

**ENLARGED CHARTS OF SYNOPTIC WEATHER OBSERVATIONS  
AND SOME INFERENCES TO BE DRAWN THEREFROM**

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(After some amusing quips at points of preceding papers, Mr. Bowie extemporaneously delivered the paper of which the following is from the stenographic report. Meeting of American Meteorological Society, Cambridge, Mass., December 29, 1923. This paper came the afternoon before Sir Frederic Stupart's presidential address, published with discussions in the January BULLETIN, pp. 1-9.)

Real progress has been accomplished in 50 years in making weather charts from a geographical standpoint. I suppose our friend, Mr. John W. Smith, who has been in the service since 1874, recalls when the meteorological frontier was at Omaha, St. Paul and some Canadian stations, when the West and Northwest, so far as the meteorological chart is concerned, was a void. Here in America we have extended the meteorological chart west and north and south; in Europe they have extended their frontier eastward until all of Russia has been taken into the situation, and about 1900 began to go west and north, first to the Azores, but only recently to Iceland. Canada and the United States help pay for reports from there. Only within the last year has Norway established a meteorological station at Jan Mayen, east of Greenland, and they send reports from there to Iceland and thence to Europe; Spitzbergen has been added to that base. Later stations have been established on the east coast of Iceland, and in the last two months have reported by radio. The synoptic chart has advanced wonderfully in the last 50 years, amazingly in the last 20 years. We all know what Dr. Stupart has done in Canada. We have extended our work into Alaska greatly and into West Indies and Caribbean Sea. In addition, we have many paid radio reports from vessels in the Atlantic and have extended the work to the Pacific Ocean so that rarely a day passes that we do not get five or six weather reports from there, even from as far as 160° E. All help us to sketch in the isobars in that region.

The meteorologist in an international sense has gone way beyond statesmen and forms of foreign relations in dealings with other nations. It seems we can get things done with them. While we may regard America and Europe as separate, meteorologically speaking, we are not. We receive every day through the Toronto office, meteorological observations from Spitzbergen, Iceland and the European stations. We receive reports every morning from Manila, Guam, Hongkong, Japan, etc. We get reports from Alaska, Aleutian Islands, Midway Island, and Honolulu in the Pacific, observations from Mexico, Canal Zone, the West Indies and north of coast of South America, and Bermuda. We are constructing every morning a map that extends through more than 200 degrees of longitude, and from the Arctic Circle down to and beyond latitude 10. We are not satisfied with one map a day, but make arrangements for evening reports. We receive every evening wireless reports from France similar to those received by Sir Frederic Stupart in the morning. Reports are sent from the radio station at Annapolis for the United States, Canada and Alaska, to the Eiffel Tower.

We did for a while issue a map of the northern hemisphere. We have

not resumed that for good reason. As soon as the Russian situation is straightened out, we will revive it. The Bolshevist may be a bad actor, but he is a good meteorologist. We hope he has kept up his observations. Those maps are very helpful in day to day forecasting, every morning and night; as to pressure, they are quite valuable for better knowledge of direction and speed of storms. We note very significant things at times. We place a good deal of stress on what is happening in the North Pacific and over the Atlantic, and according to Sir Frederic we will have more observations taken for us in the great basin of the Mackenzie. We certainly hope so. The pressure distribution there determines in good measure what happens here. A change in weather type here took place about the first of December just after a run of abnormally high pressure in the Yukon Valley and Alaska.

Some ask of what use it is to receive reports from Europe. They are of considerable value to us. We live in a river of air that is moving eastward in our latitude. If for some reason, a stoppage occurs in northwest Europe, stagnation backs up to the Mississippi Valley in 5 or 6 days. Then the dam breaks away and things assume normal movement over in Europe, and 4 or 5 days from that everything starts off in good shape over the United States. We have got so that we can look at Honolulu pressure and tell whether or not we are going to have a High. I don't know that you realize that there is an up-and-down pressure relation between Honolulu and Edmonton. Honolulu drops; Edmonton rises. Hawaii rises; Edmonton drops. The charts have shown that.

[Showing northern hemisphere weather maps: April 10 and 11, 1922] there is a low pressure belt of calms, extending into America and thence northward to Bering Sea, on days when over the polar regions they are having high barometer. That is a channel or belt in which Lows travel. There are some interesting things shown on the chart. The next day, (April 12), we have something similar in aspect when the belt of calms is extending from the Bermuda Islands along to Alaska, through Alberta. On the 13th the Low areas are growing in size and number. The polar outrush broke through the belt of calms in the Atlantic. There is a heavy storm on the west and particularly on the east. Two days later, Highs are developing in the south and Lows in the north. By the 17th storms still have their major axes N.-S. where formerly E.-W. April 18th, pressure is high generally in mid-latitudes and low in polar latitudes. If you study the maps very carefully, you will see that the barometer will be low for some time over the Arctic region, but the low pressure area will be gradually drifting south. Then it will go through the same cycle again.

*Sir F. Stupart*—It is very evident that Prof. Bowie and I have been thinking along the same lines. I have studied the maps from day to day and have watched yours. It appears to me that by next winter we may be able to make a very great improvement.

*Prof. R. DeC. Ward*—I wish very much that some inexpensive method could be made of reproducing these charts. I used to use them when published on the back of the old weather map. Lt. Smith of the Coast Guard, who is doing work with me this winter, could be very much

helped later on by having such maps to work with. I wish some way of reproducing them inexpensively could be devised.

*Sir Frederic Stupart*—They are extremely valuable.

*Prof. H. J. Cox*—Forecasting in the Chicago District takes into consideration conditions in the Far East, and the south Atlantic. When there is a deep Low in the Gulf of St. Lawrence even if the barometer is rising, and at the same time if you have low pressure in the northwest, it will become abnormally above normal on the southeast coast and Great Lakes. The Low in the northwest will go SE. directly. You will find the low which was at Edmonton one morning over Kansas the next morning. It may go down there as a dry Low and there develop. After reaching Kansas, it may stay there for a day or so, then recurve northeastward. It is generally delayed because of the great low pressure in the Gulf of St. Lawrence.

*Mr. H. Helm Clayton*—I think it is a very great advance in meteorology to see how much has been done. I am looking forward to the time when the Weather Bureau will make a map not merely of the northern hemisphere, but of the whole world. I don't believe that meteorological cycles will be united until we do have a map of the whole world. Argentine publishes a map of the larger part of South America. We could easily have some method of making a map of the whole world, but that probably will not be feasible for a long time, but for scientific study it would be a great advance if a co-operation could be carried out by which a world map of the weather could be made.

*Prof. W. M. Wilson*—If we teach that the equatorial overflow moves toward the polar regions, we must have some satisfactory explanation for a return. This chart that Major Bowie has shown is probably the best chart of that kind that shows distinctly a return from the polar region. We have Prof. Marvin's map, which helps out, but these charts would be a decided help to teachers in answering some questions that are put to us.

*Sir Frederic Stupart*—I would like to ask Dr. Marvin if the American telegraph companies would allow five figures as one word, if that would not help in giving reports to the world. At the present moment, the International code is known throughout the world except in the Antarctic. It is used in Austria, Egypt, etc., and in most of these meteorological reports, it is sent out by wireless. Would it not be possible for the Weather Bureau and the Canadian Service to supply enough influence to induce the telegraph companies to submit to the telegrams?

*Mr. Bowie*—The Central Office attempted it—made a code on the figure group and planned to put it into use, and went to the Western Union Company to ascertain whether they would not accept five figures as a word, and they refused to do so. Therefore, it would be entirely out of the question, and would increase the expenses of circuit service by 100 per cent or more.

*Sir Frederic Stupart*—How about it for international use only?

*Mr. Bowie*—In sending out the daily radio to Eiffel Tower, we use the International Code. The night message that goes, goes in International Code.

*Sir Frederic Stupart*—We receive the London and Leon (France) messages in figure code. A 5-figure group goes as one word Halifax to Toronto.

*Mr. Bowie*—If we could have a cable come to us from London through New York in a 5-figure group they would accept any message within the United States. Now every figure in the United States counts as a word.

*Prof. Marvin*—The Weather Bureau really earnestly desires the restoration of the printing of the map of the northern hemisphere. There have been two suggestions—to print a map for immediate use and to prepare one for delayed issue. What we would do if we could would be to resume the telegraphic map rather than to prepare reports for study purposes, for it is very difficult to get active meteorologists to fuss with things that belong to the archeologists. They want live weather of today. Even if a map isn't quite complete, it is very desirable to have the map as it is from the first data. I hope very sincerely we may perhaps be able to do so in the near future. We are getting enough reports now, but it will be some time before we get Russia and the Far East. We may have to leave that void, but we would like to meet the wishes of the world for study purposes.

*Prof. Humphreys*—Would not something akin to the international study of clouds, a year of data and maps based upon that, even if they be old, as complete as we could give them, be made for a study and for class purposes?

Mr. C. L. Davis asked if the barometer tendency might not be indicated on the daily weather map since this is reported by telegraph.

Mr. Smith consented to include in the written statement for the local (Boston) weather map each day a mention of the regions of rising and falling pressure.

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### A World Meteorological Foundation Proposed

The following letter has recently come to the Secretary:

The January BULLETIN has just been received, and I was greatly interested in the Presidential Address and the discussions relative to the need of meteorological stations in high latitudes and the need of a world weather map.

I have often felt that, meteorologically, we are more in the dark now than sailors were before Columbus. We absolutely need records from remote quarters of the globe.

The idea has often come to me that the atmosphere, being a whole—definite in quantity and size—could not be strongly affected in one place without a resulting effect in some other place. We should have enough observations to study and determine such questions. Stations should be established over the entire globe at suitable points, in sufficient number to enable us to record what goes on from day to day in pressure and temperature changes. From some the exclamation comes at once, "Impossible!" But I do not believe it impossible that, within a few years, such a plan could be tried.

Not that the world charts should be made daily, as the observations are taken. Let the daily observations be taken and recorded and the