

Atmospheric Science

Understanding Patterns

Introduction

Meteorology is “the study of the atmosphere ... embracing both weather and climate. It is concerned with the physical, dynamic, and chemical state of the earth’s atmosphere and with the interactions between the earth’s atmosphere and the underlying surface.”

The word is derived from the Greek *meteoros* meaning “lofty” or “in the air;” and *logia* meaning to discuss, study and explain.

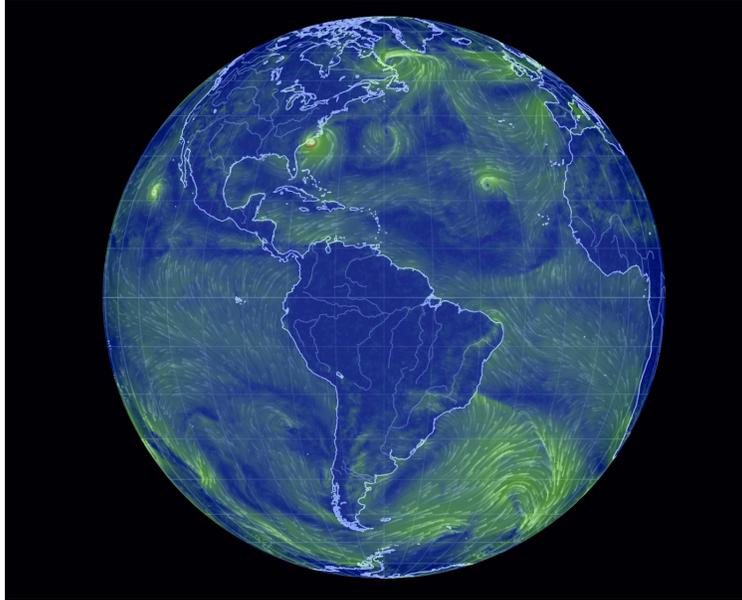
Meteorologists research and produce forecasts based on data, on patterns in the atmosphere and on intuition. Meteorologists collect data as follows:

- A. at local weather stations. This data is plotted, by computer, on a map and then analyzed by computer.
- B. by sending up weather balloons. Attached to the weather balloon is a radiosonde, which relays weather data back to earth. This data is plotted, by computer, on a map and then analyzed by computer.
- C. by analyzing satellite image.
- D. by analyzing weather radars.

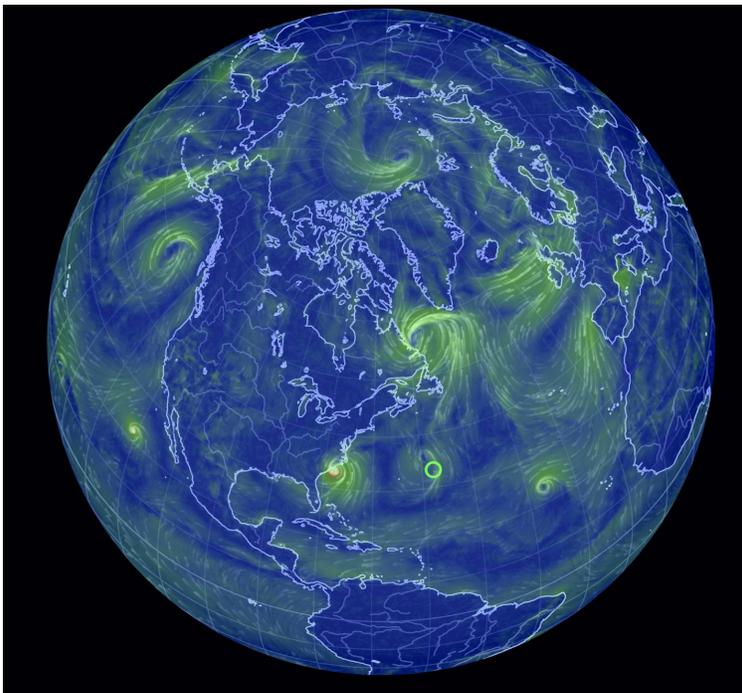
You will use the earth.nullschool.net website to understand current weather conditions.

Procedure

1. Access the earth.nullschool.net website. You should see a global map similar to the one below.



2. Orient the globe so you are looking at the northern hemisphere.



3. As you move from the equator toward the North Pole, how does the direction of the wind change (in general)?

A. west to east near the equator, east to west over the United States, west to east near the North Pole.

B. east to west near the equator, west to east over the United States, east to west near the North Pole.

C. west to east near the equator, west to east over the United States, east to west near the North Pole.

D. west to east near the equator, east to west over the United States, east to west near the North Pole.

4. Determine the wind direction and wind speed over New York City. Determine the wind direction and wind speed over Los Angeles.

5. Is the pattern the same in the southern hemisphere? Justify your answer.

6. Click on the word **earth** and change the height to **500 kPa**. Is the wind speed at 500 kPa greater than, less than or equal to the wind speed at the surface?

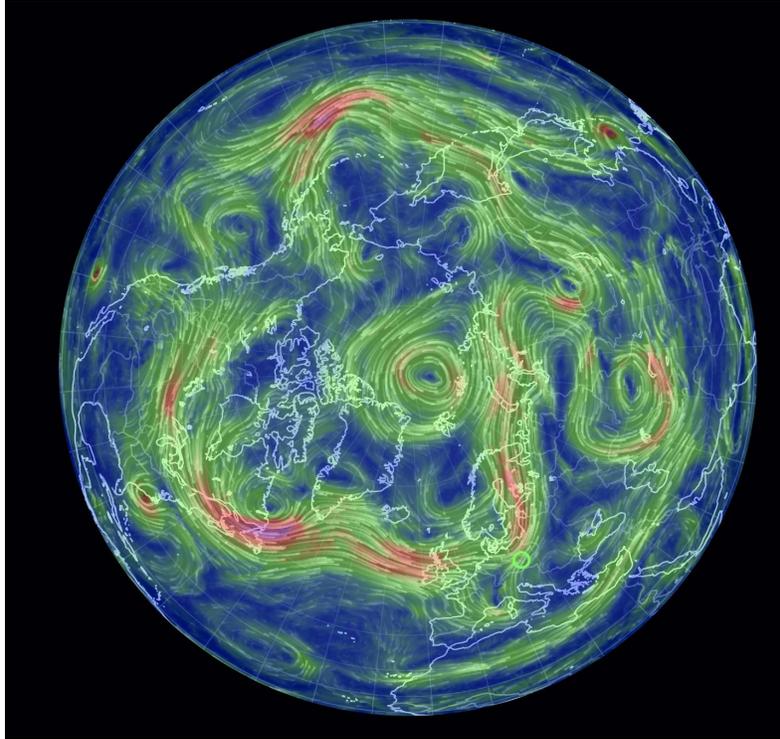
7. Click on **earth**, then **temp** and **surface**.

8. How does the surface temperature change as you move from the equator to the North Pole?

9. Determine the surface temperature in New York City and in Los Angeles.

10. Click on the word **earth** and change the height to **500 kPa**. Is the temperature, in general, at 500 kPa greater than, less than or equal to the temperature at the surface? Why do you think this change happens?

11. Unclick temperature and orient that globe so that you are looking directly down at the North Pole.



12. Does the air flow counterclockwise or clockwise?

13. What mathematical term would you use to describe the overall wind pattern?

