Current Weather Studies 1A

SURFACE AIR PRESSURE PATTERNS

Reference: Chapter 1 in the *Weather Studies* textbook. Complete the appropriate sections of Investigations in the *Weather Studies Investigations Manual* as directed by your mentor or instructor. Check for additional *Weekly Weather News* updates during the week.

Figure 1 ("Pressures" map) was acquired from the *Realtime Weather Portal* and shows reports of surface air pressures (corrected to sea level) rounded to the nearest whole millibar on 21 January 2018 at 16Z. [UTC, or Z time, is five hours "ahead" of Eastern Daylight Time (EST), so the 16Z map of January 21st depicts conditions at local times of 11 AM EST (10 AM CDT, 9 AM MDT, 8 AM PDT, etc.)].

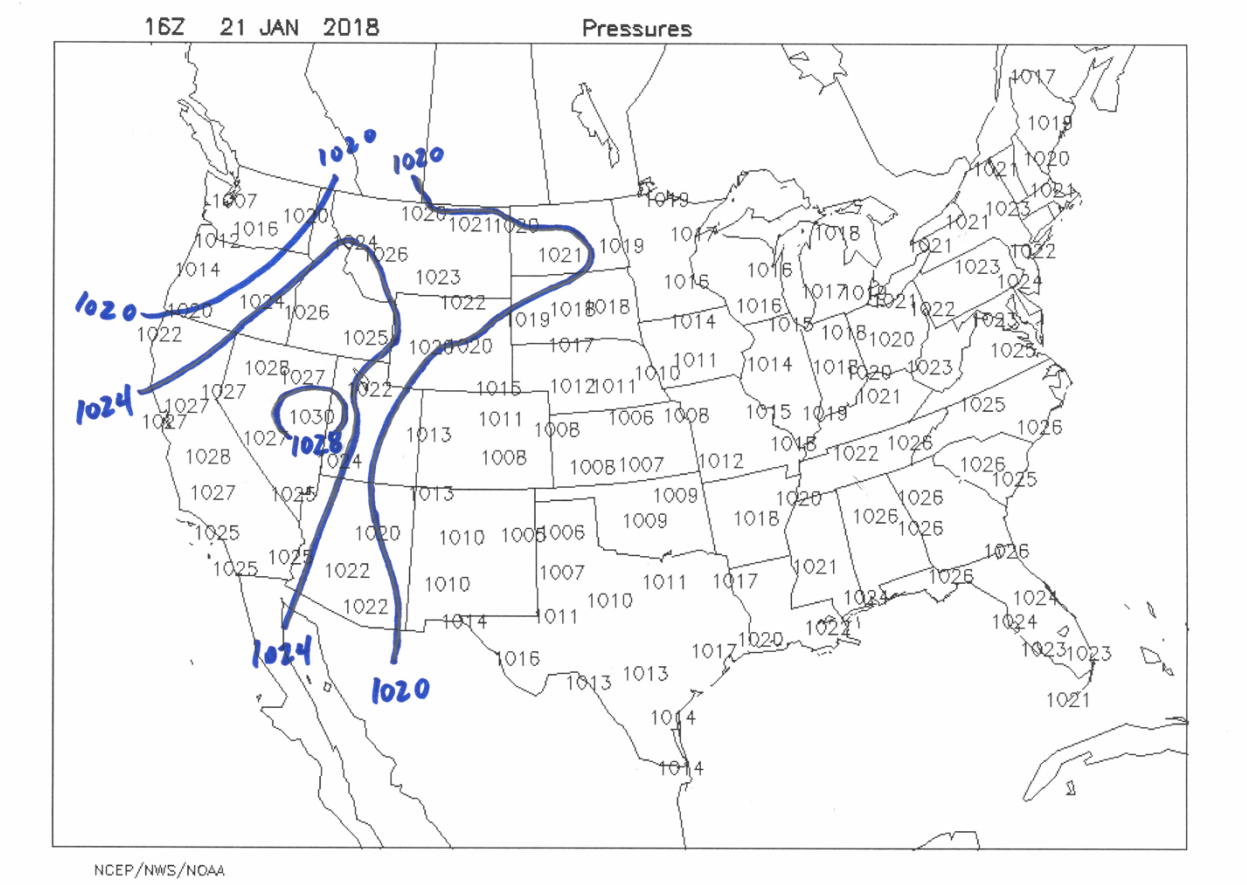

Figure 1. Map of surface atmospheric pressure (reduced to sea level) at selected stations at 16Z 21 January 2018. [It is recommended that you print out and analyze a full-size copy of this figure, click here.]

Most weather map products from the *RealTime Weather Portal* are created by the National Weather Service's (NWS) National Centers for Environmental Prediction at the National Oceanic and Atmospheric Administration (NOAA) as noted in the lower image margin ("*NCEP/NWS/NOAA"*).

1. The highest plotted air pressure observation on the map of 1030 mb was at _____.

   [ ] Atlanta, GA
   [ ] New Orleans, LA
   [ ] Philadelphia, PA
   [ ] Ely, NV

2. The lowest reported pressure was _____ mb occurring at Topeka, KS and at Amarillo, TX.

   [ ] 998
   [ ] 1000
   [ ] 1006
   [ ] 1010

3. The isobars in the conventional series that will be needed to complete the pressure analysis *between* the lowest and highest values on this map are _____ mb.

   [ ] 998, 1002, 1006, 1010, 1014. 1018
   [ ] 999, 1003, 1007, 1011, 1015, 1019
   [ ] 1008, 1012, 1016, 1020, 1024, 1028

Using a pencil on your printout, follow the steps below to complete the pressure analysis for the map area to determine the pressure pattern that existed at the time the observations were made. For completing the map, refer to the **Tips on Drawing Isobars** in the first portion of Investigation 1A from the *Investigations Manual*. More than one isobar of the same value may need to be drawn on the map if pressure values located in separate sections of the map area require it. Consider each pressure value to be located at the center of the reported number. Isobars with values of 1028, 1024 and 1020 mb have already been drawn in the western U.S. area. Note that labels for isobars have been added at their ends where they reached the boundary of the map area having plotted data or, for the small, closed 1028-mb isobar, placed in the line itself.

As we go through the term, mention of locally understood geographic regions will appear in the Daily Weather Summaries and Current Studies. Common NWS terminology for these regions of the country which may be useful to understanding is at:
http://www.wpc.ncep.noaa.gov/images/us_bndrys1_print.gif and
http://www.wpc.ncep.noaa.gov/images/us_bndrys2_print.gif.

4. If you note in the Pacific Northwest, the pressure value in Seattle is much lower than other parts of the state. There is already a 1020 isobar line intersecting part of the state. But three more isobar lines are needed through the state, given the 4-millibar interval convention. These three lines will separate values where the lower value on the map remains to one side while higher values are on the other side. The pressure values of locations generally east and south of Seattle are therefore _____ 1007 mb.

   [ ] less than
   [ ] equal to
   [ ] greater than

Continue drawing and labeling isobars of the series where they existed within the data pattern over the eastern two-thirds of the U.S. After completing all the isobars, label the positions with the lowest value in the U.S. mid-section with bold ***Ls*** (about 1 cm high). Label the highest pressure in the western U.S. with an ***H***.

Figure 2 is the analyzed surface pressure map from the *Realtime Weather Portal* produced at the NOAA's National Centers for Environmental Prediction for 16Z 21 JAN 2018. The Figure 2 map shows the locations of isobars, air pressure system centers, and fronts at the same time as those on the Figure 1 map you have analyzed.

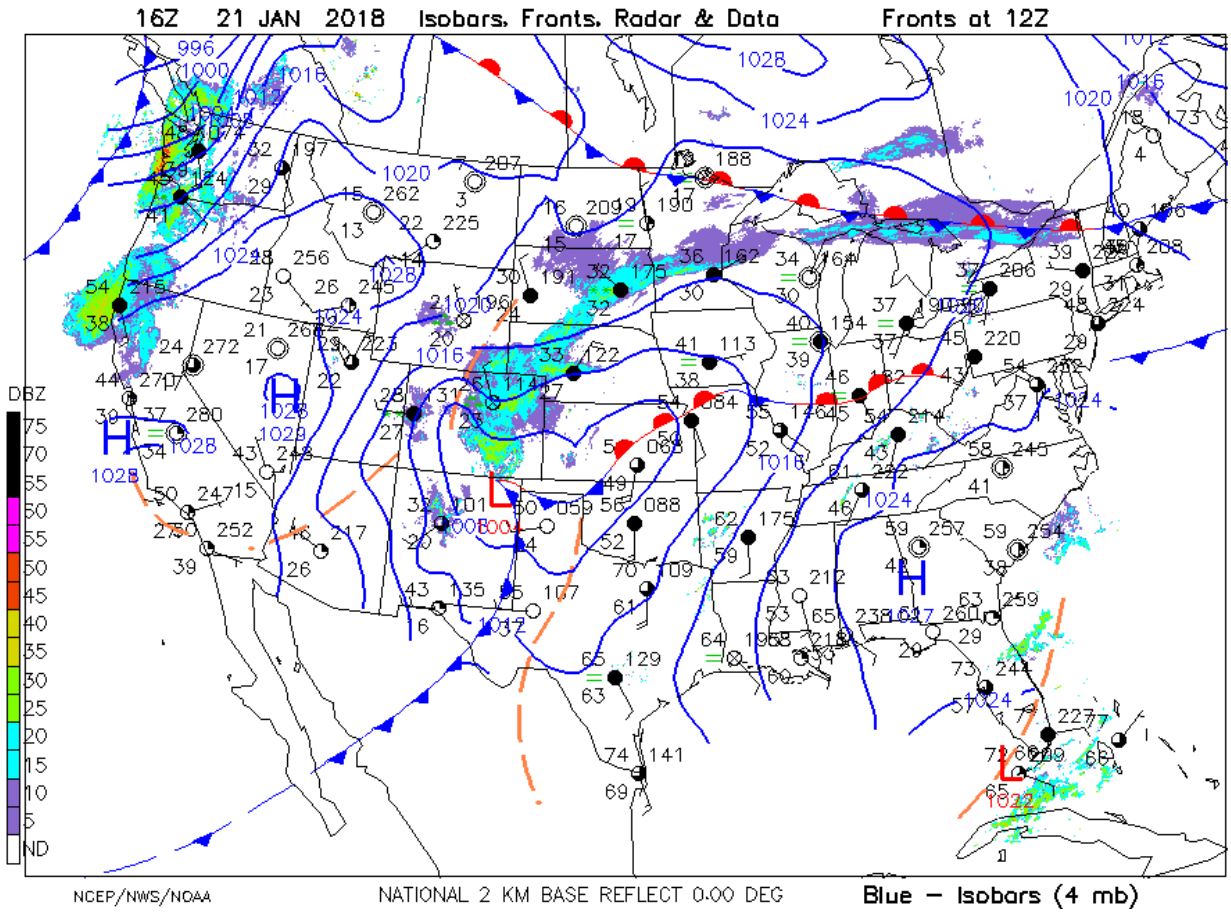

Figure 2. Analyzed NCEP surface weather map for 16Z 21 January 2018 with isobars, pressure systems, and precipitation.

5. The overall isobar patterns on the two maps over the coterminous U.S., particularly for the south-central U.S. Low and the Great Basin High, are generally _____. Also, included are shadings for precipitation occurrences around the country, based on radar reports.

   [ ] similar
   [ ] very different

The **Figure 2** map of isobars was constructed by a computer, based on a much more complete set of pressure values than those shown on **Figure 1**. This degree of detail can be seen, for example, on the latest surface map available, at http://www.wpc.ncep.noaa.gov/html/sfc-zoom.php. (This may account for some of the variations between your analysis and that by the computer. The computer-based analysis is the source of some additional plotted Hs denoting local marginally higher-pressure centers and Ls for lower pressure centers, respectively.)

By analyzing the pressure values reported on weather maps to find pressure patterns, one can locate the centers of locally highest and lowest pressures. We will see that these pressure centers often mark the midpoints of major weather systems; either regions of fair weather or stormy conditions, respectively.

Suggestions for further activities: The *Realtime Weather Portal* routinely delivers unanalyzed ("Pressures") and analyzed ("Isobars & Pressures") surface pressure maps. Practice drawing isobars by calling up the unanalyzed version. Note: If you would like to practice more on drawing isopleths (lines of a constant value) in groups of numbers, from simple to more complex patterns, go to: http://profhorn.aos.wisc.edu/wxwise/AckermanKnox/chap1/Contour_page1.html.