STORMS ON THE SUN.

Those who have witnessed the devastations which mark the path of the cyclone and the hurricane may have some conception of the enormous power there is in the wind, when it lays low, as if they were but stalks of waving grain, gigantic trees of the forest that have withstood the ordinary storms of centuries, but however enormous their power may be, the most terrific storms that ever sweep their way over the surface of the earth must be as pigmies in force to the storms which sweep the surface of the sun.

A few words concerning commotions on the sun may not be uninteresting to our readers. In the study of the sun many phenomena have demonstrated that its mighty surface is never in a state of repose, but upheavals, explosions, and the rushing hither and thither of incandescent and vaporous matter are constantly going on.

During the periods when spots are most frequent those are often seen which have a whorled appearance, and those having such an appearance are believed to have a rotary motion, and to move very much as terrestrial cyclones do, and they may be regarded as solar storms. The velocity with which these solar storms move is very great, but they sometimes extend over a space several times as large as the whole of the earth's surface. It has been computed by eminent astronomers that these storms move with the astonishing velocity of 40 or 50 and sometimes even as much as 120 miles in a single second. We can form but a very inadequate conception of the mighty force which must accompany these solar storms when we think of the havoc which air leaves in its wake when it moves that number of miles in an hour.

The most interesting times for studying the stormy movements on his surface are during total eclipses of the sun, and it is to observations made on such occasions that we are indebted for much that has been found out about solar commotions in times that are quite recent.

Probably the most interesting thing about solar storms is their connection with magnetic disturbances on the earth. Much yet remains to be found out concerning this subject, but it is already well known that the phenomena of auroras, earth currents and magnetic storms come in periods, and that these periods are coincident with solar disturbances. One of the most remarkable cases of this coincidence, and that which awakened a new interest in the theory that was announced for the first time only nine years before, was that which occurred in 1859, when two English astronomers, Carlington and Hodgson, noticed a curious outburst of two very bright patches upon the sun, which remained visible for about five minutes, and during that short time traversed a space of nearly 35,000 miles.

At the very time that they were witnessing this strange sight, as was afterwards discovered on comparing the times, there was noticed at many places a marked disturbance of magnetic instruments, occurring simultaneously with the outburst on the sun, which was followed on the same day by a terrible magnetic and electric storm, which greatly disturbed telegraphic communication, and in some cases set fire to offices; and besides auroras were seen. In the fall of 1871 a similar sun-storm was witnessed by Prof. Young, Cincinnati, who calculated that its velocity was as much as 166 miles per second, and that some fragments of matter were thrown to a height of 200,000 miles above the sun's surface. It likewise was followed by magnetic disturbances and by brilliant auroral lights, perhaps the most brilliant that have occurred in this latitude (*Cincinnati Comm.*)

WAVES OF WEATHER.

The mildness of the present December, the *Mail (Toronto)* states, is due to the prevalence of southerly and south-westerly winds. Of course it is, or that is one way of putting it, but what brought about this unusual direction of these winds, this month, is the question I should like to see satisfactorily answered. It is generally admitted that could we but ascertain, in advance, the average direction of the wind for the respective months of the year, we should be tolerably well advised respecting the general character of the seasons—Spring, Summer, Autumn and Winter. This we cannot do, however, so we must look to other sources and data for our views on this interesting and important subject. And what other source can we look to? I reply to the "waves of weather," or, more correctly speaking, to the waves and undulations of pressure and temperature. This new method of forecasting the seasons is treated of in one of the chapters of my almanac and "Weather Record." By it, I, as early as September of the year 1880, formed the forecast for the year 1881, which stands to-day amongst the most accurate of all my attempts. This foretold three marked and distinct periods of weather for the year now closing, namely, 1st, cold and heavy snow-falls for the entry of the year, and a severe Winter over the North American continent; 2nd, a very hot summer, with severe storms, and 3rd and lastly, a singularly mild and open Autumn up to the end of the year. Just now I speak of this general prediction as it was written, printed, published, and as it stood before the public in my 1881 Almanac for upwards of ten months before an alteration was made.

The alteration I refer to I shall allude to further on. Meantime I wish to show now on what grounds this prediction was arrived at. My weather charts consist of the detailed undulations of both the temperature and the atmospheric pressure of a long series of years. By a close study of these I note that as certain periods have *undulated*, so have others widely and irregularly separated. We find, for example, periods or long spaces on these charts wherein the undulations are of even duration and regular in outline, resembling great even and rolling waves of deep water. These represent long steady winters and warm summers, or, when shorter, alternate warm and cold periods during both summers and winters. Again I find periods of abrupt undulations, which, in the article referred to in my Almanac, I have likened to "chop waves." These represent winters of abrupt changes from *thaw* and mildness to moderate or intense cold, and summers of like variable features. Yet again, I observe periods wherein such abrupt or sharp undulations are separated by the evenly undulating waves first referred to. Now by watching closely the general outline of these undulations for the past and present, I find it often possible to strike off very closely what is likely to be the outline of an approaching period (season or seasons, according to the confidence felt). If, for example, after a period of extremely abrupt and irregular undulations I observe these quieting down into more regular and lengthened waves, I can or have in many instances sketched out with considerable accuracy the chief features of the weather for a number of weeks and even months in advance. Of course the unexpected return of the "chop waves" is a freak to be guarded against, and this sometimes, and most unexpectedly, occurs to the "prophet's" discomfiture, but such a recurrence is exceptional. In like manner, I note immediately the breaking up of the longer and regular undulations into the first of an approaching period of abrupt changes or "chop waves," and get an insight into the characters of the approaching period. Thus it was that towards the close of 1880 I foresaw two great undulations of waves of weather for the year 1881. These were but two and of about equal duration or length. The first a great downward curve and the second a similarly great upward curve. In other words simply a lengthened period of low, and another corresponding one of high, very high, temperatures. The first I sketched out as embracing from November (1880) to May 1881; *and the other, May to January, 1882—which* proved absolutely correct. The first gave us the cold autumn and winter of 1880-81; and the other the summer of intense heat and drought so fresh yet in all our memories. And now our warm and open autumn and first month of winter shows the "high" curve slowly but steadily terminating towards the *medial* line of the year's temperature. It will then go below this, probably reach as low as the curve of last winter did, run along this level through a portion of January and February, and then recover itself slowly through March, April and May, causing a cold, blustry March and cold spring—possibly a cool and backward summer for 1882. I may return to this subject again, and refer to "Weather Cycles," "Recurring Periods," and "Periodical Compensation."

BAROMETER.

In hanging a barometer, the following points should be attended to:

1. Hang the instrument so that the mercurial column be quite perpendicular.
2. Let the scale be about five feet high, for facility of reading.
3. Hang the whole instrument in a good light, particularly the scale and the cistern.
4. Let it be hung in a position in which it will be exposed to as little fluctuation as possible of temperature; a wall heated by a flue, and positions which expose the instrument to the heat of the sun or to *that of a fire, are very objectionable.*

WHAT THE BAROMETER INDICATES.

A high and steady state of the barometer indicates, generally, dry, calm, clear weather, with heat in summer and hard frost in winter. A low and fluctuating state of the instrument indicates cloudy, wet or windy weather, with, as a general rule, cooler weather in summer and mildness in winter.

A rapid rise in the barometer to a considerable height is generally followed by as rapid a descent of the mercury, and *vice versa*. Hence rapid variations indicate changeable weather, such as one day wet and windy, and another dry and calm.

The barometer usually sinks lowest and with greatest rapidity immediately previous to and during the prevalence of very high winds, and it continues to fall as long as the velocity of the wind is increasing, but shortly before the wind abates the mercury begins to rise with considerable rapidity. The reason for this rapid rising of the mercury is owing to the atmospheric equilibrium being somewhat restored by the influx of air before the acquired velocity of the atmospheric current is checked.

A slow and steady rise of the barometer is likely to be followed by a high and steady reading for a length of time; hence it prognosticates a continuance of calm and dry weather.

There is generally a rise in the barometer when the wind changes from a warm to a cold direction, and a fall when the change is from a cold to a warm point. For example: when the shift is from S. W. to N. E. in winter, the mercury usually rises, but when from N. E. to S. W. it falls. The former commonly indicates dry weather; the latter rain.

A prolonged high reading of the barometer is *almost invariably followed by a prolonged low reading*, and *vice versa*. Hence the former of these conditions, which is usually attended by calm, dry weather as soon as the change takes place, while the latter condition is indicative of a continuance of dry, calm weather after the change has taken place. "Long fair, long foul," is an ancient, but trite saying.—*En. Brit.*

The storms throughout New York, the Middle States and Canada, as well as the snow falls and gales in Great Britain towards the close of January, I was enabled, by my theory of *weather relations, ships*, to give warning of as early as the 18th of the month, and several days before any intimation was given by the *Signal offices*.

26½° below zero was reached by the mercury at Toronto during the month of January, 1859, the coldest on record, up to date. Last year (1881), and about the 1st or 2nd of February, the mercury fell 22° below zero in the same city.

SNOW.—The opinion prevails that snow is a whitish substance, and that it is used for sleighing purposes in certain hyperborean regions.