In the United States, from latitude 40° northward, auroras of more or less brilliance are usually observed several times in the course of a year. The display of May 14–15, 1921, however, was exceptionally noteworthy in two particulars: first, its accompanying earth currents caused the greatest demoralization to telegraphic communication ever recorded, and secondly, it was seen in extreme southern latitudes with all the brilliance usually observed in the north. In geographic extent it was very widespread. Reports thus far received show that the display was witnessed from northern and central Europe westward over the Atlantic, across the United States and far over the Pacific, reaching as far south as Apia, Samoa.

THE AURORA AND COMMUNICATION.

The following reports taken from the press of the country will give a good idea of the great difficulties experienced by the telegraphic and cable companies as a result of the excessive earth currents accompanying the aurora. In contrast to this state of affairs it is interesting to learn that radio transmission was not only not hindered but in many cases the signals were reported to have come in even better than usual.

New York, May 15, 1921.—Telegraph service throughout the United States was impeded seriously last night by an electrical disturbance caused by the aurora borealis or northern lights.

The heaviest effect of the phenomenon was felt on the lines of the Western Union Telegraph Co. in the West and South, while those in New England, it was said, although under its influence, were not badly affected.

Officials of the Western Union Telegraph Co. declared the cause of the disturbance to be due to an extra voltage, which entered the wire at one unknown point and left them at another. The variability of the extra voltage, which did not remain constant for more than a period of a few minutes, made it impossible to adjust the telegraphic apparatus and overcome the disturbance.

At the New York end of a wire which extends to Pittsburgh the current varied within a short time from 8% to 9%. The lights of the auroras borealis were reported visible in great brilliancy at Scranton, Pa., and points between there and Pittsburgh.

The greatest disturbance to the operation of the telegraph by the aurora borealis here was noted last night at 11.30 o'clock, when earth currents, due to the northern lights, registered 1000 volts. The highest previous voltage recorded was 200, according to the wire chief of the Western Union Telegraph Co. The increasing voltage of earth currents was first noted Friday at 3 p.m.—New York Times, May 15, 1921.

Helena, Mont., May 15, 1921.—The electrical storm was said to be the worst in the history of the Mountain States Telephone & Telegraph Co.'s operations in Montana. Advice reached here by relay from several repeating stations was to the effect that the storm extended in an arc from Chicago to San Francisco and into the Pacific ocean. The severity of the storm is indicated by the fact that for the first time in history the telegraph and cable lines to Alaska were completely out of commission for a time and that Territory isolated from the outside world.

COMPLETELY AT ITS MERCY.

Shortly before midnight it was learned that Denver, Salt Lake, San Francisco, Seattle, Spokane and Winnemucca, all important telegraph points on the line, were at the mercy of the elements. With the ever increasing electrical discharges would enter the earth from the heavens and completely polarize these points of entrance. Then for a few minutes the air and ground would be cleared and an attempt to resume operation would be made only to result in failure through the continued activities of the northern lights.

The condition of Helena was particularly severe. For only momentary remissions would the electrical discharge be drawn from the wires Fom Pawnee stations and a heavy pulsating current entered the system almost immediately from Spokane that the center of activity had shifted to Spokane. Then Salt Lake would begin to report that the wire was cleared and the message would be suddenly cut short before other information could be transmitted.—The Independent.

Operators puzzled.—Those who saw the strange lights were not more puzzled than telegraph operators between Chicago and San Francisco whose machines cut up queer capers. For a time the instruments clicked away, sometimes sending what made sense and at other times sending dashes of almost intelligence which left operators wondering what was happening.—San Francisco Examiner, May 15, 1921.

French wires affected.—The disturbance which interrupted telegraphic transmission in the United States last week has been making itself felt also in France.

On Saturday night especially the operators at the central transmission stations came to the conclusion that a strange force had got into their instruments, for nothing would go right. Morse instruments, instead of making dots and dashes, recorded one long line. Hughes instruments produced words in, what might have been an unknown language, and Baudot, of which French telegraphers are proud because it is very intricate, seemed possessed by evil spirits.

The phenomenon was first noticed in western France late on Friday evening and gradually spread eastward. All lines were not affected similarly, neighboring ones behaving normally or eccentrically from one another.

One feature was that while earth currents were disturbed, the wireless apparatus remained unaffected.—New York Times, May 15, 1921.

The Western Union Telegraph Co. reports that the magnetic disturbances accompanying the aurora on May 15 blew out fuses, injured electrical apparatus, and did other things which had never been caused by any ground and ocean currents known in the past. It appears as though the company will probably have to send out ships to drag up the wire to repair the damage produced by straying currents.—Scientific American, New York, May 28, 1921, page 123.

Bremer, N. Y., building burned as a result of static electricity associated with the auroral display of May 15.—Static electricity, due to the aurora borealis, which was of unusual brilliancy late Saturday night, caused a fire which totally destroyed the Central New England Railroad station in Bremer, N. Y., affected the telephone and telegraph system of the entire railroad system, and disorganized the circuits of the Western Union and Postal Telegraph Co.'s and put nearly all of the toll line circuits of the Southern New England Telephone Co. out of commission.

The electrical phenomenon was widespread over the country, starting in the early evening in some parts of the country and continuing until dawn. In this section the display appeared to be at its height between 11 and 12 o'clock, and it was at that time the static electric caused the fire in Bremer.

Unlike other displays of the aurora borealis, the shafts of light completely encircled the city and some of the time was directly overhead. It shot about in varicolored waves, creating a beautiful and at the same time an awe-inspiring spectacle. The disturbance did not abate, according to press reports, until the coming of dawn.

The fire in the Bremer railroad station started at 10:15 o'clock. Operator Hatch was working at the key when a flash of flame came out of the key and the cord was almost instantly into the flames. Operator Hatch saw that the switchboard was in flames.—Danbury Evening News, May 18, 1921.

REPORTS OF OBSERVATIONS.

The descriptions below have been culled out from a large number sent in to the Weather Bureau. An effort has been made to select a few representative of the several sections of the country. For convenience they have been arranged approximately in belts extending across the country from east to west for each 5° of latitude. Thus the first belt takes in the area between the fortieth and forty-fifth parallels, the second that between 35° and 40°, etc.

Middletown, Conn.—A very bright auroral display was observed here on the evening of May 14. The sky was overcast until 10 p.m. As the clouds dissolved the aurora was noted in spite of the bright moonlight. The aura display was near the zenith in the vicinity of the star Arcturus. From that point streamers radiated in all directions constantly changing both in position and in intensity. Across these streamers would appear clouds dissolved the aurora was noted in spite of the bright moonlight. The aura display was near the zenith in the vicinity of the star Arcturus. From that point streamers radiated in all directions constantly changing both in position and in intensity. Across these streamers would appear
Bright colors were noticed during the evening, but after the moon set about midnight, pale reds and blues appeared on the edges of the streamers and clouds. The display continued at intervals throughout the night. Each emerald was conspicuous in the north than in other directions.—Frederick Stocum.

Syracuse, N. Y., June 18, 1921.—On the 14th of May I was in the university observatory, watching Jupiter and Saturn when a display of red light which looked like a beautiful pink and red streamer in the vicinity of Saturn or higher and farther east. ** * ** But the next day, the 15th, I made observations by measurements by the method I use. At 11:30 and 12:30 p.m., I noticed the display that appeared with a single spot 20,000 miles in diameter and 94,000 the longest way from outside to outside of the two groups which had both passed the same sky at a point 40° to 60° north of the center of the sun's disk. ** * ** seemed to explain the display.—Prof. E. D. Roes, jr., Syracuse University.

Ashland, Ohio.—There was the single and double bow, the pale blue and white light, and the first extra, which came at 2:50 a.m. At that hour the northeast sky suddenly became red, as if it were the reflection of a great conflagration on the earth. This great red cloud moved south and then straight west, along the zenith, until it reached the far western horizon. It remained several minutes, a beautiful red, and then turned to a bright white light, of surpassing beauty. A few patches of clouds made their appearance in the sky at this time, which added greatly to the sublimity of the scene.—S. W. Brandt, Cooperative Observer.

Ames, Iowa.—At 9:57 p.m. a clear moonlit sky a brilliant auroral display was observed between 8:30 and 10:30 p.m., May 14. The arch which was visible throughout this time except at short intervals, formed in our magnetic north and extended about 15° above the horizon they then moved south and then straight west, all along the zenith, until it reached the horizon. The entire sky was a wonderful sight, the northern horizon being a glowing, an arc, brilliantly colored, and at times resembling an auroral arc, but a definite segment of a circle like that on the northern horizon could not be discerned.

The shoulder, tubes, and hues, changeable and increasing from the beginning of the observation, now became more distinct and all of the primary colors appeared in varying degrees of intensity. Reappearing intermittently, the colors gradually faded away during the remaining hour of the display.—Iowa State College.

Des Moines, Iowa.—The first indications of the so-called "celestial conflagration," during the night of May 14-15, were observed about 9 p.m. Pale white, waving beams of light covered nearly the entire visible sky. After a minute survey of the heavens there was nothing like the appearance of a great red cloud in the south.

The moon, at 9:59 p.m. was a crescent, full in the eastern sky. At this time I noticed the display. At 10:30 p.m. I noticed a display of red light which looked like a beautiful pink and red streamer in the vicinity of Saturn or higher and farther east. ** * ** But the next day, the 15th, I made observations by measurements by the method I use. At 11:30 and 12:30 p.m., I noticed the display that appeared with a single spot 20,000 miles in diameter and 94,000 the longest way from outside to outside of the two groups which had both passed the same sky at a point 40° to 60° north of the center of the sun's disk. ** * ** seemed to explain the display.—Prof. E. D. Roes, jr., Syracuse University.

Portland, Ore.—The phenomenon last night was said to be the most aggregating, from a telegraphic standpoint, in years. Wires which normally carry a voltage of 100 were charged as high as 450, either negative or positive, thus causing a current of 900 volts difference in potential. Elementary lights were burning in the Western Union office with voltage drawn from the earth through ground wires at Spokane and Nampa. The d-i-c-t-a-t-o-r volt-millimetre needle, which ordinarily stands a zero, was jumping in telephone now registering 400 volts positive (current flowing toward Portland), and a few seconds later indicating the same amount of negative current.

At Walla Walla the northern lights were said to be hanging over the city much like a large umbrella, and they were reported clearly visible in other inland towns. Denver reported a wonderful display of light due to ground wires drawing voltage from the earth. The demonstration, varying in intensity, has been constant for the past 36 hours, although the lightings largely to the north last night are on account of the hazy atmosphere.—Oregonian, May 15, 1921.

Across the sky a tinge to the west of north flashed horizontal rays of blue and red, the latter predominating. Beginning like a last fading red aurora and far north of the horizon, they were in a wave-like form. From the tops of downtown buildings and vantage points on the heights the view was wonderful. It began about 8:30 and continued until after 10.

Beginning with intermittent glow in the northern sky, the sheet of reddish and white light rose, each flash being higher than the preceding. After a time it seemed the level had been reached. Streamers shot high in the heavens, moving across the sky from east to west like the beam of a searchlight.—Franklin D. P. Examiners, May 15, 1921.

Boise, Utah, May 14-15.—Local spectators report that the aurora resembled, at times, a huge fountain of fire, spouting brilliantly colored streams in every direction. A curious feature was the fact that it seems to be moving toward the west, as this latitude, about 37°, is south of the zone of frequency for auroral displays.—Boise Press, May 20, 1921.

Washington, D. C.—At 8:45 p.m. at Cherry Chase, Washington, D. C., there was visible through a small rift in the clouds in the northeast an appreciable glow of greenish light characteristic of an auroral display. Later heavy clouds (with a thunderstorm) prevented any view of the display.—F. Brooks.

About 11 p.m. at the navy yard (SE.), Washington, D. C., a brilliant display of the aurora was visible. The rays of light spread in all directions from a radiant point near the zenith. I awakened several friends to view the spectacle, got the clerks in a neighboring store to come out to see the spectacle, and more than six friends to view the spectacle, got the clerks in a neighboring store to come out to see the spectacle. We noticed that the "aurora arc was miming, but at a point approxi-

San Francisco, Calif.—The aurora borealis, lights of various colors in the sky, common in the north but seldom seen as far south as San Francisco, startled many last night with what looked like a "shiny line of colors" in the heavens.

As far south as the Mexican border electric discharges in the sky were plainly visible, the first time in history, according to old-time residents. Lafayette Train dispatcher say the lights were also clearly seen on the Mojave desert, nearly all points reporting having witnessed them for the first time in history. According to the various weather offices.—San Francisco Examiner, May 15, 1921.

Grand Junction, Colo.—It is believed that it was a usual display of the "northern lights" or aurora borealis, which developed after sunset in a column of fire, with reddish-brown bodies that moved from the southern sky while the whole northern sky was by turns lavender, red, and purple light. It was wonderfully beautiful, weird, and awe-inspiring. Andrew J. Halligan, merchant police, reports that a slight display of red aurora was visible Friday night, but nothing like the display last night.

Midnight directly overhead there were many bright flashes which looked like the beam of a powerful searchlight playing across the heavens. It would wink and go out, then instantly reappear. ** * ** At midnight the whole northern part of the sky was a brilliant pale green. The largest display was at 9:54 p.m. when the aurora was a brilliant green in the north.
The aurora borealis or northern lights was visible from San Antonio for more than an hour Saturday night between 9:30 and 10:30 in a brilliant display of white shafts of light, patches, and spots. As far as we know this is the first time that this phenomenon of the sky has ever been visible this far south.

The aurora borealis is a natural phenomenon in which the aurora is a massive outflow of charged particles from the sun. These particles interact with the Earth's magnetic field, causing light to be emitted in the form of auroras. The aurora is usually seen in the northern and southern hemispheres, but occasionally, it can be seen from equatorial regions.

In this case, the aurora was observed in San Antonio, Texas, as a rare occurrence. The aurora is usually seen in areas with a moderate to high magnetic field, such as the northern and southern hemispheres. However, the aurora can also be visible in other areas, such as the equatorial regions, if there is a magnetic disturbance or a solar event.

The aurora can be a spectacular sight, with bright and colorful displays of light. The colors of the aurora depend on the type of gas in the atmosphere that is excited by the charged particles. The most common colors are green, red, purple, and blue.

In San Antonio, the aurora was observed on Saturday night, and it lasted for more than an hour. The display was so bright that it could be seen from a distance of several miles. The aurora was visible from San Antonio, Texas, to the north and northeast of the city.

The aurora is a natural phenomenon that is often associated with solar activity. When the sun is active, it can cause a disturbance in the Earth's magnetic field, which can result in an increase in the number of auroras. The aurora can also be caused by a magnetic disturbance, such as a magnetic storm.

In conclusion, the aurora borealis or northern lights is a natural phenomenon that can be seen in areas with a moderate to high magnetic field. The aurora can be a spectacular sight, with bright and colorful displays of light. The aurora is often associated with solar activity and magnetic disturbances. The aurora observed in San Antonio, Texas, is a rare occurrence and is a reminder of the beauty of the natural world.
**MONTHLY WEATHER REVIEW.**

JULY, 1921.

"May 14, at 8 p. m., in latitude 38.18 N., longitude 146.44 W., temperature 62, barometer 30.38. On this particular evening I observed numerous bright streaks which resembled the aurora borealis, in a north and south direction covering about one-third of the heavens and giving the northern portion of the sky a peculiar reddish tint.

"During this time the sky was very clear excepting the northern part close to the horizon. At 9:15 p. m. the streaks disappeared, leaving the north and eastern part of the sky very red for about 15 minutes, then gradually getting fainter until at 10:35 p. m., when it completely disappeared."

Capt. Patterson says the display was a magnificent one and that the rays resembled a great battery of searchlights, lighting up the clouds with a pure white color. The rays were white, but the sky was red. He says he has never seen anything like it in all the years he has been on the Puget Sound-Honolulu run.—Honolulu Star-Bulletin, May 19, 1921.

Apia, Samoa.—In the evening, between 6 and 7 p. m., a display of the aurora australis, a usual accompaniment of these magnetic disturbances, was observed. It was an extremely bright display, as otherwise it could not have been seen at all in the moonlight, and it is also a very rare event to see this phenomenon in latitudes near the equator. It is to be expected that news from the outside world will mention interference with the work of submarine cables and telegraphic work generally.—Samoa Times, May 20, 1921.

The following is a portion of a communication by Dr. A. L. Courtie in *Nature*, London, June 2, 1921, pp. 426-427.

On May 8 there appeared on the sun's eastern limb an equatorial sun spot in a region which had been without disturbance for some considerable time. It was an active spot which had separated by May 12 into two large spots. The maximum area of the group was 16.5, in units 1/5000 of the sun's disk, and this was attained on May 14.

The mean heliographic latitude of the earth during the passage of the group across the sun was 2.8°. Therefore, not only was there a large active sun spot on the sun, and with the penumbral character which frequently marks spots associated with magnetic disturbance, but also the earth was very favorably situated with regard to it. Under such conditions a great magnetic storm is inevitable.

**WATERSPOUTS ON LAKE ONTARIO.**

55°1', 59' (285°) By Ellis Gay.

7°40' (273°)

[Pultneyville, N. Y., Aug. 5, 1921.]

I observed this phenomenon from Gates Grove, on lake shore about half way between Nine Mile Point and Pultneyville, Aug. 2nd. The weather conditions seemed peculiar: heavy cumulus clouds over the horizon, practically no wind, but about 2 o'clock a heavy swell from the northeast commenced, which I thought indicated a disturbance in that direction, although we could see no line of wind, as is often the case. About 11:30 a. m., I noticed on the eastern horizon what I thought to be the smoke of a steamer. "hull down," but could make nothing of it with the glass. As our eastern view is partially hidden by a point, I should guess that it was about off Pultneyville (5 miles). I paid no further attention to it for a few minutes (less than 10), when I again looked, it was directly in front of the cottage, almost due north. There was a smokelike disturbance on the surface of the lake of considerable size, and rising from it was a thin ribbon-like streamer which widened gradually until it was lost in the clouds. This streamer was visible against the low-hanging cumulus clouds which lay beyond it, as well as in the small portion of the horizon which was clear. As I could not tell how far away it was, there was no way of estimating the height of the cone, although I should guess it was 3 to 5 miles out and at least 1,000 feet high. (Other observers guessed a mile high.) Through glasses a rotation could be plainly discerned, and though there was a diversity of opinion, I am convinced that it was counterclockwise. The spout traveled from east to west at a good rate of speed, probably 40 to 60 miles per hour. While we were watching, another spout was formed ap proximately a mile from the first. I saw the column reaching down from the clouds finally touch the surface and make a disturbance similar to the original one. Later we saw a third column reach down; but it did not come to the surface. Two complete and one partial spout were visible at one time. They seemed to melt away when they were a few miles west of us. The duration of our observation was about five minutes. The sky in the west below the clouds showed a decided copper tint, and it looked as though there might be a thunderstorm somewhere north of Charlotte. The phenomenon had entirely disappeared at 12 m.

From all the data I have been able to find on the subject I am satisfied that we saw waterspouts.

**ANOTHER OBSERVATION OF WATERSPOUTS.**

By Homer B. Benedict.

[Brockport, N. Y., Aug. 23, 1921.]

In the Rochester Democrat & Chronicle for Aug. 5th, I saw an account of a waterspout seen on Lake Ontario east of Rochester on Tuesday, Aug. 2nd.

To corroborate the fact that such a phenomenon was seen, I wish to state that my family and myself saw such a waterspout or cyclone on this same date, over the lake about the middle of the moon, at my farm in the town of Hamlin, about twenty miles west of Charlotte.

My attention was first called to it by my son and others, calling to come out and see a strange cloud. When I reached the lawn I found all the members of the family collected, watching this mysterious cloud. It did not last long.

This cyclone cloud or waterspout, so-called, reached from the horizon line more than half way to the zenith. My first thought was a cyclone, for it was a very awe-inspiring sight and it seemed as if it might come towards where we were standing. Instead it moved westerly along the lake. At the point where it touched the water it looked as if smoke were arising from the water, which we decided was the water sucked up by the wind.

I do not believe that the cloud itself was composed of water, as it disappeared suddenly, without any mass of water falling into the lake, so far as we could see, but at the point where it touched the water there was evidently a great disturbance. One could imagine a great elephant's trunk, reaching from the sky to the water's surface. At the upper end it was funnel shaped or cone shaped, and then ran in a narrowing form to the water line. It was a swirling streak of cloud, and as we stood watching it, wondering what was to happen, it parted in the middle, part drawing into the clouds and the other gradually disappearing toward the lake; and then as if by magic it came together again in a narrower form, but still reaching from the water to a great height in the clouds. But all the while one could see what looked like smoke arising where the end of the cloud touched the water, and even when the cloudy pillar had disappeared the smoky spot could be seen traveling up the lake.

The day was rather sultry and the clouds looked like thunder caps.

Shortly after the cloud disappeared waves rolled in on the beach, showing that they had been tossed up by the wind, but on shore we had felt no unusual amount of wind.

I also read an account in some paper. I can not tell where, that Howard Palmer of Union Hill saw a similar cloud on this same day, which lasted fifteen or twenty minutes. As I said before, the one in front of our cottage lasted but a few minutes. I am told that there were others at Straight Lake who saw the cloud.