



Weather Map Analysis

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At a Glance: In this classroom-based activity, students will learn the different steps for creating and analyzing weather maps.

Grade Level: 6 - 8

Duration: 3 class periods

This activity is meant to be a follow up to learning weather basics and divided into three separate days. The subject of day 1 is creating station plots, day 2 is contouring, and day 3 is frontal analysis.

Objectives

- 1) Students will know the correct format for plotting observations and be able to demonstrate this.
- 2) Students will be able to use station plots to create weather maps.
- 3) Students will be able to draw contours on a weather map
- 4) Students will be able to analyze where fronts should be placed on a weather map.

Student Preparation

Students will need to know what information and instruments need to be taken for weather observations.

Students should also have an understanding of basic weather concepts such as temperature, pressure, winds, clouds, precipitation, and fronts.

Materials

- Overhead projector
- Transparencies
- Transparency markers
- Ball point pens or thin markers
- Weather observation data (both in plots and raw data)
- Blank maps with stations identified on them
- Actual analyzed weather map for same day as observation data

Teacher Preparation

- 1) Review background material to review the different concepts and help create discussion questions.
- 2) Gather weather data. The data should include station plots for students to interpret and raw data for students to draw out station plots, both to use in class. Raw data, all from the same date should also be collected for homework.
- 3) Obtain professional analyses of the weather situation on the same day for which the data are gathered. Ideally, more than one source can be used, to show students that even among meteorologists, where a front is can be difficult to agree upon.

Day 1 “Station Plots”

Introduction

First, students are introduced to station plots through discussion. Questions should deal with what station plots are, the importance, what data goes in a plot etc. Make sure and point out that it is important for a standard format so that data can easily be interpreted and there are no language barriers. This should be the shortest part of the lesson, taking 5 minutes at the most. The rest of the class time should be divided between Task B and Task c

Interpreting

Once students know what a station plot is, they will learn how to interpret a station plot. First the teacher will do an example, going over each part of the station plot and explaining what it represents, as well as what the data is. For example, 889 means the pressure is 988.9 millibars.

Next interpret a station plot as a class. Do several if needed to help get the concepts across. Lastly have the students interpret a plot on their own.

Drawing

Now the students will learn how to make their own station plots from raw data. Again first start off with the teacher doing one or several examples and giving an explanation. Then do one or several as a class. Lastly, have students make their own plot.

HOMEWORK: Students should be given a map with several locations and raw data so that they have to draw the station plots for those locations. Explain that the homework will be used and added to over the next couple days.

Day 2 “Contours”

Introduction

Through lecture/discussion students will learn what contours are, how they're used in weather maps (temperature, pressure, winds, etc), and how they are drawn. Use examples of weather maps that have already been contoured so students can see what they are learning about.

Learning to Draw

Students will learn the process of drawing contours and then do several examples as a class and on their own. An attached handout shows the process for drawing isotherms (temperature contours).

- 1) A blank image with a collection of temperatures. Choose a temperature to start with based on what the different temperatures are. In this case, start with a 40 degree contour.
- 2) Make “X”s where the 40 line should go in between temperatures that are less than 40 and greater than 40. The closer the temperatures are to 40 the closer “X” should be to that number.
- 3) Draw the line and connect the “X”s.
- 4) – 6) Repeat at 5 degree intervals as needed.

Both pressure and temperature (isobars and isotherms) should be practiced by the students as they will be required to do both on their homework. When drawing contours, it is good to do one at a time, first in pencil then pen/marker so not to get the different lines mixed up. Typically black markers are used for isobars and red markers for isotherms.

HOMEWORK: Using the station plots they should have finished the night before, students will draw isotherms and isobars on their maps.

Day 3: “Frontal Analysis”

Review

Students should already know the basics of what fronts are, the different types of fronts, where the fronts are located in relation to pressure systems, as well as how to identify frontal passage based on observations. Review these as a class, especially the identification of frontal passage.

Identification

Discuss with students how the characteristics they brought up from review could be seen on a weather map. Using weather maps without fronts drawn in have students pick out where the fronts should be as a class first then on their own.

HOMEWORK: Complete the weather map the students have been working on for the past 2 days by adding the High and Low pressure centers as well as any fronts. Remember fronts are generally attached to the Low pressure center.

Assessment

Summative Assessment

The assessment of this activity is the final weather map created from the homework. This activity and assessment can also work as a final assessment for a weather unit. A good addition would be to have students explain their reasoning for where everything is placed on the map. Another addition would be to have students sketch out lines associated with temperature and moisture changes, and using the wind information try to determine their movement.

If possible, it is highly recommend that the class go over the final map together and compare it to analyses done by professionals. This could also be part of the assessment by having students compare their maps to the professionals and create hypotheses about why they are different.

Grading Rubric

There is no grading rubric provided with this activity. However the following items are things to consider when creating a rubric.

- Location of features on map (doesn't have to be exactly the same as even professional analyses vary, but should be the general area)
- Accuracy (correct symbols used, no fronts attached to high pressure, etc)
- Reasoning for placement

Ohio Standards, Benchmarks and Indicators Addressed:

Ohio Standard Earth/Space Science: Students demonstrate an understanding about how Earth systems and processes interact in the exosphere resulting in the habitability of Earth...it includes understanding the properties and the interconnected nature of Earth's systems...how the concepts and principles of energy, matter, motion, and forces explain earth systems...

Grades 6-8, Benchmark A: Describe how the positions and motions of the objects in the universe cause predictable and cyclic events.

Grades 6-8, Benchmark C: Describe interactions of matter and energy throughout the lithosphere, hydrosphere and atmosphere (e.g., water cycle, weather and pollution).

Grade 7 Indicators:

6. Determine how weather observations and measurements are combined to produce weather maps and that data for a specific location at one point in time can be displayed in a station model.

7. Read a weather map to interpret local, regional and national weather.

Ohio Standard Scientific Inquiry: Students develop scientific habits of mind as they use the processes of scientific inquiry to ask valid questions and to gather and analyze information. They understand how to develop hypotheses and make predictions. They are able to reflect on scientific practices as they develop plans of action to create and evaluate a variety of conclusions. Students are also able to demonstrate the ability to communicate their findings to others.

Grades 6-8, Benchmark B: Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions.

Resources for Students and Teachers:

<http://www.usatoday.com/weather/wmeasur0.htm> : USA Today provides resources that describe various types of weather observations and measurements.

<http://cimss.ssec.wisc.edu/wxwise/contour/> : This website was made by a University of Wisconsin professor. It has tips and basic instructions for contouring maps as well as online exercises where students can practice contouring themselves.

[http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/home.rxml): This website was put together by University of Illinois Graduate Students and Faculty through their Collaborative Visualization Program. Some of it is more advanced, but there are some very good pictures and animations. It would be good for more background.

The following websites are good for getting weather maps or creating your own:

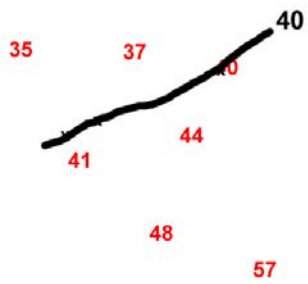
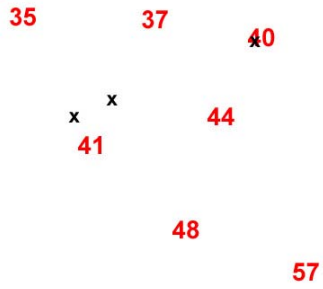
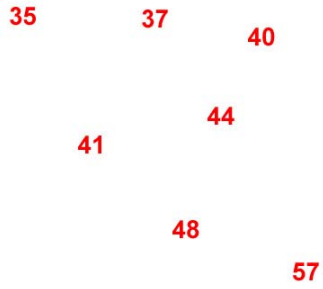
<http://vortex.plymouth.edu/>

<http://www.weather.com/>

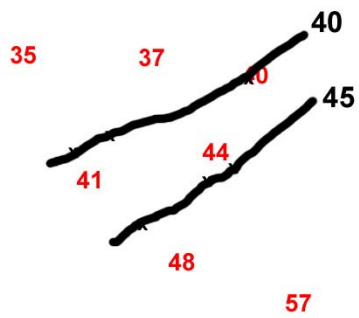
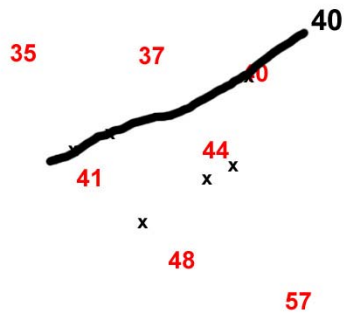
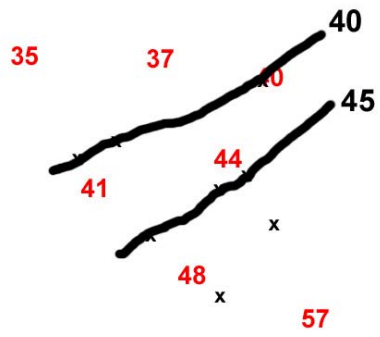
<http://www.weather.unisys.com/>

4 – Weather Map Analysis

DAY 2: EXAMPLE OF DRAWING CONTOURS



5 – Weather Map Analysis



6 – Weather Map Analysis

