Pro and Superintendent Alike Can Benefit

By Knowing How To Interpret A

Weather Map

KNOWING how to interpret or "read" the weather maps that are daily features of large newspapers as well as many medium size ones is of great practical planning value for course supts. and pros. Although these maps may seem a bit bewildering when a person first sits down to study them, he'll find that after a few days and probably no more than a week or two of familiarizing himself with their various markings such as frontal and low pressure systems, there really isn't much of a mystery either to the maps or to the way in which weather moves.

The most important thing the new student of forecasting should keep in mind when looking over the maps is that weather generally moves from east to west and that the fronts and lows, which generate and carry weather with them, move eastward at a fairly consistent pace. There are some exceptions (which will be explained later) to this latter rule, but from May through September, the period in which pros and supts. particularly in the northern states are most interested, frontal systems and lows move across the country at a rate of roughly 20 mph.

Forecasts made from newspaper maps can be projected quite accurately for a period of from 24 to 48 hours, and after a person has become sufficiently familiar with forecasting techniques, there is probably no reason why the forecast period can't be extended to three or four days.

But the do-it-yourself forecaster shouldn't make the mistake of attempting a 72 hour prediction and then ignore the maps for the next day or two. Even professional meteorologists don't fall into this kind of complacency. Practically all of them recheck their forecasts by consulting new maps that are drawn six or twelve hours after their predictions have been made.

The supt. or pro who looks over a newspaper weather map in the morning and makes a decision as to the kind of weather that can be expected will be wise to check an evening TV show to determine if his forecast is going according to schedule. This is particularly true if he has an important maintenance project planned for the following day or days or in the case of the pro, if he has an important club tournament coming up.

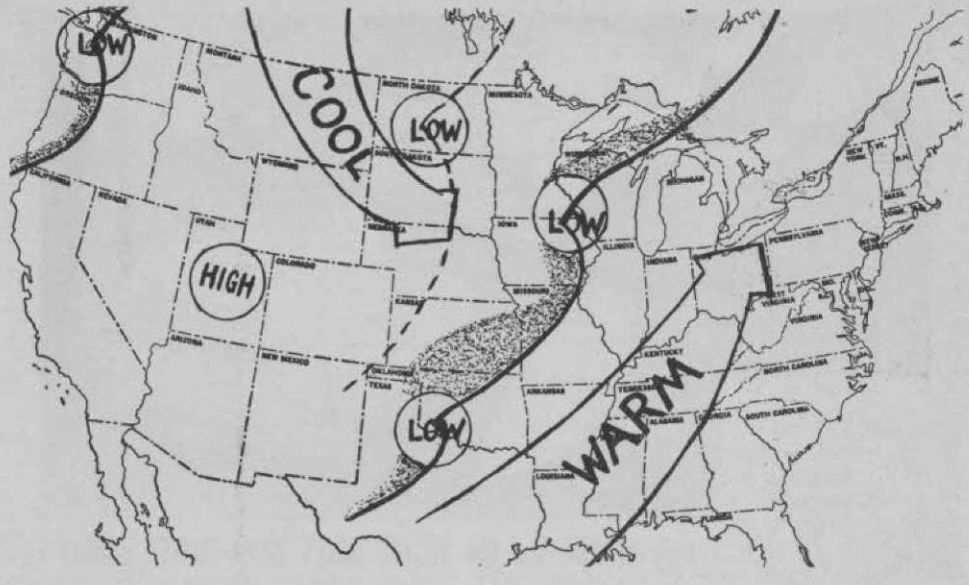
West to East Movement

Basically, there isn't much difference between a winter and summer weather map. Fronts and lows, as mentioned before, follow the same pattern on both in that they move from west to east. But the contrast in temperatures of air masses behind and ahead of a cold front in the wintertime is much greater than that which occurs in the summer. This, primarily, is what accounts for the extremes in weather in the U. S. between late November and March.

Since we're interested in summer weather situations, let's imagine we have a cold front extending from a low pressure system, centered in Bismarck, N. D., to Amarillo, Tex. The air to the west and north of the front will have pushed down from Canada, having been wedged in between the Rockies and the what has become frontal line. It will be approximately 10 to 15 degs. cooler than the air east of the front. If the front moves rapidly eastward (25 to 30 mph) and the air ahead of it is extremely warm and humid, severe thunderstoms or heavy showers will occur along the line of the front and clearing behind it will be quite rapid.

If the front proceeds more slowly and same humid and warm air is out in front of it, precipitation connected with it will be more in the order of a light, steady or intermittent rain which may last anywhere from an hour or two to 12 hours after frontal passage.

Many times fronts will pass without bringing any rain and only a slight drop in temperature. This is the result of the air mass behind the front being hardly any cooler than the air mass ahead of it, and also because both masses are relatively dry. Relative humidity of the air mass east of the front usually is a tipoff of what is to be expected in the way of rain. If it is below 50 or 60 percent in your area,



Cold front (broken line) with low centered over North Dakota picks up a secondary low as it moves eastward through Wisconsin, Iowa, Missouri, Oklahoma and Texas. Until secondary low formed, front had been moving rapidly with little or no rain. Now it slows down, and due to strong mixing of warm and cold air masses around secondary low in southwest Oklahoma, rain becomes quite heavy. This low will travel slowly east or northeast and continue to cause rather intense precipitation. Systems such as this are prevalent in spring and fall but occasionally move across eastern half of U.S. during the summer. Note front (upper left) moving into northern Pacific Coast area.

probably only light or little rain will occur when the front passes. But if it is around 75 or 80 per cent, you can predict heavy showers or thunderstorms and usually strong winds and your forecast will hold up 80 per cent of the time. It should be noted in passing that most professional meteorologists will settle for being right four out of five times.

How Fronts Slow Down

Fronts always extend out of low pressure systems. Lows tend to run pretty steadily to the east and in most cases move ahead of the frontal system. The path of the low that we picked up in Bismarck would be roughly along the Chicago, Buffalo, central Maine line. Frontal systems with only one low pressure center usually move rapidly and are not marked by much weather. When secondary lows form along the front, though, that can be a different story.

In our Bismarck-Amarillo front, it is not uncommon for the system to pick up a secondary low, which forms in the vicinity of the Texas Panhandle, while it is moving eastward. This slows down the movement of the entire system and at the same time, since lows revolve counterclockwise, brings up a large mass of warm, moist air from the Gulf of Mexico. The net result is that the front slows down to about 10 mph or less. In some cases, the northern half of the system may run on to the East Coast while the southern portion lags. The secondary low then starts traveling up the front, often taking a path that carries it through the Ohio Valley. Since it deepens (pressure continues to drop) as it progresses, its speed is retarded and the weather accompanying it continues to pile up. Eventually, this may give rise to a third low pressure system with the result that weather throughout the Midwest and East can become pretty miserable. It usually takes a good strong high pressure system, moving down from Canada, to push this kind of weather off into the Atlantic.

The fouled-up situation described above is not a common mid-summer phenomenon, but you'll see it frequently in April and May and again in late September and October.

About the only other retarding influence on frontal systems as they sweep across the country is the Atlantic and Bermuda high pressure system. This system ordinarily is centered between Bermuda and the Azores and its western edge often extends inland

across the Eastern Coast. The Bermuda high is referred to as stationary, but that doesn't mean it won't occasionally shift so that its western portion moves in as far as a line extending roughly from Columbus, Ohio to Atlanta, Ga. If, when this happens, a cold front is moving eastward across the Midwest, the frontal system will stall somewhere along a line extending south from western Ohio or eastern Indiana.

A supt. in Indianapolis may be plagued for two or three days by rain, and eventually foggy weather, by the stalled or stationary front that is sitting practically on his first tee, while another supt., say in Pittsburgh, may be wondering when the weather that he had tracked across the Midwest, is going to move into Pennsylvania.

A front in this circumstance may do one of several things. The Atlantic high pressure system may move farther west, pushing the front back to western Indiana or perhaps eastern Illinois; the high may shift eastward and allow the front to slowly move toward the East coast; or, as often happens, the front may remain stationary and break up in three or four days.

Second Type of Front

The only other front that affects weather in the midwestern and eastern part of U. S. comes out of central Canada. It tends to drift southeast at about 10 to 15 mph and on many occasions only penetrates as far south as a line that runs roughly between Chicago and perhaps Boston. When this front does get plenty of push and covers most of the eastern half of the country it brings sharp drops in temperatures, causes little rain and is marked for several days following its invasion by extremely clear weather.

This polar front occurs mainly in the winter, rarely in the summer, but quite often in April and May and again in October.

Weather that sweeps into the Pacific coast is usually generated in the Aleutian Islands area. It travels with low pressure systems that originate in the Islands. Unless there is an extremely strong high moving in behind an Aleutian low, typical frontal weather doesn't occur much below Portland, Ore. Lows taking the path from the Aleutians usually break up when they move inland against the mountains, are blocked by high pressure systems centered in Canada or move eastward and regenerate as systems connected with the previously mentioned Bismarck-Amarillo fronts.

It is due to the northerly paths of the Aleutian lows that Californians can brag about their weather. On rare occasions in the spring and fall, fronts from the Aleutians dip into Northern California and move into the San Francisco area; the same thing holds true for cold outbreaks from western and central Canada, but it takes an extremely high pressure system to push the cold air over the Sierra Nevada range and into the California heartland.

Making the Rain Forecast

After looking over a weather map and getting an idea of how quickly a front is going to move into the forecast area, it is important to check the type of rain that accompanies the front. Newspaper weather maps show whether light rain, showers or thunderstorms are occurring along the frontal line and also indicate whether these are steady, intermittent or scattered. To determine how long the rain can be expected to last it is only necessary to estimate the number of miles behind the front the rain belt extends and then divide this figure by the estimated speed of the front. For example, if the front is moving 20 miles an hour and the rain belt behind it extends 200 miles, it is logical to predict 10 hours of rain after the front has moved into the area for which the forecast is made. This is not coldly scientific, but it is a fairly reliable rule of thumb.

Temperature forecasts can be made in approximately the same manner. By selecting a city roughly 200 or 300 miles back of the front and checking its maximum and minimum temperature range for the day after the front has passed, it is possible to get a reliable idea of what these temperatures will be for your area after frontal passage. If you are located in Cleveland, for example, Chicago's temperature range will give you a tipoff as to what to expect. Speaking further of temperatures, it should be kept in mind that they usually drop to their lowest point the second day, or about 36 hours, following cold front passage. Many newspapers show maximum and minimum temperature range for the large cities.

Instability Shower

About the only other summer weather situation that has to be taken into account is the instability shower or thunderstorm. It is not an easy one to predict. Meteorologists have upper air charts compiled from radio soundings to help them in determining when instability showers are going to occur. The do-it-yourself forecaster, though, has to depend on observation and a "sense

of feel," developed after observing the buildup that touches off these showers, to predict them accurately.

Ordinarily they occur after noon and during periods when relative humidity is excessively high (75 per cent or higher) and the air has that sticky feeling. Another indication of them is the rapid buildup of fluffy cumulus-type clouds around nine or ten in the morning. Ordinarily, these clouds don't begin to form until noontime or later, but if they start to develop in the mid-morning hours, the indication is that there is an excess of moisture in the atmosphere which is being carried aloft where it will cool and condense and then fall as rain. The intensity or violence of these showers or thunderstorms usually can be gauged by the degree of relative humidity and by taking note of how early and how quickly the cloud buildup begins.

Mid-afternoon showers often are welcome since they bring relief to parched courses, but the winds that accompany them sometimes can cause great damage. If conditions point to a violent afternoon shower or thunderstorm, then all necessary precautions should be taken against wind damage since winds generated by these storms very often get up to or exceed 40 or 50 mph.

Instability showers probably occur more frequently in the south during the summer than in the north, but they are quite common in all high temperatures latitudes where humidity tends to build up.

Southern Weather Situations

Relatively few weather changes due to frontal passages occur in the summertime south of a line extending from Charleston, S. C. to Little Rock, Ark. and through the Texas Panhandle. The aforementioned front extending from Bismarck to Amarillo ordinarily is weakly defined in its southern portion and therefore gives rise to little weather. However, when secondary lows form along this front they sometimes follow a path from Oklahoma City to Atlanta and cause widespread shower and thunderstorm activity. Usually their movement is slow, about 10-15 mph. Cold fronts that come out of central Canada during the summertime rarely penetrate the South since their movement is more easterly than southerly.

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