Weather observations are plotted on a station model (circle).
- Air temperature (T) is plotted in the upper left.
- Dew Point temperature ($T_D$) is plotted in the lower left.
- Air pressure is plotted in upper right.
- Wind direction and speed are denoted by wind stick and wind barbs.
- Cloud cover is denoted by filling in station circle.
Air Masses & Weather Fronts

- Wind direction is always reported as where it is coming from.
- A wind stick points to that direction.
- Wind speed is reported in knots (kt) and is rounded to nearest 5kt.
- A long barb equals 10kt while a half barb equals 5kt.
- Barbs are plotted on the “clockwise” side of the wind direction stick.

Wind blowing from the west at 75 knots
Wind blowing from the northeast at 25 knots
Wind blowing from the south at 5 knots
Calm winds
Air Masses & Weather Fronts

- Cloud cover is plotted as the % of sky covered by clouds
- Coverage is rounded to the nearest 1/8th
- Fill in circle in a clockwise direction
Air Masses & Weather Fronts

- An air mass is a very large mass of air that forms above its source region over a period of several days. Air masses are denoted by two letters that represent the moisture and temperature characteristics of that source region.

- Air masses are defined by WHERE THEY ORIGINATE and not where they currently are. Therefore, WIND DIRECTION is the best variable to determine which air mass is located in the region being considered because it defines the source region from where that air came from.

- For example, a NW wind comes from Canada so it would be a cP air mass (dry & cool). A SE wind comes from the Southern N. Atlantic so it is an mT air mass (humid and warm).
The moisture characteristic is the first letter and is always lower-case.

- **m** – maritime (moist air) forms above large liquid water bodies.
- **c** – continental (dry air) forms above land or frozen water.
### Air Masses & Weather Fronts

- The temperature characteristic is the second letter and is always upper-case.

<table>
<thead>
<tr>
<th>LETTER</th>
<th>NAME</th>
<th>LATITUDE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Arctic</td>
<td>75-90</td>
<td>Bitter cold</td>
</tr>
<tr>
<td>P</td>
<td>Polar</td>
<td>50-75</td>
<td>Cold/cool</td>
</tr>
<tr>
<td>T</td>
<td>Tropical</td>
<td>15-30</td>
<td>Hot/warm</td>
</tr>
<tr>
<td>E</td>
<td>Equatorial</td>
<td>0-15</td>
<td>Hot</td>
</tr>
<tr>
<td>AIR MASS</td>
<td>DESCRIPTION</td>
<td>SOURCE REGION</td>
<td>WIND DIRECTION EASTERN US</td>
</tr>
<tr>
<td>----------</td>
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<td>----------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>cA</td>
<td>Dry &amp; Bitter Cold</td>
<td>Arctic/North Pole</td>
<td>N, NW</td>
</tr>
<tr>
<td>cP</td>
<td>Dry &amp; Cold/Cool</td>
<td>Canada</td>
<td>N, NW, W</td>
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<tr>
<td>mP</td>
<td>Moist &amp; Cold/Cool</td>
<td>North Atlantic O.</td>
<td>NE, E</td>
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<tr>
<td>mT</td>
<td>Moist &amp; Hot/Warm</td>
<td>South Atlantic O.</td>
<td>SW, S, SE</td>
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<tr>
<td>cT</td>
<td>Dry &amp; Hot/Warm</td>
<td>Mexico</td>
<td>N/A</td>
</tr>
<tr>
<td>mE</td>
<td>Hot &amp; Moist</td>
<td>Equatorial</td>
<td>N/A</td>
</tr>
</tbody>
</table>
• A **weather front** is a boundary between two distinct air masses. That means that on one side of a front the following weather variables should be quite different than those on the other side of the front: wind direction, dew point temperature, air temperature.

• **WIND DIRECTION IS THE MOST IMPORTANT VARIABLE WHEN LOCATING A WEATHER FRONT!** Because wind direction will relate to the air mass, wind direction will shift dramatically when a front passes. For example, the winds in the warm air ahead of a cold front will be southerly, but the winds in the cooler air behind the cold front will normally be from the northwest.
Air Masses & Weather Fronts

- Clouds are good indicators of weather fronts
- Because **cold fronts** lift warm, humid air vertically, the clouds along a cold front tend to be **vertically developed** (cumuloform). These clouds tend to produce showers and thunderstorms of short duration (minutes or hours).
- Because warm air rides over cold air ahead of a **warm front**, clouds are more **horizontally developed** (stratiform). These clouds tend to produce steady precipitation (many hours or a few days).
Air Masses & Weather Fronts

Lows move:
480 miles/day (summer)
720 miles/day (winter)
How do high and low pressure areas form?

The air molecules that make up Earth’s atmosphere have weight and this weight can be measured as pressure. Winds high in the atmosphere can affect the pressure measured at the surface.

1. Converging winds aloft add air molecules and make the air column heavier, increasing pressure at the surface.

2. Diverging winds remove air molecules from the column, decreasing pressure at the surface.

14.7 pounds
The average weight of air molecules on a square inch area. (at sea level)

Today’s weather focus idea came from Mark Miller. Send your ideas to: weatherguys@usatoday.com

Source: USA TODAY research

By Bob Swanson and Sam Ward, USA TODAY