

Barometers Make Possible Accurate Forecasts Of Weather Conditions

Every Person Has 35,000 Pounds Of Pressure On Their Body, Hall Explains

By Harry M. Hall.

In previous articles of this series we have spoken of atmospheric, or barometric pressures, their causes and their effect upon weather conditions. Reference has also been made to the mercurial barometer as the instrument used to measure this weight of air in inches of pressure. We will now explain H. M. Hall more fully the place the barometer occupies in forecasting and recording of weather conditions.

While all weather bureau stations and most ships at sea have the mercurial type of barometer as a standard by far the most generally used is the familiar round clock like instrument known as the "Aneroid." The name itself is from the Greek, and

means "without fluid." The construction of the aneroid is rather complicated, and in one that is worth having, a marvel of precision, balance and adjustment. Briefly its action is controlled by the pressure exerted by the atmosphere upon the upper surface of a vacuum chamber which is perfectly balanced between this pressure and a main spring. The vertical action of the atmosphere is multiplied and transmitted to a hand which moves over a dial or face which is divided into inches and hundredths of an inch to agree with the scale of the mercurial type of barometer.

We have seen that temperatures, winds and other influences constantly keep our atmosphere in motion, which causes changes in air pressure ahead of, during, and after weather changes. These pressure changes are recorded by the barometer. A rise in the barometer shows that heavier air is drifting to a place recently occupied by light air. Heavy air is air that has been condensed by cold. A rise in the barometer means a cold wind. A falling barometer shows that lighter pressures are moving towards the observer. These air movements and the directions from which they come, the speed or slowness of their pressure changes as recorded by the barometer tell the weather man, or the sailor at sea, or even you and me, what to expect in the way of weather for many hours ahead.

One reading of a barometer tells us little, but a series of observations tells us much, for it is the direction and the speed of the changes of pressure and temperature that tells us ahead of time what to expect. That the story may be even more complete and that it cover a wider territory the weather bureau in all its stations records the barometric pressure constantly. These reports are augmented by radio recordings from ships at sea, from planes in the air and other co-operative sources. In order that these records may have an uniform basis, whether they are at sea level or the top of Mt. Mitchell or Pikes Peak, all barometers are set to record pressure as at sea level.

It must be understood that any increase of altitude causes a decrease in air pressure, because of the lessening of the weight of the air still remaining above the observer. For it is by its own weight above its various layers, all being attracted by the earth, that makes the low or surface layers support the entire weight of air above it. This pressure at sea level is about 14.7 pounds per square inch. There are about seven hundred and ninety quadrillion square inches of earth's surface, making the weight of the atmosphere the small matter of eleven and two-thirds quadrillion pound. The pressure on an average man, sixteen square feet of body surface, is about 35,000 pounds. Were it not for the ease with which the air under pressure penetrates the body a very slight change in its pressure would mean death.

The fact that the rate of decrease in atmospheric pressure as altitude increases is known enables us to adjust the hand on our barometer to represent what our pressure is in equivalent sea level figures. For instance,

the writer's barometer may read 29.75 inches of pressure reduced to sea level, when the actual pressure here at Waynesville is 26.79 inches. A good barometer is so sensitive that it will record the fact of its being lifted from the floor to a table. There would be a mess of figures in the Washington office of the Weather Bureau if every barometric report received there about eight o'clock each morning told the actual pressure at points of observation. It would mean that each one would have to be reduced to a common base so that curves, or "isobars" as they are called, of equal pressures could be plotted. So for weather forecasting and for almost every other purpose, barometers are set to read as of sea level, as our watches are set to read as of time of the 75th meridian of longitude.

It is from the position of these curves of equal pressure, and the curves of "isotherms" of equal temperature plotted by the weather forecaster, in conjunction with the station reports of wind direction and velocity, with sky conditions, and kind and amount of clouds, with rain or

snow fall at each point of observation that the forecasts of weather conditions are made. The movements of the regions of high or low pressures are recorded by the many observers, and reported and plotted each day in the Washington Weather Bureau office and form the basis of weather forecasts.

Advance reports of coming storms at sea, of cyclones approaching our coasts, of cold waves and other serious weather conditions have reduced the loss of life and property by 75 per cent. It is not uncommon for the weather bureau to send out a hundred thousand telegrams and messages within two hours to every part of the country in time for those interested to take advantage of the information thus made available. We can appreciate the work done by the forecasters when we know that they compile this data from all over the country, reduce it to curves on their maps, and within thirty minutes in the morning and forty minutes at night their analysis is made and their forecast is broadcast to the public.

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