

Current Weather
Studies

1B:

AIR PRESSURE AND WIND

Note: This Activity is the same as AMS Weather Studies Current Weather Studies 1B from Preview Week. Students only need to complete the Activity once.

Do Now:

1. Print this file.
2. Print the Wednesday Current Weather Studies [Image 1](#) File.
3. Print the Daily Summary and/or Supplemental Information Files, if directed by your instructor.

To Complete Investigation:

1. Reference: Chapter 1 in the *Weather Studies* textbook.
2. Complete Investigation 1B in the *Weather Studies Investigations Manual* as directed by your instructor.
3. Complete this Wednesday online-delivered Current Weather Studies 1B activity if directed by your instructor.

The general weather conditions across the U.S. on Thursday morning 25 AUG 2011 at 12Z (8 AM EDT, 7 AM CDT, 6 AM MDT, 5 AM PDT, etc.) included a band of moderate to heavy showers crossing the Middle Atlantic States ahead of an advancing cold front, widely scattered precipitation in several other regions, and Hurricane Irene heading northwestward from the Bahamas. Temperatures were seasonal over most of the country. The [Image 1](#) "U.S. - Data" map acquired from the course website is the depiction of weather conditions at individual locations plotted in a coded format called the "station model" across the contiguous U.S.

1. The wind directions at reporting stations on the map are shown by the line (which can be thought of as an arrow shaft) depicting the air flow into circles representing station locations. Wind at a station is named by the direction from which the air flows, *i.e.*, air arriving at the station from the north is a **north** wind. This helps to identify the atmospheric conditions of the arriving air. Therefore the wind direction at Denver, in northeastern Colorado, at map time was generally from the [**(north)(west)(east)(south)**].

(All reporting surface weather stations can be identified from the "Available Surface Stations" link on the course website's **Surface** data section and identities given in the "User's Guide." Also a map of National Weather Service offices can be found at: http://www.wrh.noaa.gov/wrh/forecastoffice_tab.php)

2. Given the direction the wind at Denver was from, it would be reported as a [**(north)(west)(east)(south)**] wind.

The wind speed is reported by a combination of long (10 knots) and short (5 knots) "feathers" attached to the direction shaft. [The station model will be explained in more detail in Investigation 2A. Further details for deciphering station data can be found in your *User's Guide* (linked from the course website).] At map time, Denver had a 15-knot wind (one long and one short feather). [A double circle without a direction shaft signifies calm conditions, such as Minneapolis, MN, and Atlanta, GA and a shaft without feathers would denote 1-2 knots. One knot (1 nautical mile per hour) is about 1.2 land (statute) miles per hour.]

3. A bold red "**L**" and bold blue "**H**" have already been marked on the map to denote the general centers of locally lowest and highest pressures within those regions on the map, respectively. Compare the *hand-twist* model of a High to the wind directions in the states surrounding the high-pressure center marked by the H. Wind directions at most of the stations across this area of the upper Great Plains show that, as seen from above, the air spiraled generally [~~(clockwise)~~(~~counterclockwise~~)] around this high-pressure center.
4. The air also spiraled generally [~~(inward toward)~~(~~outward from~~)] the high-pressure center.
5. This wind flow pattern about the High is [~~(consistent with)~~(~~contrary to~~)] the *hand-twist* model of a High.

The local coverage of the sky by clouds at a station is denoted by the shading within the circle representing the station. An open circle means clear skies. Partial shading represents the fraction of sky covered by clouds. A dark circle means overcast conditions, *i.e.* completely cloudy sky.

6. Note the local coverage of the sky as reported in the station circles within the circulation pattern of the High. The skies about the High center were generally [~~(clear)~~(~~cloudy~~)].
7. The hand-twist model of a High includes vertical motions with air sinking. Based on the High shown on this map over the upper Great Plains, areas of sinking air are likely to be locations of [~~(clear)~~(~~cloudy~~)] skies.
8. This pattern of cloud cover [~~(is)~~(~~is not~~)] consistent with high-pressure systems being characterized as "fair", implying little or no cloudiness and precipitation. The "weather" at map time at Huron, SD, Minneapolis, MN and Des Moines, IA, was reported in the station models as clear skies and calm to light winds.
9. Next, consider the low-pressure center denoted by the **L** in the Atlantic Ocean east of Florida over the Bahamas. This low-pressure center marked the center of the circulation of Hurricane Irene at map time. Wind directions at stations across Florida and at Nassau, Bahamas show that, as seen from above, the air flow was consistent with a direction generally [~~(clockwise)~~(~~counterclockwise~~)] around the low-pressure center.
10. This flow [~~(was)~~(~~was not~~)] consistent with the *hand-twist* model of a Low.

11. From the station models at Miami and Nassau, under the influence of Hurricane Irene, it is evident a Low produces generally [(clear)(cloudy)] skies.
12. The hand-twist model of a Low includes vertical motions with air rising. Therefore, areas of rising air are likely to be locations of generally [(clear)(cloudy)] skies.
13. Refer back to the Monday Current Weather Studies A. The [Image 2](#) surface weather map, “Isobars, Fronts, Radar & Data”, [(was)(was not)] for the same day and time as the U.S. - Data map delivered with this investigation.
14. Note the precipitation areas as indicated by the radar shadings on the Image 2 map of the Monday Current Weather Studies A. One precipitation area displayed on the map generally aligned more closely to the plotted [(Hurricane Irene Low) (upper plains High)].

Another significant precipitation area as indicated by the red and yellow radar shadings is associated with the advancing frontal system from western New York State through Texas. Fronts also provide rising air motions. These weather systems will be investigated in more detail as the course progresses.

When the current weather map available on the course website shows centers of stormy Lows or fair weather Highs near your location, you might consider your local wind direction (as reported on weathercasts or shown by a flag, for example) with map circulations and the hand-twist model of weather systems. The designation of the Ls and Hs as centers of stormy and fair weather systems, respectively, can be compared to satellite views showing clouds across the U.S. Check to see if the region immediately around a Low is generally cloudy or the broad area centered on a High as mostly clear.

One tool for wind speed conversions between miles per hour and knots (as well as other quantities) and their formulae can be found at: <http://www.srh.noaa.gov/epz/?n=wxcalc>.

If directed by your instructor, place the answers to Investigation 1B and Current Weather Studies 1B on the [B Answer Form](#) linked from the AMS Weather Studies website.

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