A.M. WEATHER

VIEWER'S GUIDE

A National Program Service of the
Maryland Center for Public Broadcasting
Owings Mills, Maryland 21117

Weather affects everyone, and few of us can escape its capricious and often whimsical nature. The most we can hope for is a dependable source of weather information; one that is consistent, comprehensive, and as accurate as our present technology will permit.

AM WEATHER was created to fill that need. We set out to produce a program that would provide clear, concise, understandable predictions for pilots and the general public.

Translating intentions into a daily television show is not without difficulties. The meteorologists, the graphics team, the project assistant and producer-director struggle to Owings Mills at 3 a.m. The production and technical staff arrives at 4:00 a.m. to erect and light the set and tweak all the electronic paraphernalia. Next, the satellite motion sequence is produced, rehearsals are held, copious quantities of coffee are consumed, and it all comes together just moments before our first broadcast at 6:45 a.m.

The effort is eminently worthwhile. We believe that A.M. WEATHER is the finest program of its type available—and we're proud to be a part of it. We hope this booklet gives you added insight into the program, your program, and into the ever-changing, ever-fascinating world of weather.

Executive Producer

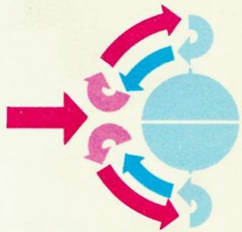
weather symbols

A.M. WEATHER FORECASTING

The phenomenon known as "weather" is the result of the earth's heat distribution. Huge amounts of warm and cold air are continuously in motion from the Equator to the poles and back again. This endless motion of cold and warm air subjects the earth to wide variations of temperature and moisture conditions and air movement.

A.M. WEATHER uses sophisticated techniques to forecast the effects of the constant motion of this "sea of air." Computer-produced forecasts introduce new weathercasting concepts and provide specialized forecasts for flight planning. A.M. WEATHER's daily broadcasts also serve many other interest areas that depend on accurate forecasting.

The program draws upon the U.S. weather observation network, on geostationary and polar orbiting satellite data and on computer analysis to produce daily forecasts with 85% to 90% accuracy.



Understanding meteorological terms and symbols used on A.M. WEATHER will enhance your understanding of the weather interpretations we bring you each weekday morning.

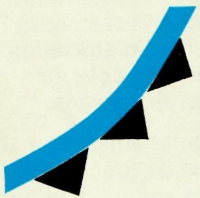
The earth balances its heat distribution by transferring warm air and cold air north and south in large air masses.

Each air mass has a center where the highest air pressure can be found. This location is called a **high** and is identified by an H. Fair weather and light winds are usually found at the center.

As the air masses migrate north and south, they are in constant contact with each other. This area, the "combat zone" where air masses of different density, temperature, and humidity meet, is called a **front.** Along the front, a major weakness usually occurs.

This area of weakness is characterized by massive lifting of air, creating a center of relatively low air pressure called a **low** pressure center (L) or storm center. Winds are usually light at the center, but close to a low pressure center, they can be very intense.

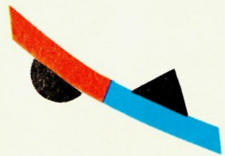
The frontal zones, or transition areas, between highs are characterized by strong contrasts of temperature and humidity—especially during autumn, winter and spring when the air masses have the greatest contrasts.



A.M. WEATHER shows four types of fronts on our maps. A **cold front** is a transition zone where colder, denser air wedges under less dense, warm air. The warm air is then forced upward at a relatively high rate. If enough moisture is available in the warm air, showers and thunderstorms can occur. We show cold fronts in blue with spikes showing the direction toward which the front is moving.

A **warm front** is another zone where air masses meet. The warm air replaces the retreating cold air. Again, the colder, denser air is the active agent and the warm air moves as a result of what the cold air does. The cold air usually retreats slowly and the warm air approaching the front rides upward and over the cold air mass, resulting in a large area of gradual lifting over a rather large frontal surface. Steady rain, drizzle, and poor visibility are present ahead of warm fronts. We show warm fronts in red with bumps pointing in the direction of movement. As a rule, cold fronts move toward the south and east, while warm fronts move toward the north and east.

Occluded fronts occur when cold fronts, moving faster than warm fronts, overtake them. Where this happens, we show the surface position of this occluded front in alternating bumps and spikes of purple.

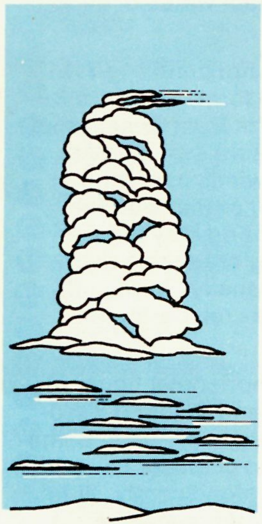


Stationary fronts occur where cold and warm air are nearly in equilibrium. We indicate these fronts by alternating warm and cold front symbols, pointing in opposite directions. Stationary fronts do not move. If they start to move, they become cold or warm fronts.

Invisible moisture called water vapor is always present in the air. When the air becomes saturated (100% relative humidity), water vapor begins to **condense** into liquid water droplets. When these droplets become large enough to be visible to the human eye, a cloud or fog is formed.

Saturation and condensation usually occur as air is lifted and cools, but when air at the surface cools at night, saturation and condensation can also occur, creating fog.

Clouds are divided into two basic types by their development. Vertically developing clouds are referred to as **cumuliform clouds.** They appear to accumulate—or boil—upward. Cumuliform clouds are usually found along a cold front and within air masses.



Flat or layered clouds are referred to as **stratiform clouds.** They appear to be level and smooth-textured. Stratiform clouds are usually formed along or ahead of a warm front.

Clouds also are classified by their location:
Low clouds (below 6,500 feet) usually are all liquid water.
Middle clouds (6,500 to 20,000 feet) are mixed liquid and frozen water.
High clouds (above 20,000 feet) usually are all ice crystals.

While clouds and precipitation usually are associated with lows and fronts, they can appear independently. Summer thunderstorms frequently occur within warm humid air masses, and mountain snows often fall within high pressure areas.

A.M. WEATHER indicates **showers** by an inverted triangle symbol. This symbol indicates periodic precipitation whose intensity may change rapidly. It is never used alone, but is modified with additional symbols.

Rain showers are usually referred to as simply "showers." We place a dot above the inverted triangle to indicate rain showers.

Our map code for **snow showers** (or flurries) is a snowflake above the inverted triangle. In some parts of the United States (e.g., the snow belt along the eastern Great Lakes), snow showers can deposit several feet of snow, while skies may be sunny only a few miles away.

Rain is indicated by a dot; **snow,** by a snowflake.

Because temperatures in clouds are usually colder than at the ground level, precipitation that reaches the ground as rain may have started out as snow. But sometimes the temperature of the clouds is warmer than the ground temperature — a condition that is likely to occur ahead of a warm front in winter. Warm air fails to displace the colder air ahead of it; hence it rides over it.

When the surface temperature is below freezing, rain or drizzle will freeze as it falls onto exposed surfaces. **Freezing rain** is indicated by a horizontal S with a rain dot. **Freezing drizzle** is indicated by a horizontal S with a comma.

Thunderstorms are experienced more frequently during the warmer months, but they can occur at any time of the year. They usually take place in warm, humid air masses and along cold fronts where warm, moist air is forced upward by colder air. However, thunderstorms also occur in winter—sometimes with snow. A blocked T with a lightning bolt is our thunderstorm symbol.

Tornadoes are probably the most violent of the severe weather phenomena. They hit with widely varying intensities and frequently are preceded by lightning, heavy rains, and large hail. Tornadoes usually occur on unseasonably warm days, never without clouds in the sky, and rarely when the temperature is below 60°F. These funnel-shaped columns of rotating air can produce winds estimated at more than 200 mph. Our tornado symbol is a black cork-screw.

On our weather maps, the closed circle with two spirals in red indicates a **hurricane,** a massive cyclonic storm with sustained winds from 74 mph upward. Hurricanes form over warm tropical ocean areas and their winds generally are accompanied by intense rain.

The open centered circle with two spirals is our symbol for a **tropical storm.** Tropical storms usually form over warm ocean areas and contain winds of 40 to 73 mph.

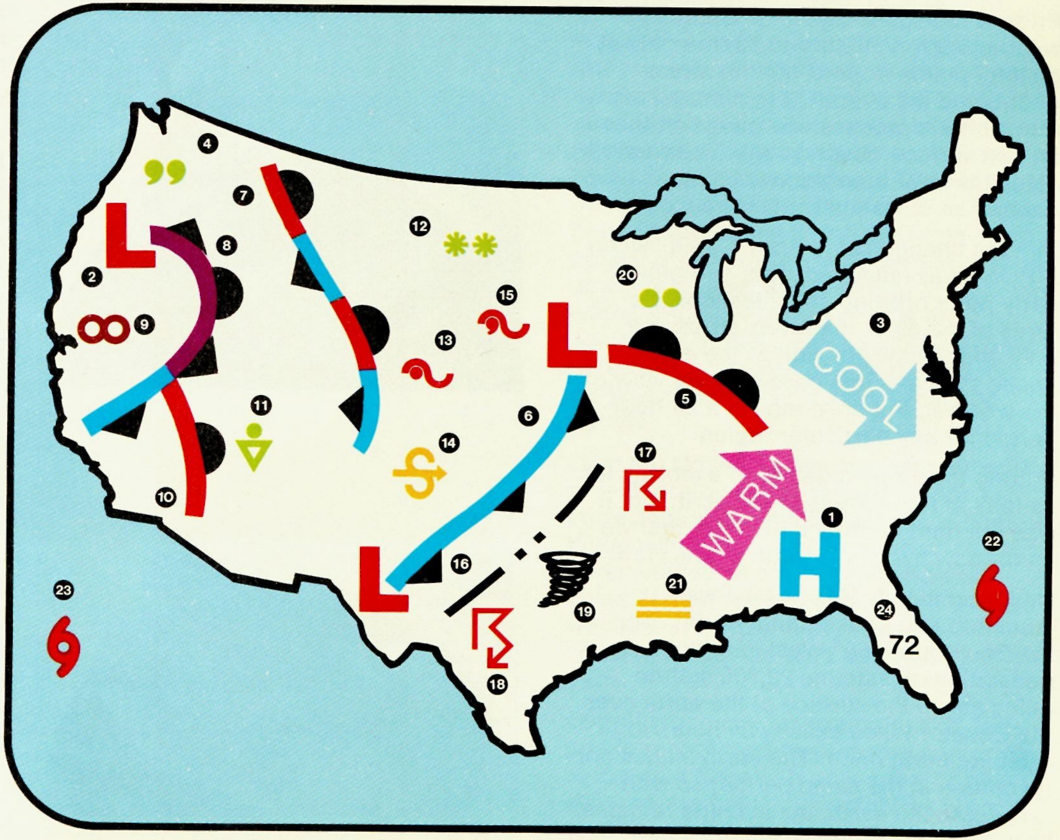
Fog (depicted by two horizontal yellow bars) is most likely to form near the surface position of a warm front or near the center of a high pressure system. With clear skies and light winds at night, the ground and the air in contact with the ground cools rapidly. Fog may form — especially in low lying areas and river valleys. Ground fog usually "burns off" shortly after sunrise as temperatures begin to rise.

Haze (depicted by a horizontal figure 8) is another weather element that is associated with high pressure systems. Sometimes haze and smoke combine to restrict horizontal visibilities significantly. (It is important to note that there may be unrestricted visibility above the haze and restricted visibility within the haze.)

The foregoing terms and symbols are illustrated on our weather map on the next page and elsewhere in this guide.

national overview

1. High pressure center
2. Low pressure center
3. Warm/cold instrusion
4. Drizzle
5. Warm front
6. Cold front
7. Stationary front
8. Occluded front
9. Haze
10. Rain showers
11. Snow showers
12. Snow
13. Freezing rain
14. Blowing dust/sand
15. Freezing drizzle
16. Squall line
17. Thunderstorm
18. Severe thunderstorm
19. Tornado
20. Rain
21. Fog
22. Hurricane
23. Tropical storm
24. Temperatures



satellites & weather

Prior to the space age and "Sputnik," weather observations were made only at distinct points from within the atmosphere, and the overall "big picture" of atmospheric process was based on these limited surface observations. The weather satellites have brought a whole new dimension to weather reporting.

The big change came April 1, 1960, when TIROS I was launched. This and other early polar orbiting satellites took pictures of the earth in narrow strips, but only on the daylight side of the earth. These strip pictures gave a broad view of the weather, but only once in a 24-hour period for any particular region.

Putting the strips together in a mosaic let us look at large areas of the earth, but it was not until February 13, 1965, that we finally saw the whole earth in one view.

On December 7, 1966, ATS-1 was launched into geostationary orbit over the Equator at 150° West longitude. A geostationary satellite 22,300 statute miles above the surface of the earth over the Equator takes exactly 24 hours to orbit the earth once. The earth makes one revolution in the same period; so with respect to the earth, the satellite remains "locked in position" above the same point on the Equator. It offers a stationary platform for continuous photographs of much of the earth's surface.

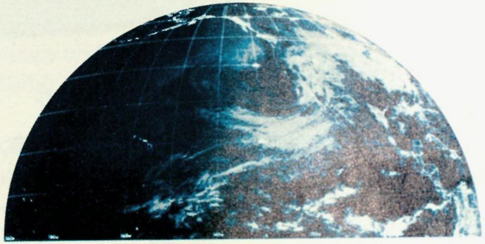


Fig. 1

Fig. 2

The ATS-1 satellite showed us the earth as a "full disc," and we were able to photograph a large area of the earth more than once in a 24-hour period. But the ATS satellite was also limited in that it saw weather only during daylight hours. In order to "see" during hours of surface darkness, a satellite sensor had to react to something other than visible light, so infra-red (IR) sensors were developed.

Infra-red light is basically heat, and an infra-red sensor generally measures temperatures. IR sensors were placed on both the polar orbiting and the geostationary satellites used operationally in the early 1970's. By late 1979, the weather satellite network of the National Environmental Satellite Service (NESS) will include two TIROS-N polar orbiting satellites and two geostationary (GOES) satellites, all IR and VIS equipped.

When the many bits of data from the satellite are combined and presented as a picture, we have satellite imagery. The imagery is generally from the Visible (VIS) or the infra-red (IR) sensors, but it is possible to turn data from other types of sensors into imagery. Figure 1 is an example of VIS imagery from the GOES Satellite, and Figure 2 is the IR imagery from the same satellite at the same time.

It is interesting to note that some areas on the two images appear very much the same, and that some areas look very different. On the visible imagery, all of the cloud areas are for the most part white, since a visible image is based on reflectivity and clouds are very reflective. In the IR, there are many shades of gray, since IR imagery is really a representation of temperature and cold temperatures are white, while warm temperatures are darker shades. High clouds which are cold show as white on both VIS and IR, while low clouds that are warm show as white on VIS and as gray on IR. Also, the western portion of the VIS picture is dark, but that portion shows up on the IR. This shows the beauty of IR in that it enables us to "see" — even at night.

It is possible to manipulate satellite data to present enhanced images for special uses. For A.M. WEATHER, IR satellite imagery is manipulated to assign particular gray tone or color to particular temperatures to bring out certain features.

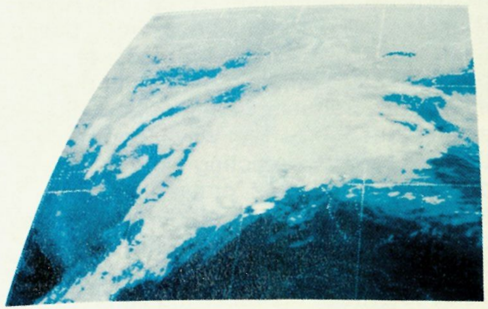


Fig. 3

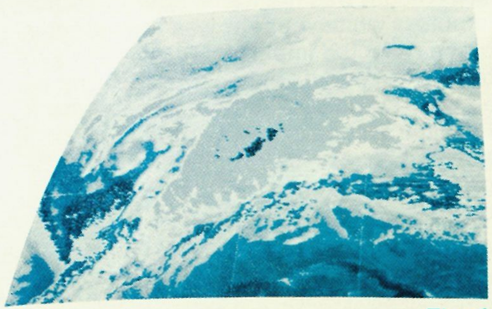


Fig. 4

In Figures 3 and 4, we have two images. Figure 3 is an IR photo with a regular linear curve where darker is warmer and lighter is colder. Figure 4 is the same data with enhanced imagery. In the IR image, we see many bright areas near Louisiana, Mississippi, and Arkansas. These areas are thunderstorms, but we have no way to tell which are higher and colder and therefore more severe. A look at the enhanced image shows at a glance where the more severe storms are occurring. In this case, the coldest range of temperatures has been assigned the darkest shade of gray rather than the lightest.

Over the United States, the data network of meteorological observing stations is fairly dense. When this network is combined with radar, very little weather goes unnoticed. Over the oceans and vast areas of sparsely populated land where weather events formerly were unobserved, satellite data now has filled the gaps.

Over the oceans, for example, it is difficult to pinpoint a low pressure center or to locate a front with only a few or no ship reports but with a satellite photo, we could easily locate a low pressure center and the fronts associated with it. Ship reports in combination with satellite photos enable us to locate these features better.

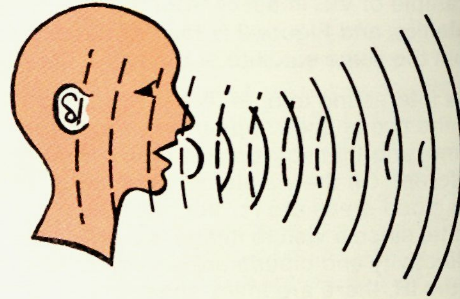
A phenomenon that forms over the tropical oceans and then moves until it dissipates or until it strikes land — often with devastating consequences — is a tropical cyclone (also can be called a hurricane or typhoon.) Prior to the advent of satellites, tropical cyclones often went undetected until it was too late, but it is now safe to say that no tropical cyclone eludes the meteorologist.

RADAR

The term radar is an acronym formed from the words RA(dio) D(etecting) A(nd) R(anging). The principle of radar is based upon the ability of certain objects or phenomena to reflect radiation. In the microwave frequency band radar sets can be tuned to certain wave lengths that are best for detecting clouds, precipitation, aircraft, or even temperature changes. The transmitter then sends out brief pulses of radiation that strike the object. A small part of the reflected pulse returns to the receiving antenna.

If you have ever stood on a hilltop, shouted, and waited for an echo to return, you have illustrated the principle of radar. Your mouth was the transmitter of audio impulses while your ear was the receiver of the reflected impulses. Radar receivers display reflected "echoes" in the form of a visual readout. Weather radars of the National Weather Service are tuned to transmit a wave length which will reflect precipitation (rain, snow, etc.) but *not* clouds.

Radar reports are routinely issued by radar sites every hour when radar

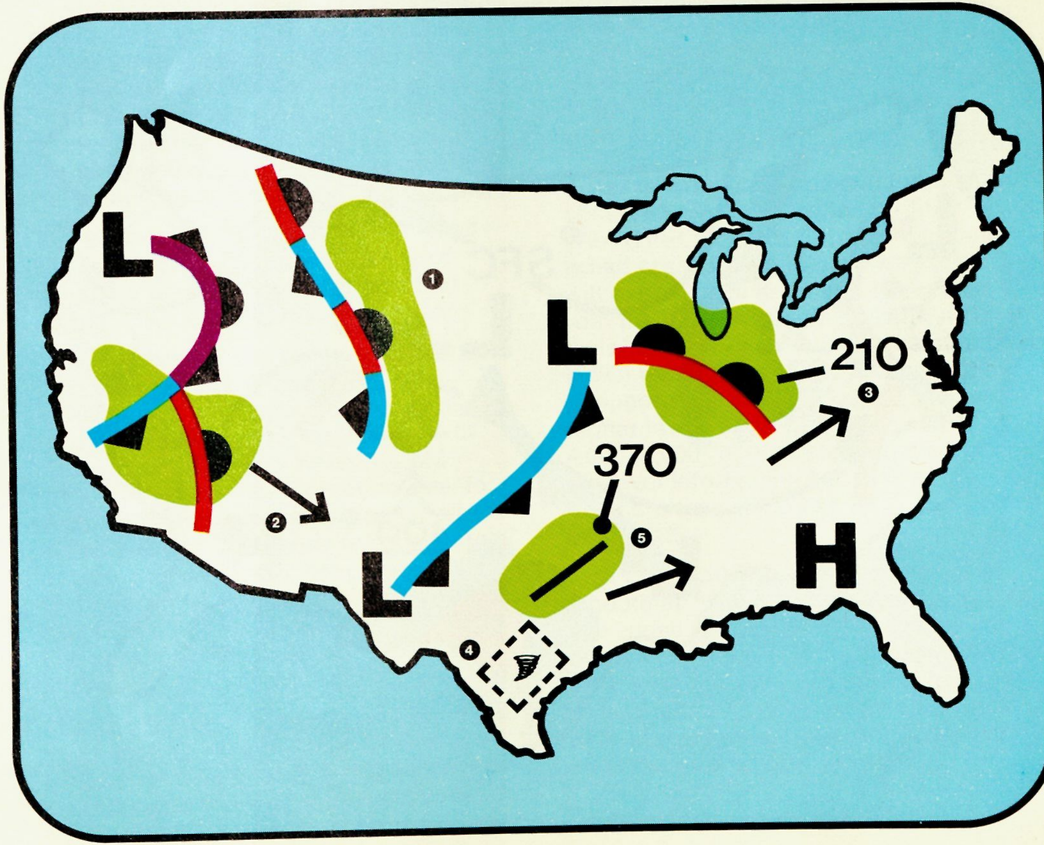


"echoes" are present. During severe weather, special observations are taken between hours. Facsimile radar charts are issued every hour from Washington, D.C.

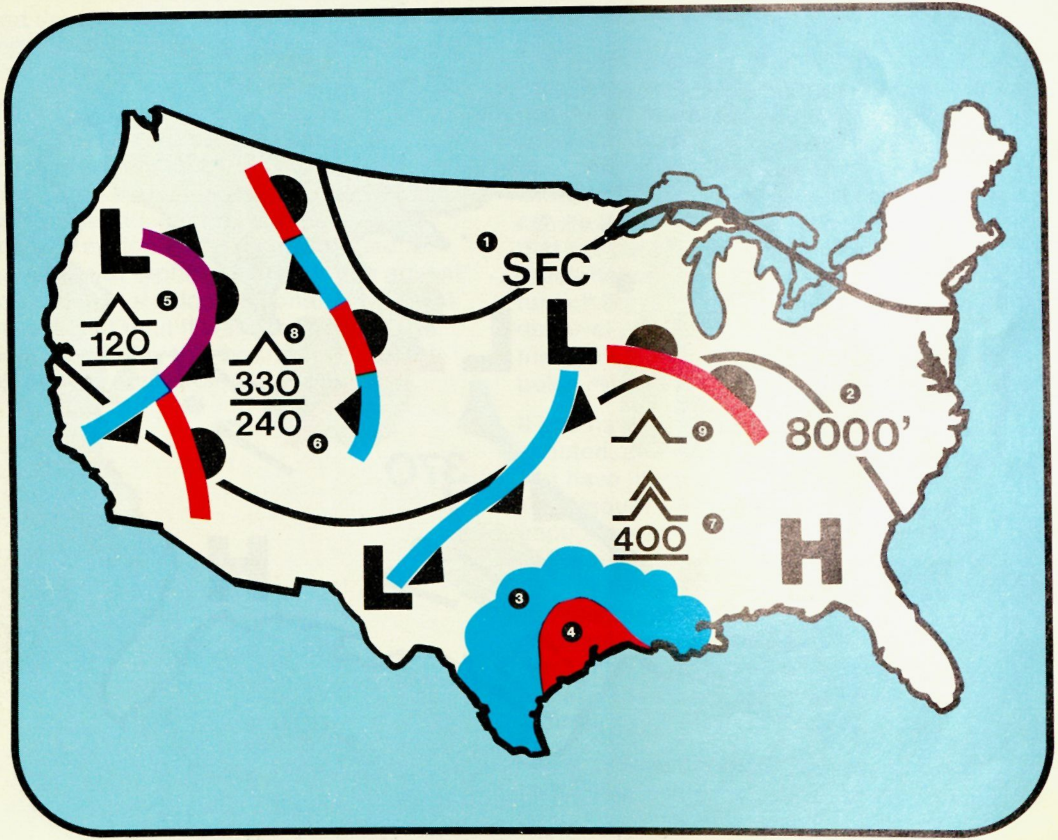
Our A.M. WEATHER chart is taken from the facsimile radar chart and shows green shaded areas of precipitation, black lines of heavy "echoes" that show heavy precipitation, thunderstorm top heights, and arrows for the direction of movement.

We also depict fronts, highs, and lows, so you can associate the areas with the weather systems.

1. Area of precipitation
2. Direction of movement
3. Cloud tops (37,000′)
4. Severe weather watch
5. Line of heavy precipitation



Flying & weather



1. SFC freezing line (colder season)
2. 8000′ freezing line (warmer season)
3. Marginal flight rules — scalloped
4. Instrument flight rules — solid
5. Height of turbulence — above 12,000′
6. Height of turbulence — 24 to 36,000′
7. Height of turbulence — to 40,000′
8. Moderate turbulence
9. Severe turbulence

Weather has an enormous impact on the 185,000 aircraft in the general aviation world. Daily weather briefings are an important part of flight preparations, with weather conditions actually dictating the success or cancellation of flights.

The blue or light shaded areas of our current and forecast flying weather charts indicate areas where ceilings are between 1000 and 3000 feet above ground level and/or where visibilities are between 3 and 5 miles. These conditions are variously referred to as "Marginal Meteorological Conditions," "Marginal Flying Weather," or "Marginal Visual Flight Rule" (MVFR) conditions. The reason for the term marginal in each of these phrases is that it will not take very much of a change, either in weather or terrain, to make the conditions unsafe for *visual flight rule* (VFR) conditions.

The areas on our charts which are dark shaded or red are the *below* visual flight rule condition areas. These conditions are variously referred to as "Instrument Meteorological Conditions," "Poor Flying Weather," or "Instrument Flight Rule" (IFR) conditions. Ceilings are less than 1000 feet above ground level and/or visibilities are less than 3 miles. The word "instrument" in some of these phrases indicates that flights, or portions of flights, (e.g., takeoffs and landings), in such conditions will require use of aircraft instruments as the only reference of aircraft position and attitude. Special equipment and pilot qualifications are necessary for flying in these conditions.

The absence of either blue or red shading does not indicate the absence of clouds or precipitation. It means that conditions are better than marginal.

Broad areas where moderate to intense **turbulence** is expected, or has been reported, are also indicated on our flying charts. Because of the large variety of aircraft used by pilots watching AM WEATHER, there is no practical way to indicate turbulence intensities for all aircraft. (Light turbulence for commercial airlines may be severe for general aviation aircraft.) Consequently, our flying charts indicate what can be expected as the worst conditions for an "average" flight.

The symbol for **moderate turbulence** is a black inverted V with "feet." **Severe turbulence** is indicated by a black caret or additional inverted V over the symbol for moderate turbulence.

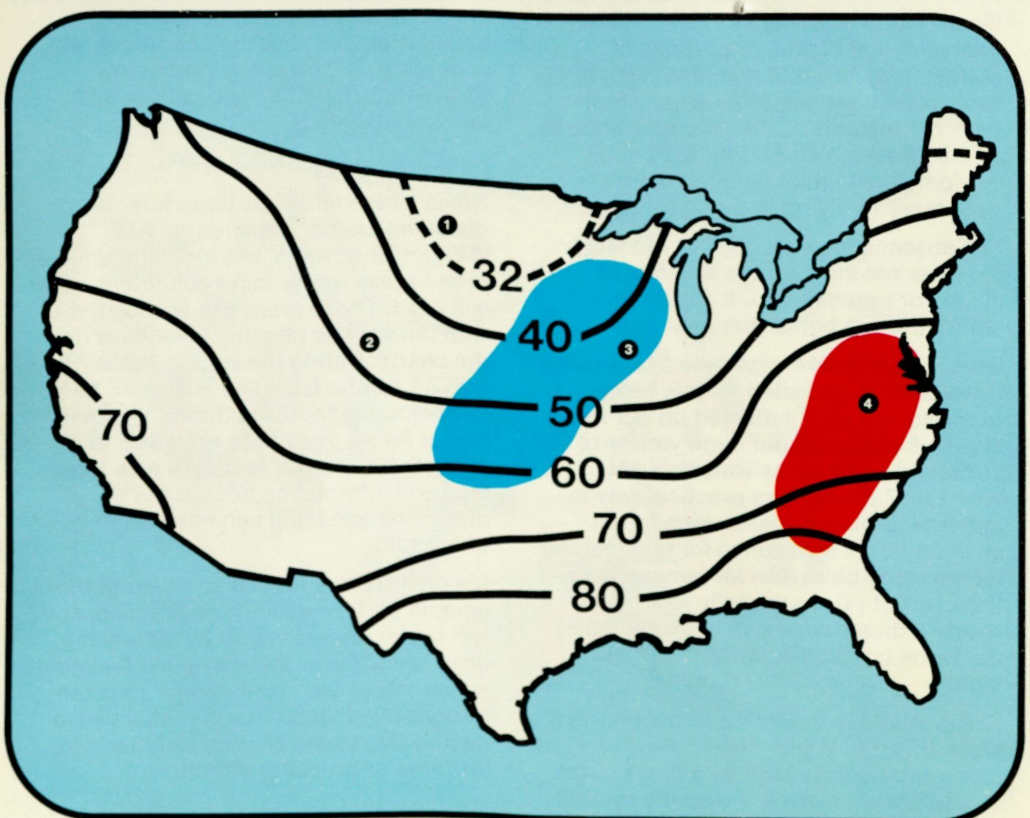
The numerals indicate the **inclusive boundaries** of where the conditions will occur, e.g. *370* means at and below 37,000 feet; 160/80 means from 8,000 feet to 16,000 feet.

FREEZING LINES AND ICING

Areas where icing has been forecast or observed are not depicted on AM WEATHER's charts, but are mentioned as broad areas where icing conditions do or will exist. These areas are associated with the various freezing level lines on the charts. During the winter, the surface (SFC) freezing level line is shown. As temperatures increase during the year, higher levels of altitude are given (e.g., 4,000, 8,000, 12,000 feet). We give freezing level information because of the drastic effects icing can have on all types of aircraft.

Ice on aircraft surfaces can disrupt the smooth air flow over lifting surfaces and will cause decreased lift by increasing drag, weight and stalling speed (speed at which the aircraft is no longer capable of controlled flight). Ice can also cause destructive levels of control flutter and airframe or propeller vibration.

temperature



1. Freezing line
2. Temperature lines
3. Colder (at least 10°F)
4. Warmer (at least 10°F)

The factors necessary for ice formation are: a free air temperature of between 0°C (32°F) and −20°C (−4°F) (or an aircraft skin/structure temperature at or less than 0°C); plus 1) visible moisture such as clouds or rain; 2) small particles or dust, sea salt, or ice necessary for the formation of liquid droplets as the water vapor condenses to liquid; or 3) the right combination of humidity, temperature and particles for the formation of ice directly from the "dry" water vapor.

Clear ice, also called glaze, is the most dangerous type of icing because it sticks firmly to the surface on which it forms and is as hard and heavy as ice cubes in your freezer.

Clear ice normally forms when large drops of super cooled (less than 0°C) liquid water or large drops (at or above 0°C) encounter a structure or surface that is below freezing. There is a spreading out of the drops as they freeze on the surface. The end product is a hard, blunt shaped, smooth or rippled coating which may cover and jam or unbalance any part of the aircraft that it can reach before completely freezing. When clear icing is mixed with sleet, snow or small hail, it has a rougher texture and may be whitish in color. The larger water drops normally associated with clear icing are most often found in the more vertically developed cumulus type clouds.

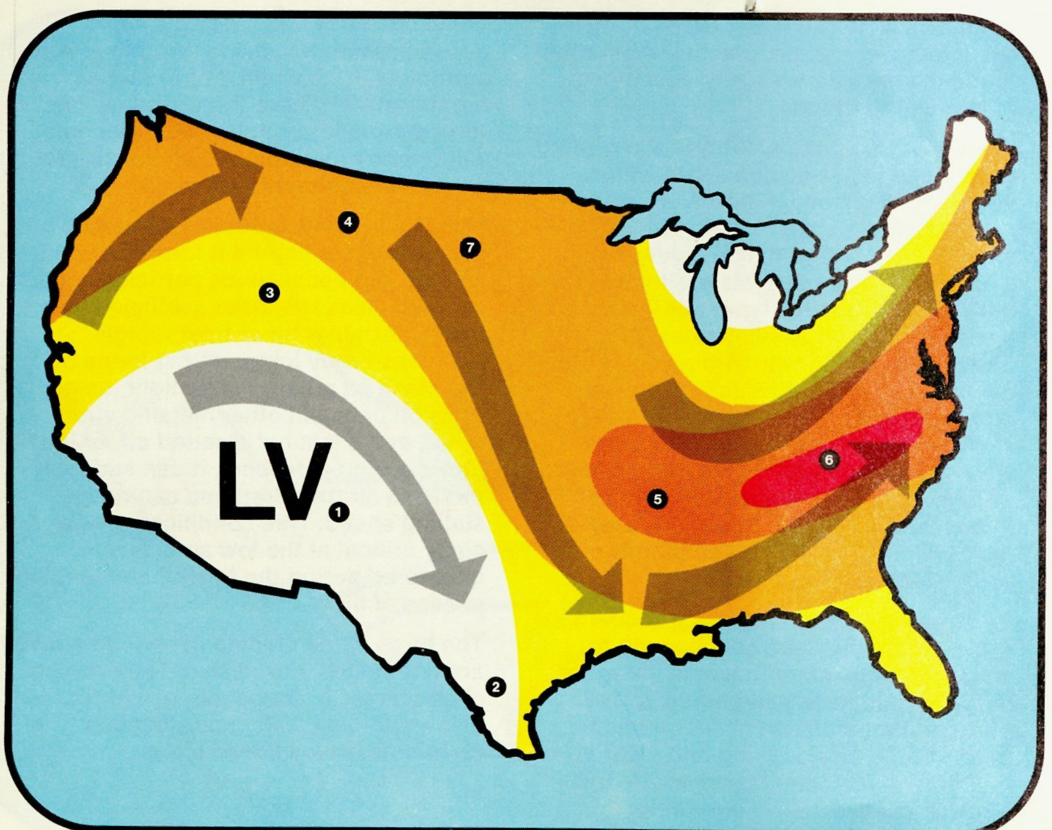
Rime icing is normally formed when small droplets of super-cooled liquid water, which can have any temperature from 0°C to −40°C, (−40°F) encounter a structure or surface that is colder than 0°C. These small droplets are found in both layered (stratus type) and colder parts of vertically developed clouds. They freeze almost instantly with no spreading out and thus are individual ice grains with air spaces among them (like the rough ice that forms on the walls of freezers when the water vapor in warmer outside air condenses and freezes on interior surfaces). Rime ice is white, granular or feathery, and can be broken off more easily than can clear ice.

Frost forms when water vapor encounters a structure or surface cold enough to cause it to sublimate (become ice without first condensing into liquid water). This phenomenon can occur on an aircraft descending or flying into clear air of higher humidity than the air where the aircraft was previously operating. Frost can occur with no visible clouds, while the aircraft is making a rapid descent, when it is flying through a frontal surface aloft, or when it approaches higher terrain where the wind flow has forced surface air upwards to become colder and more humid than the air around it that has not been pushed up.

Frost is dangerous because it can obscure vision in flight if it forms on windshields and because ice particles act as excellent aids to further sublimination; thus a harmless bit of frost rapidly becomes heavy icing. If frost forms on the plane on a clear, cold night (as it does on cars and other metallic structures) and if it is not cleaned off, or if it forms during a descent, it can suddenly increase aircraft drag and can raise stalling speed. This condition is especially critical at the low speeds encountered during the takeoff and landing phases of flight.

The three types of icing described above are not mutually exclusive. They can be encountered in sequence or, with rime and clear icing, can occur together in a condition termed **mixed icing.**

winds aloft



1. Light & variable winds
2. Under 25 MPH — no shading
3. 25-50 MPH
4. 50-100 MPH
5. 100-150 MPH
6. 150 MPH+
7. Wind direction

WINDS ALOFT

Winds aloft charts depict the predominant forecast wind directions and speeds over the U.S. for a 12-hour period beginning at 1200 GMT each day.

This information is depicted at the 5,000, 10,000, 18,000 and 34,000-foot levels which roughly correspond to the 850 mb, 700 mb, 500 mb, and 250 mb pressure levels (mb=millibar). These levels are chosen because of the ready availability of wind information at these levels and because they include a good representation of the regions of flight for most types of powered aircraft. (Since the heights mentioned above are measured above mean sea level the 5,000 foot level is often 3,000 feet or less above actual ground level and is therefore also useful for planning activities involving unpowered aircraft such as gliders.)

The wind directions are indicated by bold steamlines (or arrows) which curve so that they are always parallel to the direction of the wind at any point on the map. The wind directions are always described in terms of the compass direction from which they are blowing; for example a wind blowing from west to east is called a westerly wind. If the wind were to curve toward the south somewhat it would then be a northwesterly wind. On the 5,000 foot chart the streamlines are not drawn over areas where the ground is over 5,000 feet above sea level.

Wind speeds are forecast in knots (nautical miles per hour). One knot is equal to 1.15 miles per hour or .51 meters per second. The forecast wind speeds are depicted by varying colors or shades indicating a range of values. No shading indicates a range of speeds for 0 to 25 knots; yellow (the lightest level of shading as seen on a black and white TV) indicates the 25 to 50 knot range; orange (medium grey) indicates the 50 to 100 knot range; red-orange (grey) indicates the 100 to 150 knot range; and red (dark gray) indicates all speeds over 150 knots.

A **jet stream** is a core of maximum winds which migrate northward and southward through the temperate zones. There are two main jet streams: the polar and the subtropical.

The average height of the jet streams is about 35,000 feet, but this height will vary with the seasons. The subtropical may be at a higher altitude than the polar jet.

Wind velocities usually are higher in the subtropical jet — occasionally approaching 200 knots (230 mph) though air density is much less than in the polar jet.

The polar jet is the dominant feature when the two jet streams meet, since its density and momentum are greater. Wind speeds decrease markedly as one moves away from a jet stream. This results in both horizontal and vertical wind shear which produces turbulence. Clear air turbulence (CAT) can be encountered near the jet stream. Clear air turbulence is more likely to be found on the north side of a jet stream and can cause structural damage to aircraft.

FOG

Fog is much like a cloud on the ground. Understanding fog requires an understanding of four related terms:

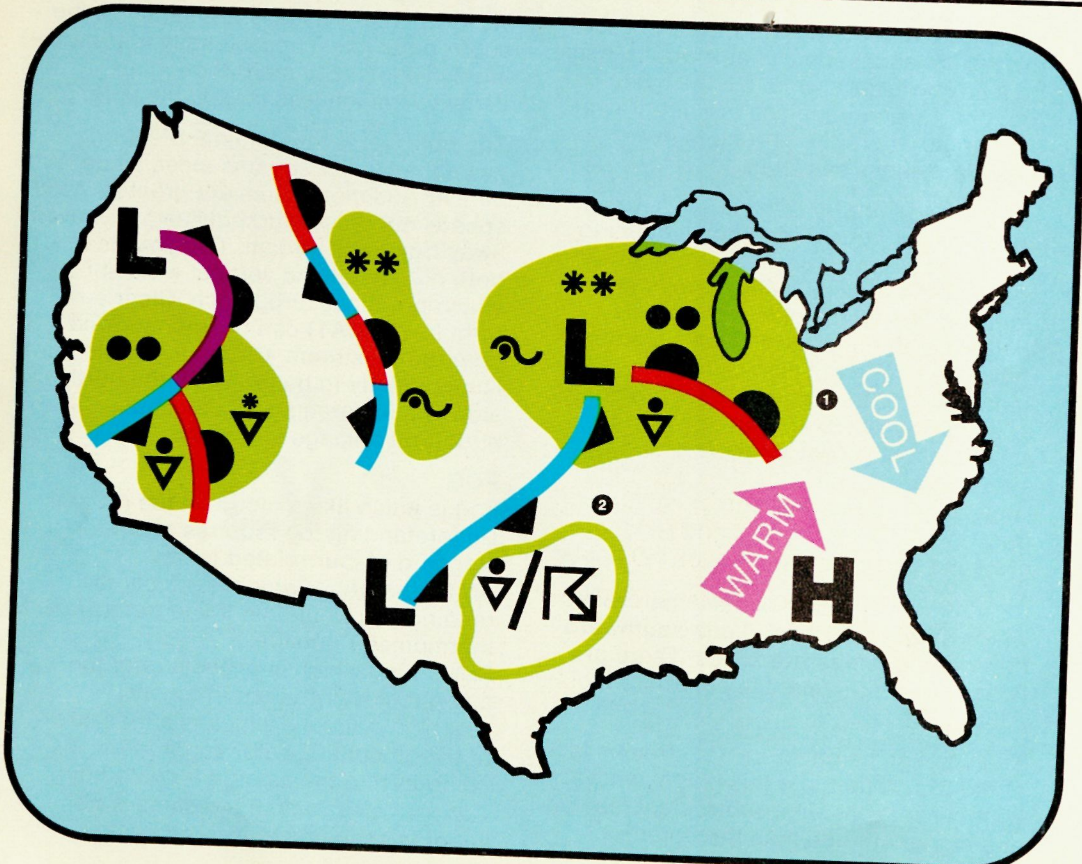
Air temperature, which is simply the reading you would get if you put a thermometer outside;

Dew Point, which is a measure of the amount of water vapor in the air;

Relative Humidity, which is a measure of the amount of water vapor in the air compared to the amount it could hold.

Condensation, which indicates water vapor is changing to water droplets.

surface forecast



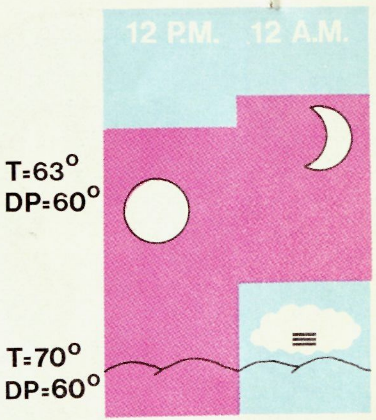
1 Precipitation area
2 Scattered precipitation

Fog usually will form in the presence of relative humidity (RH) near 100%, light winds, and some particles in the air for water droplets to form on. A 100% RH can be arrived at in two ways: (1) when air temperature is lowered to the dew point, or (2) when water vapor is added to bring the dew point up to the air temperature.

Radiation fog occurs as a result of the air temperature cooling overnight. After sunset, the air temperature starts dropping toward the dew point. If winds are light and the sky is clear, the cooling is accelerated. The air temperature varies but if the amount of water vapor in the air is constant, the dew point remains constant also. Toward early morning when the temperature and dew point are the same (RH = 100%), fog frequently will form.

Advection fog occurs frequently along the Gulf Coast and southeast U.S. during the cooler months.

When southerly winds bring warm moisture laden Gulf air over land, cold ground reduces the air temperature while the dewpoint over the ground is being raised. The combined effect brings dense fog to the Gulf states which can persist for several days. Advection fog that forms



over the water and is carried over land is called **sea fog.**

Upslope fog results from air being forced up the side of a mountain. The air's temperature decreases as it is forced upward. When the temperature is lowered to the dew point (RH = 100%), a low cloud is formed as fog.

Evaporation fog results from rain falling through the air. As the rain evaporates, it raises the dew point until it is the same as the temperature of the air and surface. Fog then forms. Evaporation fog is experienced frequently in and around warm fronts.

WEATHER WATCH

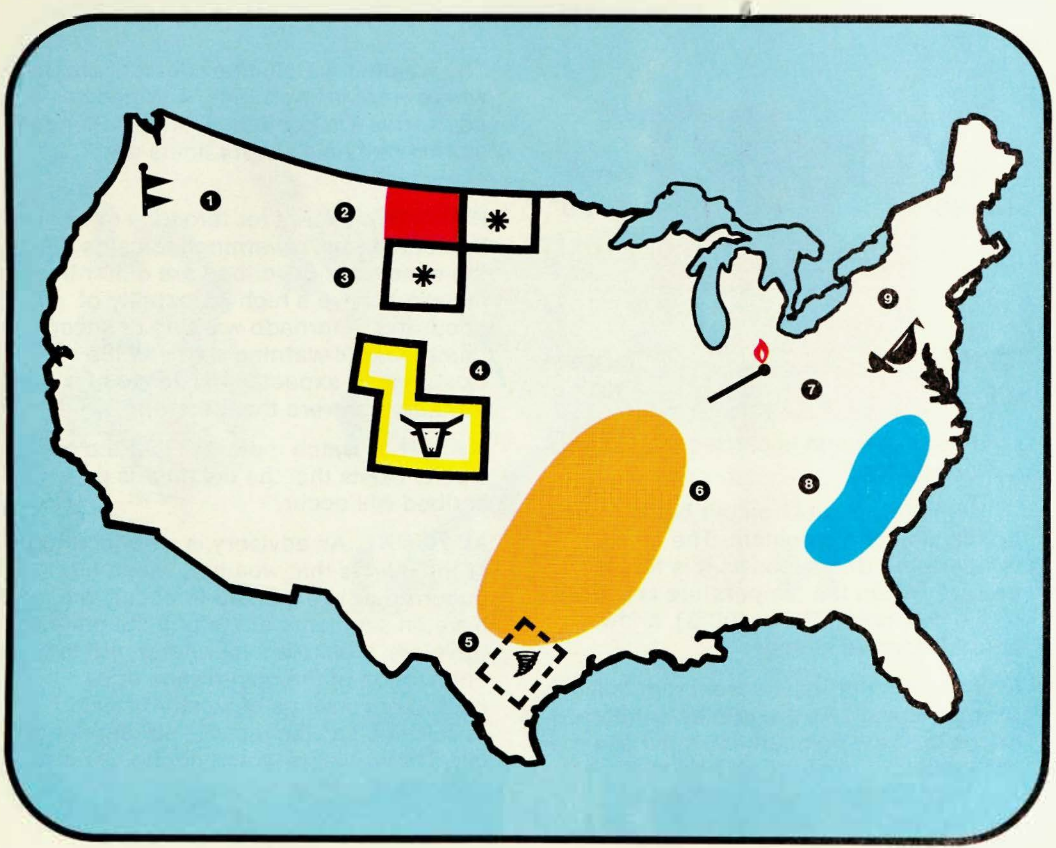
The weather watch chart depicts areas where weather warnings, watches or advisories are in effect or where thunderstorms reaching severe limits are expected.

WARNING. Except for tornados or severe thunderstorms, a warning indicates that the conditions described are either imminent or have a high probability of occurring. A tornado warning or severe thunderstorm warning warns of the existence or expected existence of a tornado or severe thunderstorm.

WATCH. A watch indicates that the possibility exists that the conditions described will occur.

ADVISORY. An advisory is a notification of the effects that weather, which has occurred or is expected to occur, will have on segments of the population (e.g., travelers, stockmen, mariners) or it is a notification of the occurrence or expected occurrence of weather related events such as ice jams or stream flooding. These events would not be covered by warnings or watches.

weather watch



1. Gale
2. Warning
3. Advisory
4. Stockmen advisory
5. Severe weather watch
6. Severe weather outlook
7. Fire danger
8. Watch
9. Small craft advisory

wind chill

At temperatures below 91°F, our bodies transfer heat to the air around us. This heat loss increases as the temperature decreases and is accelerated when low temperatures are combined with wind.

This wind chill table will enable you to determine the no-wind equivalent temperature based on the combined effects of wind and temperature. Find the selected temperature on the horizontal axis and the average wind speed on the vertical axis; the intersection of these two parameters will give you the equivalent no-wind temperature.

For example: A temperature of 0°F and an average wind of 20 mph yields a wind chill index or equivalent temperature of –40°F.

AIR TEMPERATURE (°F)

Wind Speed (miles per hour)	35	30	25	20	15	10	5	0	–5	–10	–15	–20	–25	–30	–35	–40	–45
4	35	30	25	20	15	10	5	0	–5	–10	–15	–20	–25	–30	–35	–40	–45
5	32	27	22	16	11	6	0	–5	–10	–15	–21	–26	–31	–36	–42	–47	–52
10	22	16	10	3	–3	–9	–15	–22	–27	–34	–40	–46	–52	–58	–64	–71	–77
15	16	9	2	–5	–11	–18	–25	–31	–38	–45	–51	–58	–65	–72	–78	–85	–92
20	12	4	–3	–10	–17	–24	–31	–39	–46	–53	–60	–67	–74	–81	–88	–95	–103
25	8	1	–7	–15	–22	–29	–36	–44	–51	–59	–66	–74	–81	–88	–96	–103	–110
30	6	–2	–10	–18	–25	–33	–41	–49	–56	–64	–71	–79	–86	–93	–101	–109	–116
35	4	–4	–12	–20	–27	–35	–43	–52	–58	–67	–74	–82	–89	–97	–105	–113	–120
40	3	–5	–13	–21	–29	–37	–45	–53	–60	–69	–76	–84	–92	–100	–107	–115	–123
45	2	–6	–14	–22	–30	–38	–46	–54	–62	–70	–78	–85	–93	–102	–109	–117	–125

COLD

VERY COLD

BITTER COLD

EXTREME COLD

WIND SPEEDS GREATER THAN 40 MPH HAVE LITTLE ADDITIONAL CHILLING EFFECT

Information obtained from National Oceanic and Atmospheric Administration

suggested reading

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