

CHATS WITH THE WEATHER MAN

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NOT FOR PUBLICATION

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ANNOUNCEMENT: Your old friend, Ob. Server, seems to be all up in the air. He has been having another of those chats with the weather men of the United States Weather Bureau.---I guess it must be what they told him, that started him up--- How about it, Mr. Ob. Server?-----

---oOo---

Yes, Mr. Leroy T. Samuels, of the aerological division of the United States Weather Bureau, has been telling me about how our weather experts find out about conditions in the upper air:

By "upper air" we mean anything from 65 feet above ground on up as high as there is any air. Of course, they haven't got the records that high yet; but it is surprising how high they have gone in some cases.

It is not such a simple matter to get the plain facts about the temperature and the humidity, and the speed and direction of the wind way up aloft there.

I guess the first man to make "upper-air" observations was some fellow lying on his back watching the clouds go drifting by. The clouds give a simple means of getting the direction of the wind at the level where they are.

Of course, our weather experts have improved on that system of watching the clouds. They have an instrument which is chiefly a black mirror mounted on a level stand out in the open where the mirror will reflect as much of the sky as possible. The motion of the image of a passing cloud seen in the mirror shows the direction the cloud is moving; that is, the direction of the wind. That mirror is mounted in a frame marked in degrees, and there is a movable sighting device, and Mr. Samuels tells me that if they know the height of the cloud, they can easily compute the speed with which it is moving, from the distance the cloud image moves across the mirror in a given time.

But that brings up the question; How are you going to know how high the cloud is?

Well, did you ever see a toy balloon get away from a baby on the way to the circus? --- Anyhow, as you may know, the weather men at our commercial air fields let loose little balloons to find the height of the clouds or "ceiling" for air travel. The balloons are inflated to a certain size and rise at an even rate. It is merely a matter of following the balloon with the eye and timing it until it loses itself in the clouds to get a good estimate of the height of the clouds.

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Ceiling balloon observations are rather recent developments for practical use when clouds are low. On the average, those balloons are watched until about a half mile up. The record ceiling balloon observation in this country is two miles up.

But suppose there are no clouds? How are you going to tell about the speed and direction of the wind when there are no clouds? and at the levels where there are no clouds?

The so-called "pilot" balloon observations take care of that. In those observations, wind direction and velocity is determined by watching small balloons through telescopic instruments much like a surveyor's transit. The balloons are inflated to a certain size and lift as determined by "weighing" on special scales. Barring leaks, it is known from tests that those balloons will rise at a certain even rate, per minute. By keeping the instrument sighted on the balloon and reading the angles from minute to minute, our surveyors-of-the-wind get the data needed to find the horizontal speed at which the balloon and wind which carries it move.

On the average, pilot balloons get the wind facts up to three miles high. In unusually clear air, the powerful little magnifying instruments have followed them a horizontal distance of 40 miles. The record height reached by a pilot balloon in the United States is about 21 miles. The world's record is 24 miles up.

---All very well for the wind, you say? How about the temperature and humidity way up there?

Well, our weather men get those records too.

To do it, they use sounding balloons, which are about twice the diameter of the pilot balloons. The sounding balloons carry automatic devices for writing a record of the temperature and humidity, and pressure of the air through which the balloon passes.

Mr. Samuels showed me one of those clever little instruments. I wished you all could see it. The contraction and expansion of a little piece of metal attached to a pen draws the record of the temperature. The humidity record is made by a few human hairs which stretch or shrink a wee bit according to the moisture in the air. In so doing, they move another pen. The paper wound on a cylinder moves slowly past the pens by means of clock-work.

Mr. Samuels says the average height reached by sounding balloons is nine miles. The world's record is 22 miles. That's rather high, and awful cold. At around 130 degrees below zero, any ink would freeze, so smoked paper is used to take the tracings, which show the ups and down of temperature and moisture in the air.

These sounding balloons expand as they rise and finally burst. The records are brought down by parachute. That is one of the best ways of getting records of extreme heights. One trouble with it is in recovering the instruments and records; especially in rough country.

In order to get similar records for practical every-day knowledge of the

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air at lesser levels, and get them promptly, our weather men use captive balloons and kites which carry the recording instruments. On the average, they get records of conditions up to two miles above the earth by kites and by captive balloons. The record for captive balloons is $2\frac{1}{2}$ miles up, while records have been obtained in this country with kites up to $4\frac{1}{2}$ miles.

But as you may know, big balloons carrying men have gone much higher than that. In fact, weather records have been obtained in free manned balloons up to more than 8 miles high. Of course, sending men up in free drifting balloons would be too expensive and uncertain a thing for regular weather observation.

However, airplanes carrying weather recording instruments have gone more than 8 miles high, even higher than manned balloons. Airplanes can and are being used to get day by day records of the weather conditions at different lower levels most important for forecasting conditions along our air-ways. In fact, Mr. Samuels tells me that even now airplane observations are being substituted for some of the kite station observations. The United States Weather Bureau is contracting with air-men to make regular daily up and down trips, which can get the weather facts much more quickly than kites can be flown to the desired heights.

Another promising method being tried out in France by the French meteorological office, is the use of radio sounding balloons carrying light, automatic short-wave radio-telegraphic transmitter whereby signals giving indication of pressure and temperature may be received on the ground while the balloon is going up. That method gives the weather men on the ground almost immediate knowledge of the conditions through which the balloons pass.

ANNOUNCEMENT: You have just heard something of how the United States Weather Bureau and other meteorological services reach for facts in the upper air. Station _____ will present another chat with the weather man, two weeks from to-day.

National Oceanic and Atmospheric Administration

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