speeds (Barton 2014). However, there are other forces that impact wind speed at the surface; primarily surface vegetation coverage. The impact of vegetation can be to slow down or speed up wind speeds due to frictional drag (Wever 2012). When there is more vegetation, wind speeds can be slowed; when there is less vegetation, winds can speed up.

The Laboratory has measured wind speed at the TA-6 tower location since 1992. TA-6 is approximately 7400 feet in elevation; at this altitude, in 1992, the vegetation consisted of ponderosa pine and mixed conifer forests. In the past 23 years, the landscape at the Laboratory at this altitude has changed dramatically. The impact of forest fires in 2000 and 2011, the drought and bark beetle infestations in the early 2000s, and the ongoing LANL forest thinning projects (to reduce wildland fire danger) have reduced the amount of ponderosa pine and mixed conifer forest coverage since 1992 (McKown et al. 2003).

Figure 10-11 presents the annual average 12-meter-height wind speed at TA-6 from 1994 through 2015. Essentially no change in wind speed was measured between 1994 and 2001. The annual average wind speed increased by approximately 20% between 2001 and 2014. The annual average wind speed decreased in 2015 by about 10%. The increase in wind speed between 2001 and 2014 is consistent with a reduction in frictional drag due to the reduction of ponderosa pine and mixed conifer forests at LANL.

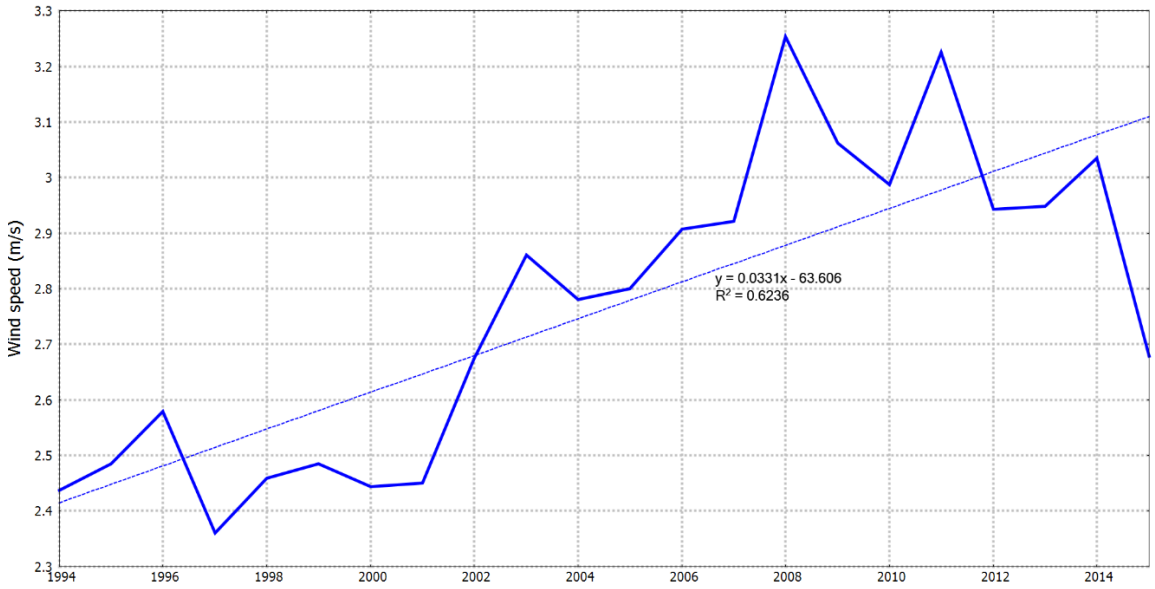

Figure 10-11: Annual average wind speed at 12 meters AGL at TA-6 (1994–2015).

Other factors may be influencing the change in average wind speed, however. The measured increase in surface temperatures should also lead to an increase in the vertical mixing of the atmosphere. Increased mixing of the atmosphere should produce higher surface wind speeds as higher wind speeds aloft are mixed to the surface. Further analysis of wind speed data is needed to determine the driving mechanisms for these observations.

11.0 REFERENCES

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APPENDIX
Monthly Average Temperatures and Precipitation for Los Alamos and White Rock

Los Alamos Temperatures

Data is for tower laarc. This file was obtained from the LANL Weather Machine http://weather.lanl.gov. Request made on Thursday, July 14 09:15:33 2016 MST.

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
January	1951	40.3	22.4
February	1951	41.3	24.2
March	1951	46.9	27.2
April	1951	56.0	34.7
May	1951	65.8	45.0
June	1951	75.7	53.9
July	1951	82.4	60.7
August	1951	76.3	56.4
September	1951	73.9	51.9
October	1951	61.4	43.0
November	1951	47.4	28.0
December	1951	38.2	23.8
January	1952	40.0	23.3
February	1952	41.8	21.4
March	1952	42.0	23.4
April	1952	56.6	35.6
May	1952	65.4	45.4
June	1952	79.2	57.7
July	1952	79.5	56.3
August	1952	78.2	57.0
September	1952	73.4	50.4
October	1952	67.0	42.1
November	1952	42.6	24.8
December	1952	36.1	19.5
January	1953	49.1	26.0
February	1953	43.6	21.7
March	1953	53.3	31.1
April	1953	58.8	35.7
May	1953	63.0	41.3
June	1953	81.3	57.0
July	1953	82.1	58.9
August	1953	78.7	55.6
September	1953	78.0	52.4
October	1953	63.5	41.1
November	1953	51.8	31.2
December	1953	38.2	20.0
January	1954	42.9	24.3

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
February	1954	53.2	29.8
March	1954	47.8	27.9
April	1954	65.6	42.9
May	1954	67.9	46.0
June	1954	79.6	55.0
July	1954	81.3	58.1
August	1954	78.4	55.5
September	1954	74.8	52.6
October	1954	65.7	43.4
November	1954	55.1	32.1
December	1954	43.2	23.3
January	1955	36.8	19.4
February	1955	37.1	17.9
March	1955	49.3	28.8
April	1955	55.7	35.3
May	1955	64.0	43.4
June	1955	76.4	52.2
July	1955	79.1	56.3
August	1955	77.7	56.4
September	1955	76.0	52.2
October	1955	66.9	42.4
November	1955	50.9	28.7
December	1955	44.4	25.1
January	1956	44.9	27.0
February	1956	38.6	19.5
March	1956	52.7	30.0
April	1956	56.5	36.1
May	1956	70.8	50.2
June	1956	80.2	58.3
July	1956	79.3	58.5
August	1956	76.8	56.5
September	1956	80.0	51.5
October	1956	64.9	39.8
November	1956	47.8	22.5
December	1956	43.4	20.8
January	1957	40.1	22.4
February	1957	49.5	29.3

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
March	1957	48.6	28.4
April	1957	55.6	31.4
May	1957	61.1	39.0
June	1957	77.4	51.1
July	1957	79.8	55.7
August	1957	75.4	52.6
September	1957	73.0	46.7
October	1957	56.3	36.6
November	1957	41.2	20.7
December	1957	42.9	21.1
January	1958	38.9	16.9
February	1958	45.4	23.6
March	1958	40.8	22.2
April	1958	52.6	30.5
May	1958	69.5	43.8
June	1958	79.5	53.2
July	1958	81.9	54.9
August	1958	78.6	54.2
September	1958	70.9	49.4
October	1958	60.4	39.1
November	1958	51.0	28.5
December	1958	48.5	24.6
January	1959	41.3	19.9
February	1959	41.2	21.0
March	1959	49.2	24.5
April	1959	57.8	33.7
May	1959	66.5	43.3
June	1959	78.3	54.0
July	1959	79.3	55.9
August	1959	76.2	55.5
September	1959	74.0	49.1
October	1959	59.7	37.4
November	1959	49.2	25.2
December	1959	43.8	23.2
January	1960	35.1	14.3
February	1960	35.9	16.5
March	1960	51.3	28.2
April	1960	61.0	35.5
May	1960	66.5	42.4
June	1960	78.8	54.6
July	1960	79.9	55.6
August	1960	80.1	54.6
September	1960	73.9	48.7
October	1960	59.9	37.2
November	1960	51.2	28.1
December	1960	38.4	17.8
January	1961	40.6	16.8
February	1961	44.7	22.0
March	1961	48.0	27.4
April	1961	56.2	32.2
May	1961	68.6	43.2
June	1961	78.5	51.7
July	1961	81.4	54.5
August	1961	76.4	53.7
September	1961	69.6	45.1
October	1961	63.0	38.2
November	1961	44.6	26.0
December	1961	38.2	16.6
January	1962	37.8	16.0
February	1962	45.9	26.1
March	1962	45.1	23.0
April	1962	63.1	36.8
May	1962	69.1	44.1
June	1962	77.2	50.7
July	1962	78.1	53.9
August	1962	81.7	55.9
September	1962	71.1	49.2
October	1962	63.7	40.0
November	1962	52.0	29.9
December	1962	43.9	21.7
January	1963	36.6	12.9
February	1963	44.0	21.2
March	1963	48.9	25.5
April	1963	59.7	34.3
May	1963	72.3	47.0
June	1963	76.7	50.2
July	1963	82.9	58.2
August	1963	76.4	54.2
September	1963	74.1	50.1
October	1963	66.2	43.1
November	1963	51.9	29.6
December	1963	42.6	19.2

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
January	1964	37.7	13.9
February	1964	34.6	13.0
March	1964	45.4	23.2
April	1964	54.3	30.9
May	1964	68.2	41.9
June	1964	76.7	50.6
July	1964	81.1	57.0
August	1964	78.1	54.9
September	1964	70.4	48.2
October	1964	64.8	39.2
November	1964	48.4	25.8
December	1964	39.2	18.8
January	1965	41.2	20.1
February	1965	41.4	17.6
March	1965	44.4	23.0
April	1965	57.4	34.1
May	1965	64.7	39.7
June	1965	73.3	47.5
July	1965	79.4	55.8
August	1965	76.3	52.9
September	1965	67.3	45.2
October	1965	64.6	39.0
November	1965	52.6	30.8
December	1965	42.3	21.4
January	1966	35.3	14.3
February	1966	36.5	15.1
March	1966	52.4	28.1
April	1966	59.8	34.2
May	1966	71.2	44.3
June	1966	75.9	51.2
July	1966	82.1	59.3
August	1966	76.0	53.8
September	1966	71.7	48.9
October	1966	62.3	37.9
November	1966	52.3	31.4
December	1966	40.5	21.2
January	1967	41.7	18.1
February	1967	45.3	23.1
March	1967	56.1	32.3
April	1967	59.3	34.9
May	1967	66.1	40.8
June	1967	73.6	50.5
July	1967	79.4	56.7
August	1967	74.2	52.9
September	1967	68.8	47.8
October	1967	63.7	39.4
November	1967	51.4	30.4
December	1967	34.7	15.1
January	1968	40.4	19.4
February	1968	44.6	25.4
March	1968	48.4	28.6
April	1968	53.3	30.5
May	1968	65.0	41.9
June	1968	79.0	52.8
July	1968	77.1	55.3
August	1968	71.9	52.3
September	1968	71.3	46.6
October	1968	63.7	39.2
November	1968	46.1	26.6
December	1968	38.8	16.7
January	1969	43.1	24.7
February	1969	42.1	22.2
March	1969	43.7	21.2
April	1969	59.1	35.6
May	1969	68.7	44.4
June	1969	74.1	49.2
July	1969	80.5	58.1
August	1969	79.7	57.3
September	1969	70.4	49.0
October	1969	55.3	35.4
November	1969	47.5	26.4
December	1969	42.2	24.6
January	1970	39.4	17.7
February	1970	46.4	26.1
March	1970	44.3	24.1
April	1970	54.6	31.2
May	1970	69.0	44.7
June	1970	74.1	50.0
July	1970	79.8	55.9
August	1970	78.8	56.4
September	1970	69.4	46.8
October	1970	55.0	34.2

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
November	1970	50.1	27.4
December	1970	43.9	20.5
January	1971	41.1	17.2
February	1971	42.0	19.9
March	1971	52.5	25.7
April	1971	57.1	32.6
May	1971	65.8	41.1
June	1971	78.1	52.7
July	1971	79.5	55.6
August	1971	76.0	52.3
September	1971	69.1	45.2
October	1971	57.1	35.1
November	1971	47.8	26.4
December	1971	37.3	17.1
January	1972	41.7	17.7
February	1972	48.1	23.9
March	1972	58.5	33.2
April	1972	62.2	36.6
May	1972	67.7	43.1
June	1972	76.7	52.6
July	1972	79.2	55.5
August	1972	74.5	52.9
September	1972	68.8	47.7
October	1972	56.8	39.2
November	1972	39.6	21.3
December	1972	38.4	18.4
January	1973	35.8	16.4
February	1973	39.3	20.9
March	1973	42.6	24.4
April	1973	51.1	28.2
May	1973	64.9	41.8
June	1973	76.7	50.8
July	1973	78.7	55.9
August	1973	80.3	55.7
September	1973	71.2	47.7
October	1973	62.3	39.7
November	1973	52.1	31.0
December	1973	42.0	20.7
January	1974	36.4	16.2
February	1974	41.0	17.3
March	1974	55.3	31.5

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
April	1974	58.8	33.1
May	1974	72.7	46.2
June	1974	80.6	54.0
July	1974	78.9	55.2
August	1974	74.7	52.1
September	1974	68.4	45.5
October	1974	56.8	39.2
November	1974	47.7	26.6
December	1974	37.2	16.4
January	1975	38.7	14.9
February	1975	39.7	18.5
March	1975	47.2	27.2
April	1975	53.2	30.0
May	1975	65.7	39.7
June	1975	77.2	49.6
July	1975	78.1	53.7
August	1975	79.0	54.0
September	1975	67.9	46.0
October	1975	62.2	36.2
November	1975	48.4	25.1
December	1975	41.8	20.0
January	1976	42.2	15.1
February	1976	50.0	24.3
March	1976	50.7	24.1
April	1976	59.0	31.8
May	1976	67.4	40.4
June	1976	78.9	48.8
July	1976	80.3	50.9
August	1976	76.3	49.3
September	1976	69.1	43.7
October	1976	58.6	30.2
November	1976	49.6	20.8
December	1976	41.4	14.5
January	1977	36.3	12.3
February	1977	44.9	20.1
March	1977	47.9	22.4
April	1977	59.0	34.8
May	1977	67.9	42.9
June	1977	81.2	53.8
July	1977	79.2	54.4
August	1977	78.2	55.8

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
September	1977	73.4	49.4
October	1977	65.2	38.7
November	1977	51.8	29.1
December	1977	45.5	24.5
January	1978	38.7	20.4
February	1978	41.2	20.3
March	1978	51.5	28.9
April	1978	60.4	34.5
May	1978	64.0	40.0
June	1978	78.5	53.8
July	1978	83.2	56.1
August	1978	78.8	52.0
September	1978	72.1	46.4
October	1978	64.4	39.8
November	1978	46.7	29.6
December	1978	36.7	15.8
January	1979	32.9	12.4
February	1979	41.9	19.8
March	1979	48.7	26.9
April	1979	58.5	34.2
May	1979	63.9	39.7
June	1979	75.4	48.8
July	1979	82.0	54.8
August	1979	77.9	51.6
September	1979	75.8	48.7
October	1979	66.8	41.2
November	1979	43.5	22.3
December	1979	46.9	22.1
January	1980	42.8	24.1
February	1980	47.8	24.6
March	1980	47.8	23.2
April	1980	56.8	30.3
May	1980	65.3	37.8
June	1980	84.5	54.3
July	1980	87.3	55.4
August	1980	81.4	53.6
September	1980	74.8	49.0
October	1980	61.4	34.0
November	1980	50.2	25.6
December	1980	50.1	26.8
January	1981	46.1	22.1
February	1981	50.4	22.4
March	1981	47.7	25.6
April	1981	64.6	36.7
May	1981	66.3	40.4
June	1981	82.6	51.7
July	1981	82.5	54.4
August	1981	78.4	52.0
September	1981	72.7	48.6
October	1981	60.5	36.8
November	1981	54.3	29.2
December	1981	46.3	22.6
January	1982	39.4	18.3
February	1982	42.4	18.9
March	1982	49.7	26.6
April	1982	58.8	33.6
May	1982	65.8	39.1
June	1982	78.5	50.0
July	1982	81.8	55.3
August	1982	79.0	54.1
September	1982	69.8	47.6
October	1982	59.9	33.9
November	1982	45.7	27.0
December	1982	36.7	19.5
January	1983	41.9	20.6
February	1983	43.9	22.3
March	1983	48.5	27.2
April	1983	52.8	27.9
May	1983	64.8	36.9
June	1983	76.7	48.3
July	1983	82.1	54.2
August	1983	80.0	54.4
September	1983	77.2	49.0
October	1983	63.0	37.8
November	1983	49.8	26.1
December	1983	39.1	18.9
January	1984	39.2	14.3
February	1984	45.2	19.4
March	1984	49.0	24.3
April	1984	56.2	29.4
May	1984	75.0	45.9
June	1984	78.9	49.6

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
July	1984	83.5	54.6
August	1984	78.9	53.1
September	1984	73.1	47.1
October	1984	52.7	33.0
November	1984	48.7	27.1
December	1984	40.2	21.8
January	1985	36.9	16.7
February	1985	41.4	17.4
March	1985	49.1	27.4
April	1985	62.0	34.8
May	1985	67.3	43.1
June	1985	78.7	50.9
July	1985	81.7	54.4
August	1985	79.2	53.3
September	1985	69.1	44.0
October	1985	60.9	37.0
November	1985	49.4	27.1
December	1985	43.8	20.0
January	1986	51.1	24.1
February	1986	47.8	24.1
March	1986	57.1	30.4
April	1986	60.5	34.7
May	1986	68.0	41.2
June	1986	74.5	49.5
July	1986	79.9	53.3
August	1986	81.3	52.6
September	1986	69.8	44.2
October	1986	58.0	34.7
November	1986	47.1	26.6
December	1986	41.2	21.1
January	1987	37.1	17.2
February	1987	41.3	21.6
March	1987	47.9	23.5
April	1987	61.0	33.5
May	1987	65.4	40.5
June	1987	78.6	50.9
July	1987	81.9	55.8
August	1987	75.3	53.3
September	1987	70.5	46.9
October	1987	66.4	40.8
November	1987	48.0	27.2
December	1987	36.7	17.8
January	1988	35.1	14.6
February	1988	46.2	22.9
March	1988	50.5	24.7
April	1988	60.1	33.9
May	1988	66.4	40.3
June	1988	77.0	51.4
July	1988	79.3	54.8
August	1988	74.7	54.6
September	1988	69.4	47.1
October	1988	65.2	41.7
November	1988	48.6	26.8
December	1988	39.9	17.3
January	1989	38.5	17.0
February	1989	43.4	21.8
March	1989	58.0	31.7
April	1989	66.5	38.9
May	1989	73.3	46.2
June	1989	78.3	51.7
July	1989	81.3	55.4
August	1989	76.7	52.2
September	1989	73.2	47.6
October	1989	61.3	36.6
November	1989	52.4	27.1
December	1989	40.8	17.7
January	1990	38.2	16.5
February	1990	41.6	20.4
March	1990	51.6	29.2
April	1990	59.2	35.8
May	1990	66.8	42.0
June	1990	84.2	55.1
July	1990	76.9	53.2
August	1990	76.3	50.8
September	1990	72.3	48.2
October	1990	62.3	36.0
November	1990	48.5	26.8
December	1990	34.8	13.3
January	1991	34.6	14.7
February	1991	45.8	23.9
March	1991	46.9	25.5
April	1991	59.1	31.9

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
May	1991	68.8	40.7
June	1991	75.2	48.3
July	1991	77.2	52.2
August	1991	74.0	52.3
September	1991	68.0	45.5
October	1991	62.9	37.6
November	1991	43.4	23.2
December	1991	36.6	18.9
January	1992	35.0	15.0
February	1992	41.0	23.7
March	1992	51.0	29.5
April	1992	63.3	36.6
May	1992	66.3	42.1
June	1992	74.0	48.4
July	1992	77.7	52.3
August	1992	75.8	50.9
September	1992	72.9	46.8
October	1992	65.2	39.4
November	1992	41.4	20.6
December	1992	33.9	13.6
January	1993	37.8	19.7
February	1993	39.1	23.6
March	1993	50.0	27.6
April	1993	59.5	34.3
May	1993	66.8	40.3
June	1993	78.0	50.3
July	1993	81.6	55.2
August	1993	73.3	52.6
September	1993	70.9	45.0
October	1993	59.7	32.9
November	1993	45.4	22.6
December	1993	41.1	18.9
January	1994	41.9	17.9
February	1994	41.1	19.0
March	1994	51.6	28.1
April	1994	57.5	33.7
May	1994	67.5	42.7
June	1994	82.6	55.3
July	1994	82.3	55.7
August	1994	79.6	54.4
September	1994	73.8	47.2
October	1994	59.1	34.6
November	1994	46.1	24.1
December	1994	43.0	22.1
January	1995	37.4	18.7
February	1995	50.0	28.1
March	1995	50.7	27.2
April	1995	55.4	30.8
May	1995	63.5	39.3
June	1995	73.7	48.1
July	1995	80.6	54.1
August	1995	79.0	54.4
September	1995	71.1	46.3
October	1995	66.2	35.7
November	1995	53.8	27.9
December	1995	42.5	21.4
January	1996	39.8	18.3
February	1996	48.2	24.7
March	1996	51.6	25.6
April	1996	62.2	34.0
May	1996	77.7	48.1
June	1996	80.3	53.5
July	1996	78.5	55.3
August	1996	77.8	53.6
September	1996	68.2	43.0
October	1996	57.7	34.4
November	1996	49.5	27.0
December	1996	42.0	18.8
January	1997	35.6	15.9
February	1997	39.2	20.6
March	1997	55.8	27.7
April	1997	53.6	29.7
May	1997	67.0	42.2
June	1997	75.5	49.9
July	1997	80.0	54.3
August	1997	76.2	53.3
September	1997	72.1	49.2
October	1997	60.7	34.5
November	1997	45.3	24.2
December	1997	35.0	15.6
January	1998	40.7	20.0
February	1998	40.3	21.1

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
March	1998	49.3	25.5
April	1998	55.2	30.0
May	1998	71.8	43.1
June	1998	79.5	50.2
July	1998	79.0	54.7
August	1998	77.6	52.9
September	1998	77.9	50.8
October	1998	59.4	36.7
November	1998	51.5	28.5
December	1998	44.0	20.3
January	1999	45.9	22.7
February	1999	50.7	23.0
March	1999	54.2	28.6
April	1999	55.7	30.5
May	1999	65.3	40.2
June	1999	75.7	49.3
July	1999	79.0	54.9
August	1999	77.0	53.2
September	1999	72.0	45.0
October	1999	65.6	36.2
November	1999	58.4	29.0
December	1999	40.8	17.6
January	2000	44.8	21.8
February	2000	50.0	25.3
March	2000	51.7	28.0
April	2000	63.5	35.7
May	2000	76.3	46.0
June	2000	80.6	53.0
July	2000	83.1	55.8
August	2000	81.8	55.6
September	2000	77.3	50.9
October	2000	57.0	38.1
November	2000	39.4	21.9
December	2000	39.6	21.0
January	2001	35.2	17.1
February	2001	41.9	23.5
March	2001	49.4	28.4
April	2001	61.3	36.3
May	2001	71.4	46.3
June	2001	81.0	53.3
July	2001	83.0	56.8
August	2001	77.9	53.1
September	2001	76.9	48.6
October	2001	66.2	38.1
November	2001	51.1	29.5
December	2001	39.7	18.5
January	2002	40.5	19.1
February	2002	43.6	19.2
March	2002	53.2	23.8
April	2002	67.1	38.3
May	2002	73.3	44.5
June	2002	84.5	55.4
July	2002	82.5	55.8
August	2002	82.7	55.1
September	2002	71.4	47.7
October	2002	58.8	36.1
November	2002	46.6	27.0
December	2002	37.2	19.0
January	2003	47.6	26.8
February	2003	42.2	22.7
March	2003	50.9	27.8
April	2003	60.6	34.4
May	2003	71.7	44.0
June	2003	78.9	50.3
July	2003	88.5	59.3
August	2003	80.4	55.0
September	2003	74.3	47.6
October	2003	66.9	41.2
November	2003	49.2	26.2
December	2003	41.2	20.5
January	2004	40.7	20.5
February	2004	36.0	17.2
March	2004	56.3	32.7
April	2004	55.9	34.2
May	2004	72.1	45.4
June	2004	79.5	52.1
July	2004	81.1	54.5
August	2004	76.8	52.5
September	2004	72.5	46.1
October	2004	58.7	36.9
November	2004	45.0	26.8
December	2004	40.1	19.9

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
January	2005	43.0	25.0
February	2005	41.5	25.8
March	2005	46.6	26.9
April	2005	59.5	34.4
May	2005	69.1	45.0
June	2005	79.4	50.9
July	2005	86.1	56.5
August	2005	76.7	53.3
September	2005	73.3	49.9
October	2005	59.5	38.3
November	2005	52.9	29.8
December	2005	43.3	20.1
January	2006	44.8	21.4
February	2006	48.8	22.5
March	2006	50.7	28.3
April	2006	65.3	37.4
May	2006	74.2	46.7
June	2006	82.5	54.8
July	2006	81.1	56.4
August	2006	73.8	54.5
September	2006	66.7	44.1
October	2006	59.8	36.9
November	2006	51.8	29.0
December	2006	38.1	20.3
January	2007	34.1	16.3
February	2007	41.4	22.1
March	2007	55.9	31.3
April	2007	59.4	33.6
May	2007	67.1	42.2
June	2007	79.3	51.7
July	2007	83.7	56.0
August	2007	83.7	56.6
September	2007	72.1	49.3
October	2007	64.5	39.2
November	2007	53.8	29.7
December	2007	36.3	18.8
January	2008	33.1	14.3
February	2008	42.8	22.4
March	2008	52.1	27.6
April	2008	60.2	33.1
May	2008	67.8	41.5
June	2008	81.1	52.7
July	2008	80.4	54.6
August	2008	77.6	54.3
September	2008	72.8	48.2
October	2008	62.9	38.2
November	2008	52.3	28.7
December	2008	39.0	20.3
January	2009	41.6	21.9
February	2009	48.3	25.7
March	2009	53.2	29.0
April	2009	58.5	33.9
May	2009	71.3	45.9
June	2009	73.6	50.6
July	2009	81.4	56.0
August	2009	80.4	54.0
September	2009	70.6	46.4
October	2009	57.6	35.5
November	2009	53.3	30.1
December	2009	33.0	14.9
January	2010	37.3	18.0
February	2010	36.0	18.5
March	2010	47.7	26.2
April	2010	59.5	34.3
May	2010	68.5	41.5
June	2010	82.4	55.0
July	2010	81.5	56.9
August	2010	78.7	54.1
September	2010	78.5	51.1
October	2010	63.2	39.6
November	2010	48.8	25.1
December	2010	44.5	25.2
January	2011	39.9	18.0
February	2011	41.3	17.8
March	2011	58.1	32.0
April	2011	62.4	35.5
May	2011	68.2	40.2
June	2011	84.6	55.5
July	2011	86.3	58.7
August	2011	82.9	58.3
September	2011	70.8	49.2
October	2011	60.8	38.4

Month	Year	Average Max Temp (°F)	Average Min Temp (°F)
November	2011	49.1	28.0
December	2011	35.1	17.6
January	2012	42.0	23.2
February	2012	41.9	21.9
March	2012	57.2	31.6
April	2012	64.8	38.8
May	2012	72.9	46.5
June	2012	86.6	56.9
July	2012	84.2	57.2
August	2012	83.4	56.1
September	2012	74.7	49.3
October	2012	65.6	39.6
November	2012	54.3	31.0
December	2012	39.4	19.0
January	2013	35.5	15.4
February	2013	41.3	20.2
March	2013	55.5	29.7
April	2013	61.7	34.9
May	2013	70.4	43.2
June	2013	84.9	55.9
July	2013	80.4	56.2
August	2013	79.8	55.6
September	2013	71.4	49.7
October	2013	58.6	36.0
November	2013	46.3	27.7
December	2013	38.5	20.1
January	2014	43.2	21.3
February	2014	48.7	26.2
March	2014	52.9	28.9
April	2014	59.4	33.6
May	2014	67.9	42.4
June	2014	82.5	54.1
July	2014	79.6	56.3
August	2014	77.0	54.0
September	2014	77.3	51.2
October	2014	66.7	41.4
November	2014	50.9	27.0
December	2014	42.0	23.3
January	2015	41.7	22.6
February	2015	47.8	25.4
March	2015	58.2	33.6
April	2015	62.0	37.0
May	2015	64.7	41.7
June	2015	80.7	55.3
July	2015	78.2	55.8
August	2015	80.1	56.4
September	2015	78.6	52.8
October	2015	64.5	42.8
November	2015	49.9	28.5
December	2015	39.9	22.4

Los Alamos Precipitation

Data is for tower laarc. This file was obtained from the LANL Weather Machine http://weather.lanl.gov. Request made on Thursday, July 14 09:15:33 2016 MST.

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	January	1951	0.9	12.8
28	February	1951	0.76	5.1
31	March	1951	0.39	3.1
30	April	1951	1.46	4.3
31	May	1951	1.03	0
30	June	1951	0	0
31	July	1951	3.21	0
31	August	1951	4.51	0
30	September	1951	0.52	0
31	October	1951	1.56	0
30	November	1951	0.12	2.5
31	December	1951	0.82	8.7
31	January	1952	1.88	5.5
29	February	1952	0.36	2.3
31	March	1952	1.19	10.1
30	April	1952	1.21	0.9
31	May	1952	3.5	4
30	June	1952	1.3	0
31	July	1952	4.02	0
31	August	1952	11.18	0
30	September	1952	1.53	0
31	October	1952	0	0
30	November	1952	1.58	9
31	December	1952	1.56	7.9
31	January	1953	0.11	1.4
28	February	1953	0.75	8.2
31	March	1953	0.9	5.7
30	April	1953	0.28	0
31	May	1953	1.58	0.6
30	June	1953	1.19	0
31	July	1953	3.37	0
31	August	1953	3.86	0
30	September	1953	0	0
31	October	1953	2.12	0
30	November	1953	1.92	6
31	December	1953	0.62	8.2
31	January	1954	0.55	11.7
28	February	1954	0	0.5
31	March	1954	1	2.9
30	April	1954	0	0
31	May	1954	1.99	0
30	June	1954	0.21	0
31	July	1954	5.46	0
31	August	1954	2.12	0
30	September	1954	1.8	0
31	October	1954	1.64	0
30	November	1954	0.06	0
31	December	1954	0.57	11.5
31	January	1955	0.75	6.9
28	February	1955	0.33	3.8
31	March	1955	0.17	1.5
30	April	1955	0.66	3
31	May	1955	1.9	0
30	June	1955	0.11	0
31	July	1955	2.39	0
31	August	1955	4.37	0
30	September	1955	1.02	0
31	October	1955	0.08	0
30	November	1955	0.13	1.5
31	December	1955	0.54	8.5
31	January	1956	0.77	19
29	February	1956	0.81	18
31	March	1956	0.02	0.5
30	April	1956	0.17	1
31	May	1956	0.67	0
30	June	1956	1.77	0
31	July	1956	0.72	0
31	August	1956	1.55	0
30	September	1956	0	0
31	October	1956	0.23	0
30	November	1956	0	0.5
31	December	1956	0.09	2.5
31	January	1957	1.5	7.5
28	February	1957	0.52	2.1

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	March	1957	1.44	12.5
30	April	1957	0.48	6.1
31	May	1957	1.3	0
30	June	1957	0.63	0
31	July	1957	3.94	0
31	August	1957	7.89	0.4
30	September	1957	0.15	0
31	October	1957	6.77	0.1
30	November	1957	3.3	34.5
31	December	1957	0.11	4
31	January	1958	0.52	13
28	February	1958	0.43	2.6
31	March	1958	2.33	35.5
30	April	1958	2.38	33.6
31	May	1958	1.37	0.3
30	June	1958	1.14	0
31	July	1958	1.58	0
31	August	1958	2.68	0
30	September	1958	2.93	0
31	October	1958	0.75	0.3
30	November	1958	0.35	6.2
31	December	1958	0.27	8.5
31	January	1959	0.13	1.2
28	February	1959	0.69	10.9
31	March	1959	0.53	8
30	April	1959	0.95	4
31	May	1959	0.98	0
30	June	1959	1.58	0
31	July	1959	2.5	0
31	August	1959	7.24	0
30	September	1959	0.08	0
31	October	1959	4.62	9
30	November	1959	0.65	4
31	December	1959	1.6	28
31	January	1960	1.11	20.5
29	February	1960	0.68	15.5
31	March	1960	1.03	11.4
30	April	1960	0.03	0
31	May	1960	0.4	0.2
30	June	1960	3.4	0
31	July	1960	2.47	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	August	1960	2.08	0
30	September	1960	1.3	0
31	October	1960	3.72	8
30	November	1960	0.46	0.5
31	December	1960	1.76	31.2
31	January	1961	0.35	6
28	February	1961	0.65	9.3
31	March	1961	2.19	17.3
30	April	1961	1.91	14
31	May	1961	0.3	0
30	June	1961	0.68	0
31	July	1961	2.04	0
31	August	1961	5.29	0
30	September	1961	1.27	0
31	October	1961	1.96	2
30	November	1961	0.99	8.2
31	December	1961	2.59	33.2
31	January	1962	1.35	14.4
28	February	1962	0.19	1.3
31	March	1962	0.58	6.6
30	April	1962	0.54	0.1
31	May	1962	0.05	0.2
30	June	1962	0.34	0
31	July	1962	4.81	0
31	August	1962	1.1	0
30	September	1962	2.92	0
31	October	1962	0.83	0
30	November	1962	1.18	5.5
31	December	1962	1.59	12.5
31	January	1963	1.04	12.2
28	February	1963	1.78	18.6
31	March	1963	1.21	15.1
30	April	1963	0.41	0
31	May	1963	0.23	0
30	June	1963	1.24	0
31	July	1963	2.91	0
31	August	1963	4.78	0
30	September	1963	1.98	0
31	October	1963	1.56	0
30	November	1963	0.66	5
31	December	1963	0.02	0.2

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	January	1964	0.64	6.7
29	February	1964	1.87	19.2
31	March	1964	0.52	6.2
30	April	1964	1.02	8
31	May	1964	0.67	0
30	June	1964	0.26	0
31	July	1964	1.9	0
31	August	1964	1.07	0
30	September	1964	1.49	0
31	October	1964	0.03	0
30	November	1964	1.08	7
31	December	1964	0.71	8.6
31	January	1965	1.35	9.8
28	February	1965	1.15	16.7
31	March	1965	0.56	5.5
30	April	1965	1.72	4.2
31	May	1965	1.13	0
30	June	1965	2	0
31	July	1965	2.25	0
31	August	1965	5.51	0
30	September	1965	2.86	0
31	October	1965	1.32	1.3
30	November	1965	1	0
31	December	1965	2.85	15.3
31	January	1966	0.39	5.3
28	February	1966	1.3	11.4
31	March	1966	0.1	0.7
30	April	1966	0.03	0.3
31	May	1966	0.46	0
30	June	1966	2.83	0
31	July	1966	4.13	0
31	August	1966	5.05	0
30	September	1966	1.11	0
31	October	1966	0.46	0.7
30	November	1966	0.48	3.5
31	December	1966	1.14	7
31	January	1967	0.11	1.3
28	February	1967	0.33	2.8
31	March	1967	0.42	1.5
30	April	1967	0	0
31	May	1967	0.73	0
30	June	1967	1.55	0
31	July	1967	5.68	0
31	August	1967	6.42	0
30	September	1967	2.41	0
31	October	1967	0.25	2
30	November	1967	0.21	2.1
31	December	1967	2.69	41.3
31	January	1968	0.15	1.8
29	February	1968	0.92	11.7
31	March	1968	1.1	12.7
30	April	1968	0.46	5.4
31	May	1968	2.08	0
30	June	1968	0.03	0
31	July	1968	6.6	0
31	August	1968	6.39	0
30	September	1968	0.38	0
31	October	1968	0.45	0
30	November	1968	0.57	1.7
31	December	1968	0.43	7.2
31	January	1969	1.08	6
28	February	1969	0.91	10.2
31	March	1969	1.04	21.4
30	April	1969	1.99	5.9
31	May	1969	1.53	1.5
30	June	1969	3.29	0
31	July	1969	4.44	0
31	August	1969	2.91	0
30	September	1969	3.77	0
31	October	1969	3.62	5
30	November	1969	0.33	3
31	December	1969	0.76	11.5
31	January	1970	0.06	1.5
28	February	1970	0.25	3.2
31	March	1970	2.05	22.4
30	April	1970	0.2	1.7
31	May	1970	0.31	0.5
30	June	1970	1.56	0
31	July	1970	2.49	0
31	August	1970	5.6	0
30	September	1970	1.7	0.2
31	October	1970	0.42	1.4

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
30	November	1970	0.23	0
31	December	1970	0.06	0.9
31	January	1971	0.81	10.5
28	February	1971	0.25	4
31	March	1971	0.32	5.9
30	April	1971	0.48	3.6
31	May	1971	0.21	0
30	June	1971	0.4	0
31	July	1971	4.83	0
31	August	1971	2.89	0
30	September	1971	2.48	1.5
31	October	1971	3.02	0.7
30	November	1971	0.79	4.9
31	December	1971	2.8	35.8
31	January	1972	0.24	3.6
29	February	1972	0.04	0.6
31	March	1972	0.09	0.5
30	April	1972	0.02	0
31	May	1972	0.96	0
30	June	1972	1.66	0
31	July	1972	2.6	0
31	August	1972	2.76	0
30	September	1972	3.77	0
31	October	1972	2.9	9
30	November	1972	1.15	14.5
31	December	1972	0.8	1
31	January	1973	0.23	3.8
28	February	1973	0.69	9
31	March	1973	4.11	37
30	April	1973	0.4	4
31	May	1973	1.58	0
30	June	1973	0.47	0
31	July	1973	3.28	0
31	August	1973	1.2	0
30	September	1973	2.21	0
31	October	1973	0.45	0
30	November	1973	0.3	1.5
31	December	1973	0.06	1
31	January	1974	1.55	23.2
28	February	1974	0.36	3.6
31	March	1974	1.11	7

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
30	April	1974	0.45	3.5
31	May	1974	0.11	0
30	June	1974	0.88	0
31	July	1974	3.38	0
31	August	1974	3.94	0
30	September	1974	1.71	0
31	October	1974	3.86	0
30	November	1974	0.47	0.7
31	December	1974	0.87	13.2
31	January	1975	1.29	15.7
28	February	1975	1.84	23
31	March	1975	1.28	12
30	April	1975	3.23	33.2
31	May	1975	0.16	0
30	June	1975	0.35	0
31	July	1975	3.88	0
31	August	1975	1.63	0
30	September	1975	4.55	0
31	October	1975	0.22	0
30	November	1975	0.59	4
31	December	1975	0.3	3
31	January	1976	0.08	1
29	February	1976	1.06	0
31	March	1976	0.69	7.3
30	April	1976	0.72	0
31	May	1976	1.08	2
30	June	1976	0.21	0
31	July	1976	4.75	0
31	August	1976	3.03	0
30	September	1976	1.22	0
31	October	1976	0.02	0
30	November	1976	1	12
31	December	1976	0.09	1.2
31	January	1977	1.38	14.4
28	February	1977	0.09	1
31	March	1977	0.21	0
30	April	1977	2.34	4
31	May	1977	1.02	0
30	June	1977	1.09	0
31	July	1977	3.35	0
31	August	1977	5.12	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
30	September	1977	0.4	0
31	October	1977	0.15	0
30	November	1977	1.4	2
31	December	1977	0.14	0.8
31	January	1978	0.69	6
28	February	1978	0.28	2
31	March	1978	1.45	5
30	April	1978	0.28	0
31	May	1978	1.99	16
30	June	1978	1.38	0
31	July	1978	1.35	0
31	August	1978	1.39	0
30	September	1978	1.35	0
31	October	1978	1.05	1
30	November	1978	6.6	7
31	December	1978	2.25	25
31	January	1979	2.81	30.3
28	February	1979	0.14	1.3
31	March	1979	1.27	7.5
30	April	1979	0.43	0
31	May	1979	3.1	0
30	June	1979	2.11	0
31	July	1979	0.78	0
31	August	1979	2.33	0
30	September	1979	0.82	0
31	October	1979	0.59	4
30	November	1979	0.48	0.7
31	December	1979	0.36	9
31	January	1980	1.55	11
29	February	1980	0.96	2
31	March	1980	0.85	9.3
30	April	1980	1.62	12
31	May	1980	1.43	0
30	June	1980	0	0
31	July	1980	0.35	0
31	August	1980	1.97	0
30	September	1980	1.18	0
31	October	1980	1.04	6
30	November	1980	0.68	8.3
31	December	1980	0.33	7
31	January	1981	0.05	1.2

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
28	February	1981	0.09	1.3
31	March	1981	2.73	29.4
30	April	1981	0.75	1
31	May	1981	2.17	0
30	June	1981	1.22	0
31	July	1981	3.36	0
31	August	1981	2.76	0
30	September	1981	2.37	0
31	October	1981	1.37	0
30	November	1981	0.83	1.5
31	December	1981	0.01	0.2
31	January	1982	0.75	19.3
28	February	1982	1.76	36.4
31	March	1982	1.33	8.2
30	April	1982	0.4	2
31	May	1982	1.95	0.5
30	June	1982	0.15	0
31	July	1982	3.76	0
31	August	1982	4.54	0
30	September	1982	2.67	0
31	October	1982	0.6	5
30	November	1982	1.7	3.8
31	December	1982	2.06	24.2
31	January	1983	1.12	17.9
28	February	1983	0.63	9.8
31	March	1983	1.81	16.3
30	April	1983	0.84	11.5
31	May	1983	0.65	0
30	June	1983	0.41	0
31	July	1983	3.64	0
31	August	1983	2.99	0
30	September	1983	1.89	0
31	October	1983	1.12	0
30	November	1983	0.48	5.2
31	December	1983	1.08	11.7
31	January	1984	0.63	14.2
29	February	1984	0.14	1
31	March	1984	2.04	34
30	April	1984	0.51	2.2
31	May	1984	0.72	0
30	June	1984	0.76	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	July	1984	2.5	0
31	August	1984	3.86	0
30	September	1984	1.69	0
31	October	1984	3.02	20
30	November	1984	0.34	3.3
31	December	1984	3.21	37.1
31	January	1985	0.57	14.3
28	February	1985	0.87	13.5
31	March	1985	3.17	28.3
30	April	1985	3.1	3.5
31	May	1985	2.23	0
30	June	1985	1.87	0
31	July	1985	2.97	0
31	August	1985	3.98	0
30	September	1985	2.78	0
31	October	1985	2.96	0
30	November	1985	0.57	5.9
31	December	1985	0.44	10.5
31	January	1986	0.01	0.2
28	February	1986	1.01	19
31	March	1986	0.76	7.2
30	April	1986	1.84	2.7
31	May	1986	1.64	2
30	June	1986	5.64	0
31	July	1986	2.18	0
31	August	1986	3.31	0
30	September	1986	2.02	0
31	October	1986	2.94	7
30	November	1986	2.23	5.9
31	December	1986	0.44	5.2
31	January	1987	2.43	64.8
28	February	1987	2.78	48.5
31	March	1987	0.88	9.3
30	April	1987	1.09	12.5
31	May	1987	2.83	0
30	June	1987	2.69	0
31	July	1987	1.37	0
31	August	1987	4.29	0
30	September	1987	1.72	0
31	October	1987	0.49	0
30	November	1987	1.47	7
31	December	1987	1.58	36.3
31	January	1988	0.95	16
29	February	1988	0.2	1.8
31	March	1988	1.1	17.9
30	April	1988	1.75	1.2
31	May	1988	1.97	0
30	June	1988	4.36	0
31	July	1988	4.71	0
31	August	1988	4.56	0
30	September	1988	3.28	0
31	October	1988	0.54	0
30	November	1988	0.59	6.4
31	December	1988	0.32	6
31	January	1989	1.2	16.6
28	February	1989	0.99	16.3
31	March	1989	0.91	7.3
30	April	1989	0.21	0
31	May	1989	1.07	0
30	June	1989	0.51	0
31	July	1989	3.71	0
31	August	1989	3.16	0
30	September	1989	2.14	0
31	October	1989	1.73	0
30	November	1989	0.04	0.6
31	December	1989	0.5	10.7
31	January	1990	0.97	17.5
28	February	1990	0.38	6.3
31	March	1990	0.62	1.9
30	April	1990	1.5	1.2
31	May	1990	0.89	3
30	June	1990	0.93	0
31	July	1990	3.65	0
31	August	1990	1.87	0
30	September	1990	3.37	0
31	October	1990	0.66	0
30	November	1990	2.08	5.5
31	December	1990	1.79	10.5
31	January	1991	0.39	7.5
28	February	1991	0.34	3.3
31	March	1991	1.3	12
30	April	1991	0	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	May	1991	1.77	0
30	June	1991	1.71	0
31	July	1991	5.03	0
31	August	1991	5.93	0
30	September	1991	2.73	0
31	October	1991	0.35	7.3
30	November	1991	2.56	12.1
31	December	1991	2.23	18.1
31	January	1992	0.61	5.1
29	February	1992	0.34	1
31	March	1992	1.21	1.5
30	April	1992	0.59	0
31	May	1992	3.46	0
30	June	1992	1.29	0
31	July	1992	1.41	0
31	August	1992	5.05	0
30	September	1992	2.26	0
31	October	1992	0.59	0
30	November	1992	1.28	5.6
31	December	1992	1.69	21.3
31	January	1993	3.22	33
28	February	1993	2.12	13.5
31	March	1993	1.2	5
30	April	1993	0.05	0
31	May	1993	1.15	0
30	June	1993	0.7	0
31	July	1993	3.37	0
31	August	1993	5.43	0
30	September	1993	1.12	0
31	October	1993	0.59	3
30	November	1993	1.44	4
31	December	1993	0.21	3
31	January	1994	0.44	8
28	February	1994	0.69	5.9
31	March	1994	2.05	18.8
30	April	1994	1.66	9.3
31	May	1994	2.54	0
30	June	1994	1.13	0
31	July	1994	2.21	0
31	August	1994	2.58	0
30	September	1994	0.83	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	October	1994	3.17	0
30	November	1994	2.07	0
31	December	1994	0.71	2.5
31	January	1995	1.34	21.3
28	February	1995	1.01	3.3
31	March	1995	1.11	9.7
30	April	1995	1.82	20.4
31	May	1995	2.68	2.8
30	June	1995	1.83	0
31	July	1995	1.28	0
31	August	1995	3.53	0
30	September	1995	2.36	0
31	October	1995	0	0
30	November	1995	0.35	1.7
31	December	1995	0.61	12.4
31	January	1996	1.29	14.1
29	February	1996	0.69	10.4
31	March	1996	0.39	4.8
30	April	1996	0.11	0
31	May	1996	0.02	0
30	June	1996	3.83	0
31	July	1996	2.96	0
31	August	1996	2.25	0
30	September	1996	2.2	0
31	October	1996	3.37	21.2
30	November	1996	0.64	5.9
31	December	1996	0.09	1.2
31	January	1997	1.68	20.8
28	February	1997	2.18	23.1
31	March	1997	0.09	0
30	April	1997	2.04	9.6
31	May	1997	1.55	0
30	June	1997	1.91	0
31	July	1997	2.63	0
31	August	1997	6.44	0
30	September	1997	3.4	0
31	October	1997	0.59	0
30	November	1997	1.16	16
31	December	1997	1.83	26.4
31	January	1998	0.12	0
28	February	1998	0.39	6.7

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	March	1998	1.59	3.7
30	April	1998	0.61	0.5
31	May	1998	0	0
30	June	1998	0.44	0
31	July	1998	5.29	0
31	August	1998	3.32	0
30	September	1998	0.8	0
31	October	1998	4.16	0
30	November	1998	0.52	0
31	December	1998	0.06	0.6
31	January	1999	0.15	1.2
28	February	1999	0.07	0.2
31	March	1999	1.44	15.2
30	April	1999	2.41	5.7
31	May	1999	1.81	0
30	June	1999	1.72	0
31	July	1999	3.01	0
31	August	1999	2.06	0
30	September	1999	2.71	0
31	October	1999	0.57	1.8
30	November	1999	0.02	0
31	December	1999	0.34	4.7
31	January	2000	0.24	1.2
29	February	2000	0.07	1.2
31	March	2000	1.32	5.8
30	April	2000	0.39	1
31	May	2000	0.15	0
30	June	2000	1.47	0
31	July	2000	1.63	0
31	August	2000	1.77	0
30	September	2000	0.34	0
31	October	2000	4.1	0
30	November	2000	1.95	13.8
31	December	2000	0.37	4.9
31	January	2001	2.35	35.2
28	February	2001	0.93	7.2
31	March	2001	1.14	5.8
30	April	2001	0.94	0
31	May	2001	1.43	0
30	June	2001	0.85	0
31	July	2001	2.45	0
31	August	2001	3.16	0
30	September	2001	0.39	0
31	October	2001	0.1	0
30	November	2001	0.5	4.5
31	December	2001	0.18	2.3
31	January	2002	0.73	8.4
28	February	2002	0.03	0
31	March	2002	0.03	0
30	April	2002	0.21	0
31	May	2002	0	0
30	June	2002	1.91	0
31	July	2002	1.71	0
31	August	2002	1.14	0
30	September	2002	2.12	0
31	October	2002	1.64	0
30	November	2002	1.36	6.6
31	December	2002	0.83	10.4
31	January	2003	0	0
28	February	2003	0.88	7.3
31	March	2003	0.63	3.2
30	April	2003	0.49	0
31	May	2003	1.35	0
30	June	2003	0.71	0
31	July	2003	0.26	0
31	August	2003	2.78	0
30	September	2003	0.84	0
31	October	2003	0.9	0
30	November	2003	0.78	3.4
31	December	2003	0.31	1.4
31	January	2004	0.41	8.5
29	February	2004	2.22	37.8
31	March	2004	0.85	9.4
30	April	2004	3.08	4.4
31	May	2004	0.02	0
30	June	2004	0.75	0
31	July	2004	3.13	0
31	August	2004	1.83	0
30	September	2004	1.63	0
31	October	2004	2.5	0
30	November	2004	1.47	14.6
31	December	2004	0.89	7.7

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
31	January	2005	2.63	13.1
28	February	2005	2.11	12.7
31	March	2005	1.91	22.2
30	April	2005	1.45	0
31	May	2005	0.92	0
30	June	2005	0.26	0
31	July	2005	1.63	0
31	August	2005	5.76	0
30	September	2005	3.44	0
31	October	2005	1.11	0
30	November	2005	0.07	0
31	December	2005	0.01	0.3
31	January	2006	0.15	0
28	February	2006	0.02	0
31	March	2006	0.63	5.3
30	April	2006	0.51	0
31	May	2006	0.22	0
30	June	2006	1.78	0
31	July	2006	2.26	0
31	August	2006	5.85	0
30	September	2006	1.36	0
31	October	2006	1.73	0
30	November	2006	0.49	6.9
31	December	2006	1.62	25.1
31	January	2007	1.06	13.9
28	February	2007	0.54	6.2
31	March	2007	1.23	0
30	April	2007	0.62	0
31	May	2007	1.7	0
30	June	2007	1.28	0
31	July	2007	1.93	0
31	August	2007	2.93	0
30	September	2007	4.35	0
31	October	2007	0.32	0
30	November	2007	1.61	5.6
31	December	2007	2.74	9.5
31	January	2008	1.39	7.6
29	February	2008	1.11	13.5
31	March	2008	0.46	9.5
30	April	2008	0.13	0.8
31	May	2008	1.66	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
30	June	2008	0.04	0
31	July	2008	2.59	0
31	August	2008	6.01	0
30	September	2008	0.33	0
31	October	2008	1.43	0
30	November	2008	0.6	1
31	December	2008	1.63	29
31	January	2009	0.26	4.8
28	February	2009	0.02	0.2
31	March	2009	1.18	8.7
30	April	2009	1.31	9.8
31	May	2009	2.14	0
30	June	2009	2.67	0
31	July	2009	4.01	0
31	August	2009	1.66	0
30	September	2009	1.95	0
31	October	2009	1.87	1.6
30	November	2009	0.26	1.6
31	December	2009	1.27	16.7
31	January	2010	1.32	13.5
28	February	2010	1.23	18.2
31	March	2010	1	11.4
30	April	2010	1.43	0
31	May	2010	1.1	0
30	June	2010	0.59	0
31	July	2010	4.1	0
31	August	2010	3.43	0
30	September	2010	1.32	0
31	October	2010	2.09	0
30	November	2010	0.03	0
31	December	2010	1.18	16.6
31	January	2011	0.01	0
28	February	2011	0.04	1.4
31	March	2011	0.16	0.6
30	April	2011	0.47	0
31	May	2011	0.18	0.7
30	June	2011	0	0
31	July	2011	0.77	0
31	August	2011	4.98	0
30	September	2011	3.04	0
31	October	2011	1.62	0

Day	Month	Year	Total Precip (inches)	Total Snow (inches)
30	November	2011	0.36	0
31	December	2011	2.02	31.4
31	January	2012	0.22	2.4
29	February	2012	0.53	9.7
31	March	2012	0.3	4.4
30	April	2012	0.9	8.5
31	May	2012	0.93	0
30	June	2012	0.05	0
31	July	2012	1.51	0
31	August	2012	1.52	0
30	September	2012	1.69	0
31	October	2012	1.02	0
30	November	2012	0.12	0
31	December	2012	0.8	12.2
31	January	2013	0.52	1.9
28	February	2013	0.45	5
31	March	2013	0.15	0.5
30	April	2013	0.6	3
31	May	2013	0.11	0
30	June	2013	0.76	0
31	July	2013	3.71	0
31	August	2013	1.8	0
30	September	2013	8.72	0
31	October	2013	1.44	2
30	November	2013	2.03	8.5
31	December	2013	0.15	4.2
31	January	2014	0.02	0.5
28	February	2014	0.2	0.5
31	March	2014	1.08	1.1
30	April	2014	0.3	0
31	May	2014	1.48	0
30	June	2014	0.91	0
31	July	2014	9.04	0
31	August	2014	1.28	0
30	September	2014	0.3	0
31	October	2014	0.85	0
30	November	2014	0.51	1
31	December	2014	0.85	3.3
31	January	2015	1.28	14.8
28	February	2015	0.84	15.9
31	March	2015	0.84	1.7
30	April	2015	0.85	3.6
31	May	2015	2.8	0
30	June	2015	2.12	0
31	July	2015	6.68	0
31	August	2015	2.66	0
30	September	2015	0.35	0
31	October	2015	3.15	0
30	November	2015	0.8	2
31	December	2015	0.88	14.7

White Rock Temperatures

Data is for tower wrarc. This file was obtained from the LANL Weather Machine http://weather.lanl.gov. Request made on Tuesday, July 19 09:22:13 2016 MST.

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
October	1964	68.7	35.7
November	1964	52.0	23.9
December	1964	43.0	16.6
January	1965	41.9	18.2
February	1965	44.5	15.0
March	1965	48.9	23.4
April	1965	63.0	32.3
May	1965	69.4	39.9
June	1965	78.3	48.1
July	1965	85.5	56.8
August	1965	81.5	52.0
September	1965	71.5	44.4
October	1965	69.2	32.1
November	1965	57.3	26.6
December	1965	44.1	16.8
January	1966	38.1	9.5
February	1966	40.9	14.0
March	1966	59.0	23.7
April	1966	66.0	32.9
May	1966	78.4	43.5
June	1966	80.9	49.9
July	1966	88.5	55.5
August	1966	80.5	51.0
September	1966	76.0	42.8
October	1966	68.4	31.6
November	1966	58.0	23.3
December	1966	43.7	11.5
January	1967	45.9	9.2
February	1967	52.1	18.9
March	1967	63.0	28.7
April	1967	62.8	30.9
May	1967	71.1	36.8
June	1967	77.7	47.4
July	1967	86.1	57.0
August	1967	80.8	52.4
September	1967	75.6	46.4
October	1967	69.9	33.7
November	1967	57.9	25.0
December	1967	37.3	10.8
January	1968	43.3	12.3
February	1968	49.9	22.3
March	1968	54.0	25.6
April	1968	57.5	27.8
May	1968	69.8	38.4
June	1968	84.2	48.7
July	1968	82.8	54.1
August	1968	77.7	51.8
September	1968	76.6	42.8
October	1968	68.3	32.4
November	1968	51.8	22.4
December	1968	41.9	9.0
January	1969	48.4	21.6
February	1969	48.0	19.3
March	1969	49.9	20.1
April	1969	65.1	35.2
May	1969	74.4	42.5
June	1969	79.6	48.6
July	1969	86.6	57.7
August	1969	86.3	56.7
September	1969	77.3	47.1
October	1969	61.4	35.3
November	1969	53.6	22.9
December	1969	46.6	21.0
January	1970	44.2	13.5
February	1970	52.5	22.6
March	1970	50.1	24.0
April	1970	60.3	28.5
May	1970	75.3	42.8
June	1970	79.8	48.5
July	1970	85.5	56.4
August	1970	84.0	56.3
September	1970	74.3	46.1
October	1970	59.6	32.4
November	1970	53.6	25.1
December	1970	46.5	16.8
January	1971	43.0	12.9
February	1971	46.3	19.3
March	1971	57.7	24.2
April	1971	62.4	32.1
May	1971	72.1	38.5
June	1971	83.9	50.9
July	1971	85.6	56.6
August	1971	81.8	53.4
September	1971	73.4	45.1
October	1971	62.5	34.6
November	1971	51.4	25.0

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1971	38.6	14.5
January	1972	43.2	15.2
February	1972	51.8	21.4
March	1972	63.5	30.9
April	1972	67.4	34.1
May	1972	73.1	40.9
June	1972	81.9	51.1
July	1972	83.9	55.5
August	1972	80.8	54.3
September	1972	74.1	47.9
October	1972	61.7	40.1
November	1972	44.1	20.9
December	1972	40.5	15.7
January	1973	38.7	14.1
February	1973	43.3	19.7
March	1973	48.5	26.1
April	1973	56.3	28.1
May	1973	70.1	40.8
June	1973	81.8	49.2
July	1973	84.6	55.3
August	1973	84.7	53.9
September	1973	77.0	45.4
October	1973	68.0	36.1
November	1973	56.1	26.6
December	1973	45.6	17.4
January	1974	37.7	13.6
February	1974	44.5	14.9
March	1974	60.0	29.6
April	1974	62.4	31.0
May	1974	76.9	43.1
June	1974	86.4	52.0
July	1974	84.4	54.5
August	1974	79.7	51.8
September	1974	73.6	45.2
October	1974	62.4	38.7
November	1974	50.7	23.4
December	1974	36.7	10.1
January	1975	36.4	8.6
February	1975	41.8	17.0
March	1975	50.1	25.8
April	1975	56.6	29.0
May	1975	70.2	37.7
June	1975	82.7	48.5
July	1975	84.3	55.7
August	1975	85.3	54.4
September	1975	73.6	45.5
October	1975	68.1	32.9
November	1975	51.7	20.2
December	1975	44.8	15.7
January	1976	43.7	12.0
February	1976	52.3	22.8
March	1976	54.1	24.8
April	1976	63.3	33.7
May	1976	72.8	42.5
June	1976	84.0	50.2
July	1976	84.0	53.8
August	1976	79.8	51.1
September	1976	72.7	45.3
October	1976	59.8	29.2
November	1976	51.5	17.7
December	1976	40.5	7.9
January	1977	36.8	8.6
February	1977	48.0	19.2
March	1977	51.2	23.0
April	1977	63.3	34.7
May	1977	72.4	41.3
June	1977	86.7	52.4
July	1977	86.5	57.2
August	1977	84.9	57.1
September	1977	78.1	48.5
October	1977	69.7	36.2
November	1977	52.4	23.0
December	1977	46.7	19.0
January	1978	39.9	18.0
February	1978	44.0	19.0
March	1978	55.9	26.5
April	1978	64.3	33.1
May	1978	67.0	37.2
June	1978	83.5	52.1
July	1978	87.7	55.2
August	1978	82.4	50.6
September	1978	75.4	45.1
October	1978	66.0	36.0
November	1978	48.3	28.8
December	1978	37.0	13.4
January	1979	34.4	11.7
February	1979	45.2	18.7
March	1979	53.9	27.8
April	1979	62.8	34.7
May	1979	67.4	40.1
June	1979	79.1	47.5
July	1979	87.3	53.9
August	1979	82.0	52.5
September	1979	79.2	45.8
October	1979	70.9	36.7
November			

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December			
January			
February			
March			
April			
May	1980	67.5	38.3
June	1980	88.1	52.0
July	1980	90.3	57.1
August	1980	83.6	53.7
September	1980	78.1	47.3
October	1980	66.0	33.6
November	1980	53.3	22.7
December	1980	51.1	22.3
January	1981	46.5	17.4
February	1981	41.2	9.1
March	1981		
April	1981	67.9	36.9
May	1981	70.5	43.1
June	1981	86.8	54.2
July	1981	87.2	57.7
August	1981	83.2	55.6
September	1981	76.1	48.8
October	1981	63.3	38.1
November	1981	57.2	27.7
December	1981	48.5	21.1
January	1982	40.7	16.5
February	1982	44.0	16.4
March	1982	53.6	28.2
April	1982	62.8	34.7
May	1982	70.0	40.3
June	1982	82.3	51.9
July	1982	86.7	57.3
August	1982	83.9	56.7
September	1982	74.7	49.7
October	1982	63.5	33.4
November	1982	47.9	26.0
December	1982	39.2	17.7
January	1983	42.6	18.0
February	1983	46.9	22.4
March	1983	52.7	29.4
April	1983	56.9	29.4
May	1983	68.8	39.0
June	1983	80.3	48.9
July	1983	86.9	56.9
August	1983	84.8	57.3
September	1983	81.9	50.6
October	1983	66.0	37.1
November	1983	51.7	24.6

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1983	41.2	18.5
January	1984	40.9	11.1
February	1984	48.9	17.4
March	1984	53.4	25.2
April	1984	60.5	31.4
May	1984	78.6	46.0
June	1984	82.1	49.5
July	1984	86.1	54.9
August	1984	82.4	54.4
September	1984	76.7	48.0
October	1984	55.5	32.7
November	1984	51.1	25.0
December	1984	41.0	19.5
January	1985	38.3	17.8
February	1985	44.3	18.2
March	1985	53.3	29.0
April	1985	64.8	34.4
May	1985	71.7	42.8
June	1985	82.5	50.6
July	1985	85.3	55.3
August	1985	84.0	54.0
September	1985	74.1	44.9
October	1985	66.0	38.7
November	1985	54.1	30.4
December	1985	48.4	19.9
January	1986	54.0	23.4
February	1986	52.2	27.5
March	1986	59.0	28.9
April	1986	65.2	37.6
May	1986	72.2	43.3
June	1986	79.7	50.8
July	1986	83.8	55.1
August	1986	85.4	55.5
September	1986	73.7	44.9
October	1986	62.0	33.7
November	1986	49.2	25.6
December	1986	42.9	19.9
January	1987	41.8	15.3
February	1987	46.2	22.6
March	1987	52.1	24.7
April	1987	64.8	32.7
May	1987	69.0	40.9
June	1987	83.3	51.4
July	1987	87.0	55.7
August	1987	80.5	53.8
September	1987	76.4	46.1
October	1987	70.6	37.6
November	1987	51.1	24.9

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1987	42.4	16.5
January	1988	39.7	11.7
February	1988	51.1	23.2
March	1988	55.1	25.2
April	1988	64.7	35.4
May	1988	73.1	42.9
June	1988	83.6	53.5
July	1988	84.7	55.8
August	1988	80.2	56.2
September	1988	74.9	44.7
October	1988	70.4	39.4
November	1988	54.4	26.7
December	1988	44.9	16.5
January	1989	40.2	12.9
February	1989	47.5	21.1
March	1989	61.6	29.9
April	1989	70.3	38.0
May	1989	77.3	44.8
June	1989	82.2	53.3
July	1989	85.8	56.8
August	1989	82.6	54.4
September	1989	79.1	48.4
October	1989	66.1	34.6
November	1989	56.7	23.9
December	1989	46.5	16.8
January	1990	43.3	16.3
February	1990	45.8	21.3
March	1990	55.5	29.5
April	1990	64.7	38.1
May	1990	72.2	44.4
June	1990	89.3	55.2
July	1990	83.4	55.9
August	1990	83.6	54.5
September	1990	79.7	52.2
October	1990	70.5	37.6
November	1990	54.8	27.8
December	1990	41.1	14.0
January	1991	41.7	16.1
February	1991	54.0	24.6
March	1991	53.6	29.4
April	1991	65.6	34.4
May	1991	74.6	42.8
June	1991	81.8	50.9
July	1991	84.6	55.9
August	1991	82.6	55.7
September	1991	75.0	48.2
October	1991	71.3	38.2
November	1991	50.4	27.7

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1991	43.0	19.7
January	1992	41.3	14.9
February	1992	48.4	25.4
March	1992	55.1	28.2
April	1992	67.7	34.9
May	1992	70.0	41.9
June	1992	79.2	47.4
July	1992	82.3	52.0
August	1992	81.7	50.5
September	1992	78.1	44.8
October	1992	68.9	35.8
November	1992	44.1	18.6
December	1992	34.0	9.8
January	1993	40.0	18.9
February	1993	43.5	22.9
March	1993	54.6	26.1
April	1993	63.6	33.5
May	1993	71.0	39.8
June	1993	82.6	47.5
July	1993	87.0	54.5
August	1993	78.9	53.5
September	1993	75.2	42.1
October	1993	63.2	30.8
November	1993	47.9	19.5
December	1993	43.2	13.9
January	1994	45.1	12.8
February	1994	45.6	17.2
March	1994	55.2	25.9
April	1994	62.1	32.3
May	1994	71.7	41.2
June	1994	88.1	51.8
July	1994	86.8	55.1
August	1994	84.2	54.3
September	1994	77.2	45.3
October	1994	62.3	32.1
November	1994	48.7	22.7
December	1994	45.3	18.6
January	1995	40.3	17.4
February	1995	53.7	25.5
March	1995	55.2	26.3
April	1995	59.5	30.7
May	1995	68.3	39.1
June	1995	78.8	46.6
July	1995	86.3	52.2
August	1995	84.5	55.3
September	1995	74.8	46.0
October	1995	69.5	31.2
November	1995	57.0	25.2

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1995	46.8	18.3
January	1996	43.1	15.3
February	1996	51.5	23.5
March	1996	55.2	23.3
April	1996	66.3	31.2
May	1996	81.4	44.4
June	1996	84.3	51.9
July	1996	83.1	55.3
August	1996	82.7	53.6
September	1996	72.3	43.0
October	1996	60.6	33.3
November	1996	52.3	24.2
December	1996	45.1	16.4
January	1997	37.8	13.5
February	1997	44.2	20.8
March	1997	61.0	25.5
April	1997	58.8	29.3
May	1997	72.4	41.2
June	1997	81.2	48.5
July	1997	85.3	52.7
August	1997	82.0	53.1
September	1997	78.5	49.2
October	1997	65.4	32.1
November	1997	49.2	22.1
December	1997	37.2	12.1
January	1998	45.1	17.6
February	1998	45.1	20.2
March	1998	53.8	25.2
April	1998	59.6	28.9
May	1998	76.5	38.7
June	1998	84.1	46.8
July	1998	84.3	54.9
August	1998	83.7	53.1
September	1998	82.3	49.3
October	1998	62.7	35.4
November	1998	54.4	26.3
December	1998	46.5	16.3
January	1999	49.0	18.7
February	1999	54.3	19.8
March	1999	57.9	26.9
April	1999	60.7	29.8
May	1999	69.9	39.0
June	1999	80.6	46.1
July	1999	83.5	55.2
August	1999	80.7	52.4
September	1999	75.7	43.8
October	1999	69.2	32.5
November	1999	60.9	22.3

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	1999	43.2	12.6
January	2000	47.7	18.1
February	2000	53.3	21.9
March	2000	55.8	26.0
April	2000	67.4	34.3
May	2000	81.0	42.3
June	2000	84.6	50.5
July	2000	88.5	53.6
August	2000	85.5	53.8
September	2000	81.4	46.7
October	2000	60.9	35.9
November	2000	42.9	19.5
December	2000	42.4	17.0
January	2001	38.5	11.9
February	2001	46.9	20.4
March	2001	54.9	26.6
April	2001	65.5	33.4
May	2001	77.0	44.1
June	2001	86.8	49.1
July	2001	88.5	55.9
August	2001	83.3	51.9
September	2001	81.8	45.3
October	2001	70.0	34.1
November	2001	55.0	26.3
December	2001	43.1	12.5
January	2002	43.5	14.5
February	2002	47.5	14.5
March	2002	57.5	20.5
April	2002	71.8	35.2
May	2002	77.8	41.1
June	2002	89.5	52.6
July	2002	88.6	55.7
August	2002	87.9	52.7
September	2002	75.7	47.1
October	2002	63.1	34.6
November	2002	50.2	23.7
December	2002	40.6	15.7
January	2003	51.9	20.4
February	2003	46.5	21.2
March	2003	55.7	25.5
April	2003	65.7	31.9
May	2003	77.0	40.9
June	2003	84.0	49.1
July	2003	93.3	57.7
August	2003	85.7	54.9
September	2003	79.4	45.1
October	2003	70.6	37.0
November	2003	52.3	23.5

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	2003	44.0	16.0
January	2004	43.8	15.9
February	2004	41.1	14.5
March	2004	61.7	30.9
April	2004	60.7	33.2
May	2004	77.1	41.7
June	2004	84.9	49.0
July	2004	86.7	52.2
August	2004	81.8	52.4
September	2004	77.0	44.4
October	2004	62.6	35.3
November	2004	48.6	25.6
December	2004	43.0	15.2
January	2005	46.7	25.0
February	2005	46.1	26.0
March	2005	51.2	25.7
April	2005	64.1	32.2
May	2005	74.2	41.9
June	2005	84.4	47.7
July	2005	91.4	55.4
August	2005	82.6	52.4
September	2005	79.2	47.5
October	2005	63.8	36.0
November	2005	56.8	23.5
December	2005	46.4	15.0
January	2006	48.1	15.8
February	2006	53.0	16.7
March	2006	55.7	26.4
April	2006	69.9	34.1
May	2006	79.3	43.0
June	2006	87.5	51.7
July	2006	86.3	56.2
August	2006	79.3	55.4
September	2006	72.0	42.4
October	2006	64.0	34.6
November	2006	56.3	23.8
December	2006	40.8	15.1
January	2007	36.0	12.3
February	2007	46.8	19.7
March	2007	61.0	27.3
April	2007	64.1	32.7
May	2007	71.9	41.4
June	2007	84.4	49.1
July	2007	87.3	56.1
August	2007	88.2	55.9
September	2007	78.0	47.9
October	2007	68.6	34.1
November	2007	56.6	23.4

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	2007	39.2	17.2
January	2008	36.4	11.4
February	2008	46.4	21.2
March	2008	56.0	25.1
April	2008	64.2	30.5
May	2008	71.9	39.9
June	2008	85.9	49.2
July	2008	84.8	54.3
August	2008	83.1	54.2
September	2008	77.9	45.3
October	2008	66.2	34.1
November	2008	54.6	23.9
December	2008	40.8	17.8
January	2009	44.6	16.5
February	2009	52.1	21.6
March	2009	56.6	27.9
April	2009	62.9	32.3
May	2009	75.8	45.1
June	2009	79.1	48.5
July	2009	87.5	55.6
August	2009	85.7	51.6
September	2009	75.2	44.6
October	2009	61.3	32.8
November	2009	56.1	24.1
December	2009	35.5	10.8
January	2010	39.9	14.6
February	2010	41.2	19.3
March	2010	53.3	25.3
April	2010	64.0	32.7
May	2010	73.5	39.2
June	2010	87.8	51.3
July	2010	85.9	57.0
August	2010	84.0	54.0
September	2010	82.5	48.2
October	2010	68.0	36.6
November	2010	52.1	20.6
December	2010	46.6	21.8
January	2011	42.3	12.9
February	2011	44.5	14.2
March	2011	62.1	27.7
April	2011	66.8	33.5
May	2011	72.2	38.1
June	2011	88.7	53.6
July	2011	90.5	57.8
August	2011	87.7	57.1
September	2011	75.5	46.9
October	2011	65.3	34.7
November	2011	52.4	23.7

Month	Year	Average Max Temp (ºF)	Average Min Temp (ºF)
December	2011	37.5	13.6
January	2012	46.7	19.9
February	2012	47.2	21.3
March	2012	61.5	27.1
April	2012	69.2	37.4
May	2012	77.5	43.9
June	2012	90.9	54.3
July	2012	88.2	56.0
August	2012	87.1	55.4
September	2012	79.5	46.7
October	2012	70.9	34.6
November	2012	58.2	22.7
December	2012	42.4	13.7
January	2013	38.8	8.0
February	2013	46.0	16.7
March	2013	59.7	26.1
April	2013	66.3	32.9
May	2013	75.2	42.2
June	2013	89.5	53.9
July	2013	84.5	56.6
August	2013	84.3	55.2
September	2013	76.1	49.2
October	2013	63.4	32.8
November	2013	49.3	24.3
December	2013	41.5	15.4
January	2014	46.9	16.4
February	2014	53.0	23.8
March	2014	57.5	27.8
April	2014	64.3	31.7
May	2014	72.9	40.5
June	2014	86.5	51.9
July	2014	84.0	56.3
August	2014	81.6	52.1
September	2014	80.6	50.5
October	2014	70.1	37.5
November	2014	52.9	23.0
December	2014	43.7	19.4
January	2015	43.6	19.0
February	2015	50.2	22.1
March	2015	62.1	30.3
April	2015	65.1	34.8
May	2015	68.0	40.3
June	2015	84.6	54.7
July	2015	81.9	56.7
August	2015	84.3	56.3
September	2015	81.5	52.7
October	2015	66.2	42.4
November	2015	51.4	26.5
December	2015	41.6	21.4
January	2016	41.7	18.7
February	2016	52.7	24.0
March	2016	61.0	29.1
April	2016	63.4	34.3
May	2016	71.8	40.3
June	2016	89.7	53.4

White Rock Precipitation

Data is for tower wrarc. This file was obtained from the LANL Weather Machine http://weather.lanl.gov. Request made on Tuesday, July 19 09:22:13 2016 MST.

Day	Month	Year	Total Precip (inches)
31	October	1964	0.06
30	November	1964	0.52
31	December	1964	0.56
31	January	1965	1.04
28	February	1965	0.65
31	March	1965	0.93
30	April	1965	1.2
31	May	1965	1.37
30	June	1965	2.28
31	July	1965	1.54
31	August	1965	3
30	September	1965	2.42
31	October	1965	1.06
30	November	1965	0.62
31	December	1965	2.62
31	January	1966	0.34
28	February	1966	0.94
31	March	1966	0.09
30	April	1966	0
31	May	1966	0
30	June	1966	2.07
31	July	1966	1.79
31	August	1966	3.19
30	September	1966	0.9
31	October	1966	0.08
30	November	1966	0.4
31	December	1966	0.46
31	January	1967	0.05
28	February	1967	0.43
31	March	1967	0.23
30	April	1967	0
31	May	1967	0.44
30	June	1967	1.45
31	July	1967	2.27
31	August	1967	4.88
30	September	1967	1.75
31	October	1967	0.14
30	November	1967	0.25
31	December	1967	1.63
31	January	1968	0.03
29	February	1968	1.04
31	March	1968	0.71
30	April	1968	0.44
31	May	1968	1.4
30	June	1968	0.52
31	July	1968	4.51
31	August	1968	3.89
30	September	1968	0.48
31	October	1968	0.3
30	November	1968	0.41
31	December	1968	0.47
31	January	1969	0.44
28	February	1969	0.48
31	March	1969	0.72
30	April	1969	1.98
31	May	1969	1.47
30	June	1969	2.22
31	July	1969	2.05
31	August	1969	4.26
30	September	1969	1.38
31	October	1969	2.84
30	November	1969	0.08
31	December	1969	1.07
31	January	1970	0
28	February	1970	0.08
31	March	1970	1.21
30	April	1970	0.1
31	May	1970	0.17
30	June	1970	0.82
31	July	1970	3.01
31	August	1970	2.45
30	September	1970	1.55
31	October	1970	0.28
30	November	1970	0.08

Day	Month	Year	Total Precip (inches)
31	December	1970	0
31	January	1971	1.33
28	February	1971	0.45
31	March	1971	0.25
30	April	1971	0.55
31	May	1971	0.7
30	June	1971	0.3
31	July	1971	3.93
31	August	1971	1.74
30	September	1971	1.88
31	October	1971	1.94
30	November	1971	0.95
31	December	1971	1.77
31	January	1972	0.1
29	February	1972	0.07
31	March	1972	0.07
30	April	1972	0
31	May	1972	1.3
30	June	1972	1.03
31	July	1972	1.34
31	August	1972	3.44
30	September	1972	3.06
31	October	1972	2.7
30	November	1972	1.45
31	December	1972	0.9
31	January	1973	0.37
28	February	1973	0.6
31	March	1973	2.06
30	April	1973	0.38
31	May	1973	0.95
30	June	1973	0.55
31	July	1973	2.88
31	August	1973	1.43
30	September	1973	1.6
31	October	1973	0.33
30	November	1973	0.31
31	December	1973	0.19
31	January	1974	1.01
28	February	1974	0.45
31	March	1974	0.9
30	April	1974	0.26
31	May	1974	0.01
30	June	1974	0.66
31	July	1974	2.19
31	August	1974	2.21
30	September	1974	0.85
31	October	1974	2.65
30	November	1974	0.33
31	December	1974	0.61
31	January	1975	0.95
28	February	1975	1.42
31	March	1975	0.93
30	April	1975	0.93
31	May	1975	0.1
30	June	1975	0.84
31	July	1975	2.58
31	August	1975	0.85
30	September	1975	2.8
31	October	1975	0.07
30	November	1975	0.59
31	December	1975	0.24
31	January	1976	0
29	February	1976	1.01
31	March	1976	0.58
30	April	1976	0.32
31	May	1976	0.57
30	June	1976	0.06
31	July	1976	3.65
31	August	1976	2.77
30	September	1976	1.28
31	October	1976	0
30	November	1976	0.72
31	December	1976	0.1
31	January	1977	0.76
28	February	1977	0.06
31	March	1977	0.17
30	April	1977	1.13
31	May	1977	0.44
30	June	1977	0.96
31	July	1977	1.11
31	August	1977	1.52
30	September	1977	0.3

Day	Month	Year	Total Precip (inches)
31	October	1977	0.05
30	November	1977	1.19
31	December	1977	0.13
31	January	1978	0.79
28	February	1978	0.14
31	March	1978	1.01
30	April	1978	0.05
31	May	1978	1.21
30	June	1978	0.7
31	July	1978	1.25
31	August	1978	0.75
30	September	1978	0.58
31	October	1978	0.6
30	November	1978	3.05
31	December	1978	1.09
31	January	1979	0.8
28	February	1979	0.05
31	March	1979	0.32
30	April	1979	0.09
31	May	1979	1.45
30	June	1979	1.24
31	July	1979	0.24
31	August	1979	1.05
30	September	1979	0.44
31	October	1979	0.46
30	November	1979	0
31	December	1979	0
31	January	1980	0
29	February	1980	0
31	March	1980	0
30	April	1980	0
31	May	1980	0.64
30	June	1980	0
31	July	1980	0.17
31	August	1980	0.97
30	September	1980	0.52
31	October	1980	0.58
30	November	1980	0.35
31	December	1980	0.18
31	January	1981	0.08
28	February	1981	0.07

Day	Month	Year	Total Precip (inches)
31	March	1981	1.7
30	April	1981	0.9
31	May	1981	0.96
30	June	1981	0.55
31	July	1981	1.88
31	August	1981	1.22
30	September	1981	2.06
31	October	1981	0.97
30	November	1981	0.56
31	December	1981	0
31	January	1982	0.7
28	February	1982	1.37
31	March	1982	0.73
30	April	1982	0.2
31	May	1982	1.12
30	June	1982	0.95
31	July	1982	2.02
31	August	1982	2.43
30	September	1982	1.52
31	October	1982	0.48
30	November	1982	1.5
31	December	1982	1.36
31	January	1983	0.88
28	February	1983	0.62
31	March	1983	1.25
30	April	1983	0.62
31	May	1983	0
30	June	1983	0.63
31	July	1983	2.49
31	August	1983	2.16
30	September	1983	0.48
31	October	1983	1.01
30	November	1983	0.58
31	December	1983	0.61
31	January	1984	0.41
29	February	1984	0.02
31	March	1984	1.44
30	April	1984	0.23
31	May	1984	0.16
30	June	1984	0.3
31	July	1984	1.51

Day	Month	Year	Total Precip (inches)
31	August	1984	2.65
30	September	1984	0.2
31	October	1984	2.41
30	November	1984	0.25
31	December	1984	2.65
31	January	1985	0.53
28	February	1985	1.18
31	March	1985	3.36
30	April	1985	2.8
31	May	1985	2.05
30	June	1985	0.82
31	July	1985	1.08
31	August	1985	2.06
30	September	1985	1.91
31	October	1985	3.12
30	November	1985	0.52
31	December	1985	0.16
31	January	1986	0.01
28	February	1986	0.87
31	March	1986	0.84
30	April	1986	1.21
31	May	1986	1.45
30	June	1986	3.26
31	July	1986	2.7
31	August	1986	0.97
30	September	1986	2.48
31	October	1986	1.95
30	November	1986	2.54
31	December	1986	0.61
31	January	1987	0.94
28	February	1987	1.26
31	March	1987	0.38
30	April	1987	0.49
31	May	1987	2.35
30	June	1987	0.52
31	July	1987	1.28
31	August	1987	4.82
30	September	1987	0.96
31	October	1987	0.49
30	November	1987	1.2
31	December	1987	1.19

Day	Month	Year	Total Precip (inches)
31	January	1988	0.86
29	February	1988	0.18
31	March	1988	0.55
30	April	1988	1.25
31	May	1988	1.59
30	June	1988	0.99
31	July	1988	2.15
31	August	1988	0
30	September	1988	3.47
31	October	1988	0.74
30	November	1988	0.23
31	December	1988	0.18
31	January	1989	1.27
28	February	1989	0.7
31	March	1989	0.68
30	April	1989	0.1
31	May	1989	1.65
30	June	1989	0.55
31	July	1989	1.7
31	August	1989	1.37
30	September	1989	1.59
31	October	1989	3.86
30	November	1989	0.05
31	December	1989	0.55
31	January	1990	0.67
28	February	1990	0.38
31	March	1990	0.54
30	April	1990	1.59
31	May	1990	0.76
30	June	1990	0.92
31	July	1990	4.64
31	August	1990	0.88
30	September	1990	2.28
31	October	1990	0.28
30	November	1990	1.71
31	December	1990	1.91
31	January	1991	0.18
28	February	1991	0.56
31	March	1991	1.17
30	April	1991	0.02
31	May	1991	1.79

Day	Month	Year	Total Precip (inches)
30	June	1991	1.66
31	July	1991	4.54
31	August	1991	2.53
30	September	1991	1.83
31	October	1991	0.58
30	November	1991	2.2
31	December	1991	1.75
31	January	1992	0.49
29	February	1992	0.47
31	March	1992	1.04
30	April	1992	0.23
31	May	1992	3.41
30	June	1992	0.81
31	July	1992	1.17
31	August	1992	1.66
30	September	1992	1.03
31	October	1992	0.22
30	November	1992	0.96
31	December	1992	1.65
31	January	1993	2.04
28	February	1993	1.28
31	March	1993	0.79
30	April	1993	0.04
31	May	1993	1.05
30	June	1993	0.34
31	July	1993	1.33
31	August	1993	3.91
30	September	1993	0.72
31	October	1993	0.56
30	November	1993	0.93
31	December	1993	0.12
31	January	1994	0.3
28	February	1994	0.31
31	March	1994	1.22
30	April	1994	0.95
31	May	1994	2.04
30	June	1994	0.73
31	July	1994	2.1
31	August	1994	2.36
30	September	1994	1.53
31	October	1994	2.51

Day	Month	Year	Total Precip (inches)
30	November	1994	2.13
31	December	1994	0.77
31	January	1995	0.8
28	February	1995	0.49
31	March	1995	0.47
30	April	1995	1.29
31	May	1995	1.61
30	June	1995	1.1
31	July	1995	0.73
31	August	1995	3.21
30	September	1995	2.72
31	October	1995	0
30	November	1995	0.1
31	December	1995	0.27
31	January	1996	0.8
29	February	1996	0.46
31	March	1996	0.15
30	April	1996	0.07
31	May	1996	0
30	June	1996	3.32
31	July	1996	3.52
31	August	1996	1.5
30	September	1996	1.36
31	October	1996	3.62
30	November	1996	0.53
31	December	1996	0.01
31	January	1997	1.05
28	February	1997	1.56
31	March	1997	0.17
30	April	1997	1.74
31	May	1997	0.96
30	June	1997	1.72
31	July	1997	1.64
31	August	1997	3.98
30	September	1997	2.06
31	October	1997	0.85
30	November	1997	0.88
31	December	1997	1.17
31	January	1998	0.03
28	February	1998	0.2
31	March	1998	1.46

Day	Month	Year	Total Precip (inches)
30	April	1998	0.61
31	May	1998	0.01
30	June	1998	0.45
31	July	1998	3.35
31	August	1998	1.66
30	September	1998	1.25
31	October	1998	3.35
30	November	1998	0.3
31	December	1998	0.02
31	January	1999	0.08
28	February	1999	0.02
31	March	1999	1.11
30	April	1999	2.19
31	May	1999	1.66
30	June	1999	3.75
31	July	1999	1.7
31	August	1999	4.1
30	September	1999	1.45
31	October	1999	0.5
30	November	1999	0.05
31	December	1999	0.24
31	January	2000	0.38
29	February	2000	0.03
31	March	2000	1.2
30	April	2000	0.5
31	May	2000	0
30	June	2000	1.58
31	July	2000	1.26
31	August	2000	3.3
30	September	2000	0.32
31	October	2000	3.58
30	November	2000	1.63
31	December	2000	0.25
31	January	2001	1.5
28	February	2001	0.69
31	March	2001	0.66
30	April	2001	0.78
31	May	2001	0.58
30	June	2001	0.61
31	July	2001	1.45
31	August	2001	2.01
30	September	2001	0.22
31	October	2001	0.27
30	November	2001	0.15
31	December	2001	0.15
31	January	2002	0.58
28	February	2002	0.02
31	March	2002	0.01
30	April	2002	0.25
31	May	2002	0
30	June	2002	0.52
31	July	2002	0.64
31	August	2002	1.7
30	September	2002	2.46
31	October	2002	1.74
30	November	2002	0.79
31	December	2002	0.66
31	January	2003	0
28	February	2003	0.84
31	March	2003	0.96
30	April	2003	0.19
31	May	2003	1.6
30	June	2003	0.09
31	July	2003	0.17
31	August	2003	2.28
30	September	2003	0.44
31	October	2003	1.13
30	November	2003	0.64
31	December	2003	0.26
31	January	2004	0.53
29	February	2004	1.17
31	March	2004	1.08
30	April	2004	3.08
31	May	2004	0
30	June	2004	0.53
31	July	2004	1.46
31	August	2004	2.19
30	September	2004	1.17
31	October	2004	2.76
30	November	2004	1.05
31	December	2004	0.62
31	January	2005	1.67

Day	Month	Year	Total Precip (inches)
28	February	2005	1.69
31	March	2005	1.63
30	April	2005	1.28
31	May	2005	0.67
30	June	2005	0.27
31	July	2005	0.86
31	August	2005	3.19
30	September	2005	3.77
31	October	2005	1.59
30	November	2005	0.08
31	December	2005	0
31	January	2006	0.08
28	February	2006	0
31	March	2006	0.33
30	April	2006	0.25
31	May	2006	0.18
30	June	2006	0.94
31	July	2006	2.17
31	August	2006	4.58
30	September	2006	0.6
31	October	2006	1.65
30	November	2006	0.42
31	December	2006	1.31
31	January	2007	0.5
28	February	2007	0.52
31	March	2007	0.95
30	April	2007	0.61
31	May	2007	1.53
30	June	2007	1.05
31	July	2007	2.42
31	August	2007	1.15
30	September	2007	2.38
31	October	2007	0.22
30	November	2007	1.42
31	December	2007	2.3
31	January	2008	1.02
29	February	2008	0.91
31	March	2008	0.88
30	April	2008	0.16
31	May	2008	0.84
30	June	2008	0.04

Day	Month	Year	Total Precip (inches)
31	July	2008	1.84
31	August	2008	2.01
30	September	2008	0.54
31	October	2008	1.99
30	November	2008	0.39
31	December	2008	1.3
31	January	2009	0.15
28	February	2009	0.02
31	March	2009	0.91
30	April	2009	0.83
31	May	2009	1.05
30	June	2009	1.74
31	July	2009	2.01
31	August	2009	0.95
30	September	2009	1.93
31	October	2009	1.34
30	November	2009	0.39
31	December	2009	0.5
31	January	2010	1.15
28	February	2010	1.16
31	March	2010	1.32
30	April	2010	0.64
31	May	2010	0.25
30	June	2010	0.22
31	July	2010	3.49
31	August	2010	2.88
30	September	2010	0.78
31	October	2010	0.54
30	November	2010	0.05
31	December	2010	1.01
31	January	2011	0
28	February	2011	0.01
31	March	2011	0.03
30	April	2011	0.23
31	May	2011	0.04
30	June	2011	0.02
31	July	2011	2.53
31	August	2011	2.66
30	September	2011	2.71
31	October	2011	1.66
30	November	2011	0.26

Day	Month	Year	Total Precip (inches)
31	December	2011	1.35
31	January	2012	0.07
29	February	2012	0.12
31	March	2012	0.17
30	April	2012	0.74
31	May	2012	0.78
30	June	2012	0
31	July	2012	2.02
31	August	2012	1.64
30	September	2012	0.6
31	October	2012	0.14
30	November	2012	0.11
31	December	2012	0.53
31	January	2013	0.27
28	February	2013	0.12
31	March	2013	0.15
30	April	2013	0.1
31	May	2013	0
30	June	2013	1.01
31	July	2013	2.85
31	August	2013	1.86
30	September	2013	7.68
31	October	2013	0.66
30	November	2013	1.67
31	December	2013	0.05
31	January	2014	0.01
28	February	2014	0.07
31	March	2014	0.51
30	April	2014	0.11
31	May	2014	0.98
30	June	2014	0.66
31	July	2014	3.98
31	August	2014	1.17
30	September	2014	0.26
31	October	2014	0.41
30	November	2014	0.45
31	December	2014	0.91
31	January	2015	1.03
28	February	2015	0.72
31	March	2015	0.62
30	April	2015	0.77
31	May	2015	2.92
30	June	2015	0.38
31	July	2015	3.68
31	August	2015	1.32
30	September	2015	0.3
31	October	2015	2.82
30	November	2015	0.78
31	December	2015	0.6