Climatological Data for August, 1910.

DISTRICT No. 11, CALIFORNIA.

Prof. ALEXANDER G. McADIE, District Editor.

GENERAL SUMMARY.

August is a month of little rain in this district. The present season, however, has been marked by the absence of rain, not only in California but over the entire Pacific Slope. In fact, there appears to have existed an unusually dry spell. It was also a season when the temperature was below the normal. Speaking generally there was less than half of the seasonal rainfall, and in some places little more than one-quarter. Eighty-seven per cent of the stations reporting were without rain. In most respects August throughout California was an average midsummer month. Owing to the early stoppage of the rainy season, the roads were unusually dusty, the water in wells low, and the streams at a lower stage than known for many years. Snow in the mountains was to be found only on a few of the higher peaks. At elevations less than 12,000 feet there was little or no snow.

The precipitation was less than in any year during which records have been kept.

The weather was favorable from an agricultural standpoint and fruits ripened nicely. There was not, however, a sufficient supply of water at most points. There were no especially warm periods. Afternoon temperatures in the Great Valley frequently exceeded 100°, but this is not unusual. The highest afternoon temperature in the San Joaquin Valley occurred on the 23d and averaged about 108°. The highest afternoon temperature in the lower Sacramento Valley was 102° on the 23d; but in the northern part of the valley, 105° on the 5th.

TEMPERATURE.

The mean temperature for the State was normal. The following table shows the mean temperatures for California during the time in which records have been kept:

Year.	Mean.	Departure.	Year.	Mean.	Departure.
	°F.	°F.		°F.	°F.
1897	73.9	+1.4	1904	73.9	+1.4
1898	74.5	+2.0	1905	73.4	+0.9
1899	70.8	−1.7	1906	73.6	+1.1
1900	71.0	−1.5	1907	71.0	−1.5
1901	75.6	+3.1	1908	73.3	+0.8
1902	71.8	−0.7	1909	72.1	−0.4
1903	72.6	+0.1	1910	72.5	0.0

The highest temperature reported at any station was 120° on August 30 and 31, at Mammoth Tank. This was 6° higher than the highest temperature recorded during August, 1909, which occurred at the same point. Temperatures, however, as high as 130° have been recorded at points in the Salton Desert in previous years. The lowest temperature recorded was 20° on August 31, at Quincy, in Plumas County. This is 4° colder than the lowest temperature recorded during August, 1909.

At many stations the monthly mean temperature was 5° or more above the normal; yet on the other hand, at most stations it was from 2° to 4° below the normal. Indeed the temperature varied greatly at stations not far apart; and local factors apparently influenced to a large degree the readings.

PRECIPITATION.

The average monthly precipitation for the State was 0.01 of an inch or 0.05 of an inch below the normal. The normal, however, is unduly large, owing to a phenomenal rainfall in 1909.

The greatest monthly precipitation was 0.91 inch at Needles. Rain was reported only at 13 per cent of the stations considered. The precipitation occurred almost entirely in the southern counties and was associated with storms of the Sonora type. The heaviest 24-hour rainfall was 0.53 inch at Needles.

There was no rain on the north coast during the month. This is quite unusual as generally light showers occur. At the close of the month the rainfall at Eureka for the period from April 1 to August 31 was about one-quarter of the usual amount.

The average monthly precipitation for California in August is as follows:

Year.	Amount.	Departure.	Year.	Amount.	Departure.
	Inch.	Inch.		Inch.	Inch.
1897	0.03	−.03	1904	0.17	+.11
1898	0.02	−.04	1905	0.03	−.03
1899	0.11	+.05	1906	0.13	+.07
1900	0.02	−.04	1907	0.11	+.05
1901	0.12	+.06	1908	0.12	+.06
1902	0.06	00	1909	0.19	+.13
1903	0.02	−.04	1910	0.01	−.05

SUNSHINE.

The following table gives the hours of sunshine and the percentage of possible:

Stations.	Hours.	Per cent of possible.	Stations.	Hours.	Per cent of possible.
Eureka	143	33	Sacramento	425	100
Fresno	418	100	San Diego	320	77
Los Angeles	415	83	San Francisco	309	73
Mount Tamalpais	414	98	San Jose	345	82
Red Bluff	425	100	San Luis Obispo	304	73

EARTHQUAKES.

Eureka, Cal., August 4.—A sharp earthquake shock occurred at 5:27 p. m. It came as one jolt and was of sufficient violence to shake buildings and stop the office clock. The vibrations were from a southerly direction and lasted about 8 seconds. Barometer, 30.15 inches; temperature, 55°; clear; wind, north, 5 miles per hour. The maximum phase of new moon occurred at 10:20 p. m. A second shock was felt about midnight. Very light.—*A. H. Bell, Observer.*

Santa Clara, Cal., August 4.—The seismograph at Santa Clara College registered a disturbance, which was the longest one on record here. It began at 5:32 p. m. and ended at 6:45:18 p. m., and had a west movement. The greatest amplitude was at 5:34:40 p. m., movement east and west. The vertical component showed a period of 2 seconds main portion and varying to 6 seconds at the end. The disturbance had its origin apparently southeast of Santa Clara College. No shock felt.

Santa Clara, August 11.—The seismograph recorded a disturbance at 8:37:45 a. m., ending 8:41 a. m. The maximum north and south movement was at 8:37:54; an east-west movement at 8:38:10. The period was 2 seconds and the disturbance apparently northeast of Santa Clara.

Santa Clara, Cal., August 20.—9:49:38 p. m., ending 10:05 p. m., period 2 seconds. Two distinct shocks recorded, second at 9:57:36. Disturbance west of here.

Santa Clara, Cal., August 26.—12:30:48 p. m., ended 12:37. Two distinct shocks recorded. Period about ½ second on first and 1½ on second record. Disturbance northwest. Many short tremors between.

NOTES ON THE RIVERS OF THE SACRAMENTO AND SAN JOAQUIN WATERSHEDS FOR THE MONTH OF AUGUST, 1910.

By N. R. TAYLOR, Local Forecaster, Sacramento, Cal.

Sacramento watershed.—There was a steady but slow fall in all of the smaller streams in the Sacramento drainage basin during the month of August. The Sacramento River itself from Red Bluff to the mouth of the Pitt has remained practically station-

ary since the last of July. While the river at Red Bluff averaged slightly above the low water of 1908, it was, with this exception, the lowest ever recorded during any month. Below Red Bluff, especially in most of the reaches between Colusa and Knights Landing, there was little interruption in the fall of the river during the month.

At Colusa the Sacramento averaged 1.1 foot, which is 1.4 foot below the August normal stage, and 1.2 foot below the low water of 1908.

At Knights Landing the zero stage was reached on the 9th of the month, and on the 31st a stage of 0.3 below zero was recorded, which is the lowest stage ever before noted at this point.

At Sacramento the river averaged 0.1 foot above the previous lowest monthly average, which was in September, 1908, and 2.4 feet below the August normal stage. At this point the fall was frequently interrupted by the tides, which, in some cases, amounted to a rise of as much as 0.4 foot. Below Sacramento there was little departure from the summer stage, except that the effects of flood tides were more marked than usual.

In some of the reaches the Sacramento has left its usual summer channel, and, as a result, navigation has been rendered difficult, and frequent groundings have occurred among the large craft.

The Yuba River at Marysville averaged over 1 foot below the usual August stage, and was 0.8 foot lower than the previous lowest average for the month. The run-off in the numerous forks of this stream was markedly deficient, so much so that it is reported that several mines have been compelled to close on account of the scarcity of water.

At Oroville the Feather averaged 1.4 foot below the usual August stage, and nearly 1 foot below the lowest previous monthly average of which there is a record. At the close of the month all the feeders of the Feather River carried less water than they have ever been known to carry before.

The American River at Folsom averaged 0.6 foot below the normal August stage, and was 0.3 foot lower than the low water of August, 1908. The run-off of all streams in the headwaters of this river diminished very slowly during the month, and the American itself exhibited an unusually sluggish condition, there being a range of only 0.1 foot between the highest and lowest stages.

San Joaquin watershed.—All reports received from streams in the drainage basin of the San Joaquin during August show a steady but gradual decrease in the water supply, and, in some cases, exhibit lower gage readings than have ever before been recorded. The Stanislaus at Melones averaged over 3 feet below the zero of the gage. The Mokelumne at Electra averaged 0.1 below zero, and the Tuolumne at Jacksonville averaged 0.3 foot above the zero of the gage. The Merced River at Merced Falls averaged 0.8 foot below the zero of the gage and 0.4 below the lowest previous average for the month of August.

The San Joaquin River itself was markedly below its usual August stage from Pollasky to Lathrop, but from Lathrop to the lower islands there was little departure from the normal summer stage.

SMOKE FROM BURNING FORESTS.

The British ship *Dunfermline*, which arrived at San Francisco from Newcastle, Australia, August 31, 1910, reports that the smell of the forest fires was noticed when the ship was 500 miles from land. The odor of burning wood was quite unmistakable and officers of the ship stated that they expected to find evidence of a great conflagration upon reaching port. The haze from the forest fires made it impossible to get an observation for about 10 days.

The observation is of unusual interest because the prevailing winds in this region are from the west or northwest. During the morning hours, however, there is a gentle movement of the lower air from the land seaward. It seems hard to realize that the smoke should have been carried so far from the land.

MOUNTAIN SITES FOR OBSERVATORIES ON THE PACIFIC SLOPE.

By A. G. McADIE.

It was the writer's privilege to be a member of Doctor Campbell's expedition to the summit of Mount Whitney in August, 1909, when certain spectroscopic studies were made of the atmosphere of Mars. The site was selected, after some preliminary investigations by Messrs. Campbell and Abbot, because it is practically above the level of the water vapor of the atmosphere. This virtually eliminates absorptive effects due to dust, haze, water vapor, and other matter prevailing in general in the lower air strata. The elevation is 4,400 meters and the general climatic reputation one of clear weather and extreme dryness. Mount Whitney is historically familiar because of Langley's early work on the transparency of the atmosphere and his determination of the value of the solar constant. Langley's work was carried on not at the summit, but some 600 meters below, over on the Kern side, at what is now known as Langley's Camp. In 1909 Abbot repeated to some degree the earlier observations, using, however, the summit. His is the first use of a complete bolometric outfit at an elevation above 4 kilometers.

The station has again been occupied during the present season by Abbot and doubtless some valuable solar energy curves were obtained for comparison with those made at lower levels.

Acting on the recommendation of Messrs. Campbell and Abbot, Dr. C. D. Walcott, Secretary of the Smithsonian Institution, authorized the construction of a small stone building on the summit, and this shelter is now available for astrophysical purposes. The erection of this shelter is in line with the development of high-level observatories in America. The establishment of the Lick Observatory may be said to mark the beginning of the movement in favor of sites where research could be conducted under atmospheric conditions markedly different from those where the great astronomical observatories of the world were situated, namely, at low levels and near centers of population. Harvard Observatory early recognized the value of high-level sites and established observing stations in South America. The inauguration of the Solar Physics Observatory at Mount Wilson is but a progressive development and clearer recognition of the necessity of carrying on work where there is the greatest possible freedom from the atmospheric disturbances so common at low levels.

Primarily the degree of definition or clearness of seeing will determine the reputation of both observatory and observer. The astrophysicist is handicapped by his inability to get away from earth; or to get out of the convectional region, i. e., from the surface up to the region of constant temperature. If it were possible to work at an elevation of about 11 kilometers, it would be found that the "load," as it may be called, of foreign matter in the atmosphere is practically *nil*, and that the several gases are distributed according to their molecular weights. The so-called isothermal region is one in which there is no vertical convection; and also, because of the absence of water vapor, one where absorption of solar radiation is a minimum. Professor Turner has pointed out that such conditions must materially affect refraction.

Recent discussion of the amount of water vapor in the atmosphere of Mars shows the need of some better knowledge of the amount of water vapor in the lower air strata. Water vapor is present to the extent of 1.2 per cent of the total gases at the surface of the earth (according to Humphreys[1]), and decreases rapidly with increase of elevation to an imperceptible amount at or below 10 kilometers. It is plain, therefore, that for problems connected with planetary atmospheres, as well as solar and stellar atmospheres, and for work bearing upon solar radiation, the greater the altitude, other things being equal, the more accurate the work. If one stops to consider the irregular dis-

[1] Mount Weather Bulletin, Vol. 2, Part 2, p. 66.