

On the afternoon of August 25 the balloon was followed to an altitude of nearly 20,000 meters. It became faint as in the morning, but as the altitude was not noted exactly it is not known how it was related to the changes in velocity of the balloon. The visibility of the balloon improved afterwards.

The altitude at which distortion or extinction occurred is marked on the graphs, figure 1. It will be seen that the disturbance occurred in each case after a sudden increase in the velocity of the balloon. The interval was small on August 14 (3 minutes), August 24 (1 minute), and August 25 (2 minutes), but longer on September 2 (7 minutes).

In the absence of temperature observations it is impossible to know whether the velocity discontinuity was accompanied by a temperature discontinuity, but if it were, then detached "lenses" of air of different temperature and density may have caused the observed disturbances of refraction.

Leaking would cause extinction of the balloon, and seeming increase in the velocity on account of the failure of the balloon to maintain the assumed rate of ascent upon which is based the calculation of the position of the balloon by the one-theodolite method used at Madison. The intervals of 10 and 14 minutes after the sudden partial extinction noted on August 14 and 24 during which the balloon was followed, and the speeding up of the balloon for 20 minutes before the sudden extinction on September 2, are thought to eliminate the possibility that leaking has caused the phenomenon here reported.

The possibility that the distortion of the balloon image on August 25 was due to eyestrain was eliminated by the change of observers. That it was not due to internal reflections in the optical system of the theodolite is proven by the wriggling motion of the balloon image.

THE RELATION OF TELESCOPIC DEFINITION TO COLD WAVES.

By W. H. PICKERING.

[Mandeville, Jamaica, June 21, 1920.]

Telescopic definition, or "seeing," as it is technically called, depends mainly on the currents located in our atmosphere up to an altitude of 3 or 4 miles. Their velocity is of little consequence, variations in their temperature forming the controlling influence. In the temperate zones a high barometer and cold wave are most injurious to the seeing; in the Tropics, the vicinity of a hurricane. The seeing is measured on a scale of 12, and is at its worst in Jamaica during the winter months,

everyone of the five cold periods, *a, b, c, d, f*, was preceded by bad seeing. It therefore appears, as far as these observations go, that cooler nights can often be foretold about three days in advance by means of the upper air currents through their production of bad seeing.

In January and February every HIGH in Florida and Georgia was preceded by a low minimum in Jamaica. It did not seem necessary to letter all of them. Only 3 dates out of the 15 failed, namely, March 2, 27,

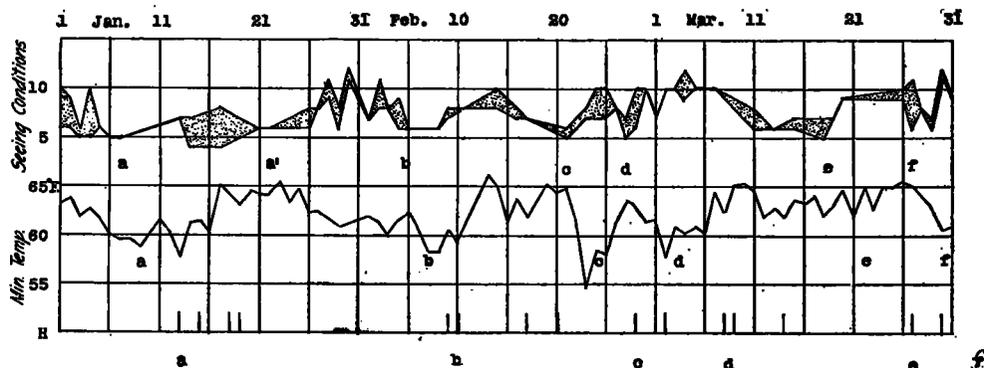


FIG. 1.—"Seeing" during January, February, and March, 1920, at Mandeville, Jamaica.

when the circulation of the temperate zone, with its westerly winds, sometimes reaches us. This it is especially liable to do at night.

The seeing is recorded here nearly every night when it is clear, and often several times during the evening. The upper graph in figure 1 represents the seeing during the three months of January, February, and March, 1920. The angles of the shaded regions indicate the dates when it was found to vary. The second graph indicates the readings of our minimum thermometer, and the short vertical lines at the bottom, the dates when a "high" in Florida or Georgia is found on the daily maps of the Weather Bureau.

An examination of the figure shows that there were seven periods when the seeing was inferior. These are indicated by the letters *a, a', b, c, d, e, and f*. All cases except the second and next to last were followed by low minima on the second graph. In the latter case the minima were quite irregular. It will be noted that

and 30. The interval was usually two to three days, but the warning of bad seeing came nearly a week in advance. Whether a HIGH is found on the weather maps during the first four days in April the writer does not know.¹ This investigation suggests that the same general atmospheric drift that carries the hurricanes northerly in these longitudes, into our extreme southern States, carries the HIGHS as well.²

AN UNUSUAL LUNAR HALO PHENOMENON.

The accompanying figure 1 represents a lunar halo observed by Mr. A. A. Graham, about 8 p. m., September

¹ A weak HIGH moved across the South from the 1st to 3d, and was central in Georgia on the night of the 2d.—EDITOR.

² This explanation seems questionable, and the following connections more likely: With the passage of a Low on the north, the cold winds on the back side first affect the upper levels and produce bad seeing, which is followed in two or three days by the arrival of the slower-moving lower winds at Jamaica, producing the minimum temperatures. In about three days more the HIGH which followed the Low is, naturally, in the Southeastern States.—EDITOR.

20, 1920, 90th meridian time, at Topeka, Kans., the observations being communicated by Mr. S. D. Flora, official in charge of the United States Weather Bureau station there.

The halos are stated to have been quite distinct, lasting almost an hour; no prismatic colors were visible; the line joining the moon with the point of tangency was parallel to the horizon; the relative diameters of the two arcs were merely estimated. The sky was to all appearances clear at the time, the halos apparently being formed in a sort of haze. Mr. Graham is stated to be a very keen and reliable observer of natural phenomena; no one else observed the halo.

No forms like these have ever before been reported. The closest approach to them are the infralateral and supralateral arcs to the 22° halo, observations of which are cited by Besson, *MONTHLY WEATHER REVIEW*, July, 1914, 42, 444; they have never been explained. It

seems desirable to put the present observation on record,

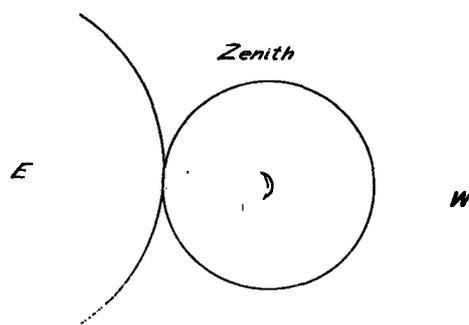


FIG. 1.—Lunar halo observed at Topeka, Kans., between 8 p. m. and 9 p. m., Sept. 20, 1920.

without making any attempt to interpret it.—*Edgar W. Woolard.*

WEATHER AND LITERATURE.

By ROBERT E. HORTON, Consulting Hydraulic Engineer.

[Voorheesville, N. Y., August, 1920.]

Literature owes much to the weather. It is nearly always the background, and sometimes the backbone, of pastoral prose and poetry. The Bible is filled with illustrations drawn from the aspects of the air. Thomson has made weather the theme of his "The Seasons." What would "The Midsummer Night's Dream" be without it?

Mark Twain claims the distinction of writing the only novel containing no weather, but even he did not venture to place the good nature of his readers under too great a strain, and so he added a compendium of assorted weathers as an appendix from which the reader may select to suit his fancy.

Three things make up the framework of the great outdoors: the rocks and soils and water, which determine the form and substance of the earth's surface; the organic or living forms which cover and inhabit it; and the air, which surrounds it. These appeal to lovers of the wood and open fields in various ways and to different degrees. To some the graceful molded forms of hills and valleys, the stupendous masses of mountains, and the appalling depths of canyons afford an exhilaration; to others they are mere curiosities of nature. Still others "have eyes, but they see not."

So it is with vegetation. To some the ever-changing verdure of the hills, the flowers of the field, and the lilies of the valley are things of beauty, interesting and inspiring in all their multi-varied forms and combinations. Others are like Peter Bell:

"A primrose by the river's brim,
A yellow primrose was to him,
And it was nothing more."

Those who enjoy natural scenery in its broad magnificence, or its even more wonderful detail, or who rejoice in the life of vegetation, owe much of their enjoyment to the background of weather conditions. Measured in human generations, Tamalpais or Shasta or Ben Nevis is always the same mountain, but it has numberless and ever-changing aspects, according to the state of the weather in which it is viewed.

To some, weather is merely one of Nature's confirmed habits; to others it is an evanescent gown in which Nature's beauties are clothed—now fully revealed, now half concealed. Some persons derive a peculiar enjoyment—a feeling of kinship with Nature—from the ex-

perience of storms. Perhaps it is this feeling which keeps many a sailor at sea and many a voyager in the wilderness.

Artists seem to specialize in clouds and sunsets, partly because of their intrinsic beauty, but also because they lend themselves more readily to the brush than do other weather conditions. Poets often dwell at length on storms, and most of us stand at the door with reverent, uncovered heads, as "Announced by all the trumpets of the sky, arrives the storm."

It may be that one of the functions of literature is to stimulate the more refined sensibilities of man in the same way that the aspects of Nature exhilarate and invigorate them. In any event, Nature, as exemplified by the weather, must ever form an important element of descriptive literature. Without it the description is incomplete.

One need not read many authors to note great differences in weather description, as regards both accuracy and minutiae. Minutiae of weather conditions are not always essential. In the parable of the two houses the picture is fully drawn—

"The rain descended,
And the floods came down,
And the winds blew and beat upon that house."

There are, perhaps, not many writers who can either describe or utilize details of weather conditions as well as Stevenson has done in "The Inland Voyage" and "Travels with a Donkey." Fortunately weather occurs in such endless varieties that impossibilities in events or their sequences are few, but it is to the positive, not to the negative, capabilities of the weather description as an ingredient of good literature that attention is called.

Some of us still have the old-fashioned idea that art in literature consists in painting a word picture that seems real. John Muir could portray a thunderstorm or snowstorm which Jupiter Pluvius and Mother Nature need not be ashamed to own as their child. The other extreme is found in the writings of those whose ability to utilize weather as a literary resource seems to go little further than besmutting the paper and leaving the rest to the imagination.

The argument seems never to be made that the study of good literature by a budding author debauches his natural style or dulls his imaginative faculties. So it seems reasonable to suppose that the quality of literary