Northmont Invitational 2013
Meteorology
5 January 2013

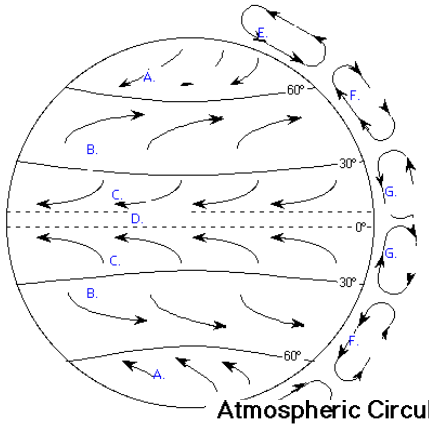
Team Name: Answer Key
Team Number:

Names: _____

_____

2 points per answer blank. In case of tie, first response that is different and wrong breaks tie. If multiple test results are the same, the second tiebreaker is time (shortest time wins tie).

1. Identify the labeled areas:

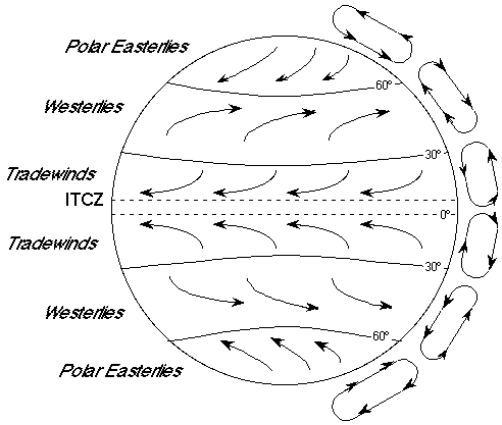


Atmospheric Circulation & Hadley Cells

   a. Polar Easterlies
   b. Westerlies
   c. Tradewinds
   d. ITCZ
   e. Polar Cells
   f. Ferrel Cells
   g. Hadley Cells

2. What is the name of this diagram?

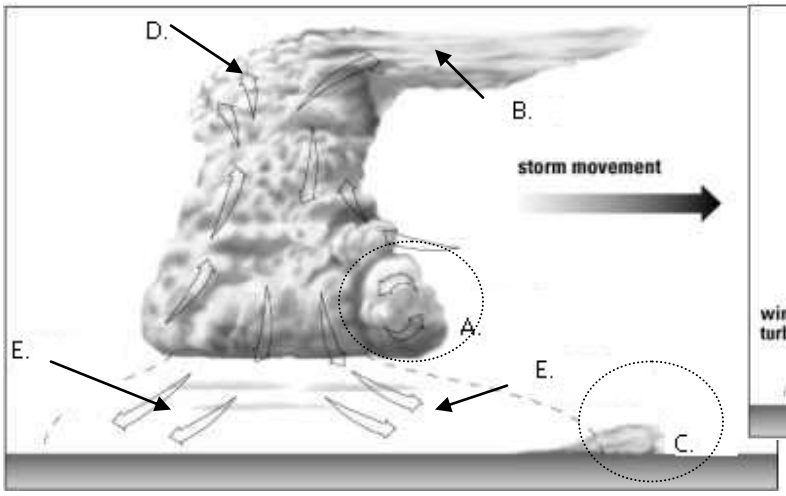
   Three Cell Model

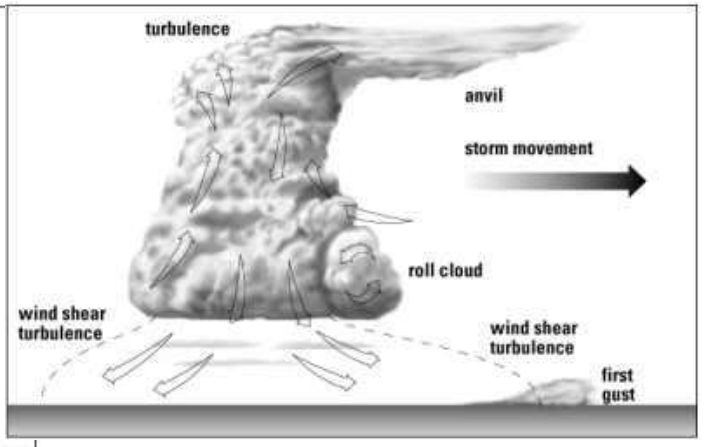


3. Glaciers can be thought as remnants from the last Ice Age, when ice covered nearly X percent of the oceans, and Y percent of the land.

    a. X=30, Y=32
    b. X=27, Y=29
    c. X=32, Y=30
    d. X=30, Y=30

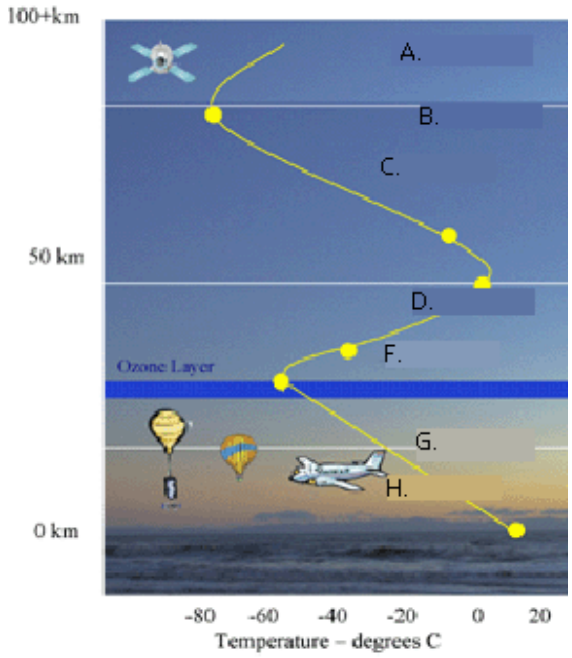
4. Label the following diagram:
    a. Roll Cloud
    b. Anvil
    c. First Gust
    d. Turbulence
    e. Wind Shear Turbulence





5. Presently, glaciers occupy about ____ percent of the worlds's total land area.
    a. 4
    b. 7
    c. 10
    d. 14

6. Label the levels of the atmosphere:
    a. Thermosphere
    b. Mesopause
    c. Mesosphere
    d. Stratopause
    e. Ozone Layer
    f. Stratosphere
    g. Tropopause
    h. Troposphere



7. Name two levels of the atmosphere where the temperature rises with altitude:

    - Stratosphere
    - Thermosphere

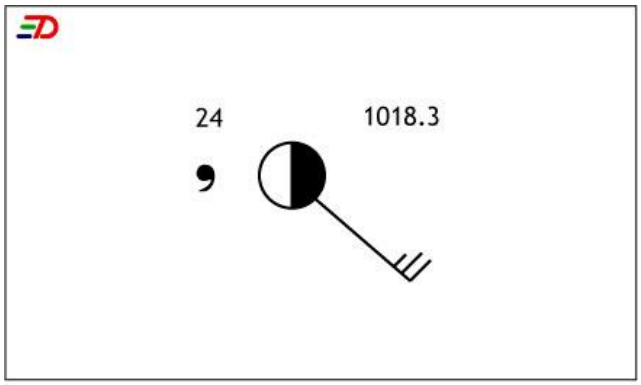
8. In what layer of the atmosphere does most of our weather occur? Troposphere

9. In what layer of the atmosphere can be found the most dense layer of ozone? Stratosphere

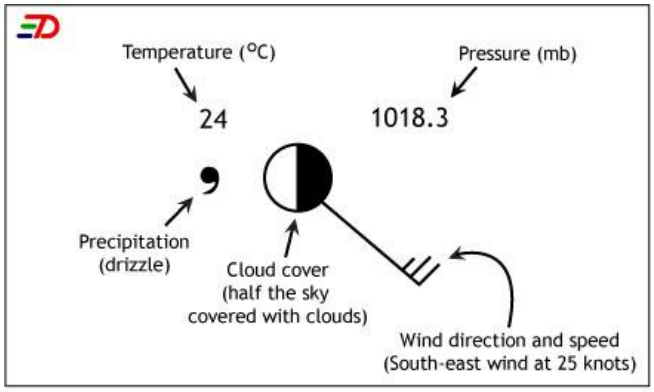
10. Within the past 750,000 years, scientists know that there have been _____ Ice Age cycles, separated by warmer periods called interglacial periods.
    a. One
    b. Two
    c. Five
    d. Eight

11. Describe characteristics of the following air masses in the northern hemisphere (include general direction and whether it is moist or dry):
    - Maritime Polar: Cold and Wet
    - Maritime Tropical: Warm and Wet
    - Continental Tropical: Warm and Dry
    - Continental Polar: Cold and Dry

12. What are the weather conditions for the following diagram:
    - Wind direction: South East
    - Wind speed: 25 Knots
    - Precipitation: Drizzle
    - Cloud Cover: Half the sky covered with clouds
    - Temperature: 24˚C

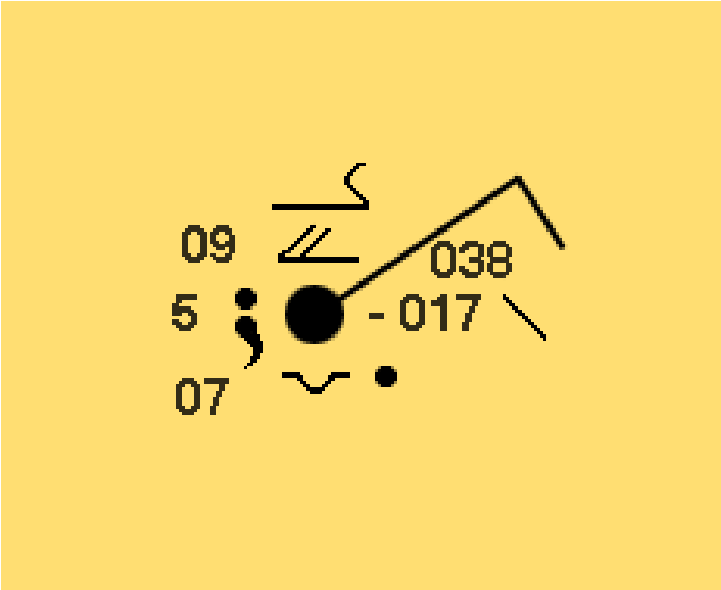


Weather symbols (a)

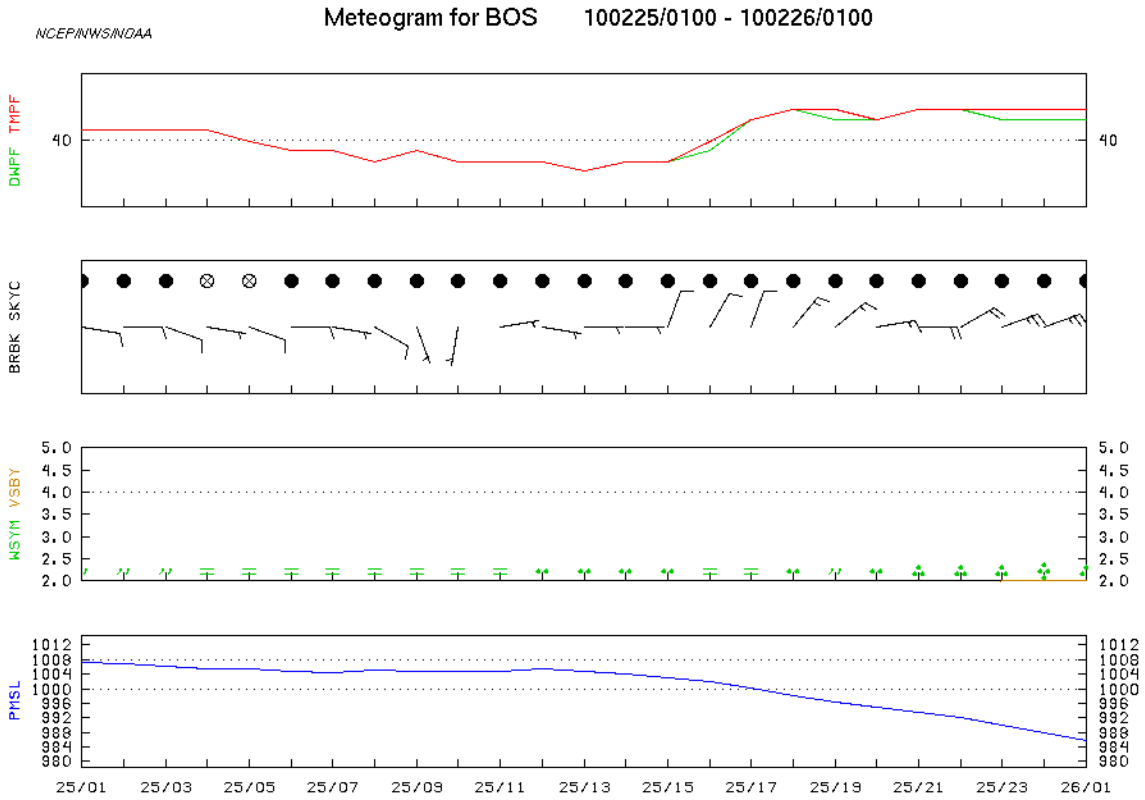


Weather symbols (ai)

13. What are the weather conditions for the following diagram:
    - Wind direction: North East
    - Wind speed: 8-12 knots
    - Precipitation: Drizzle and Rain mixed
    - Cloud Cover: Sky completely covered with clouds
    - Temperature: 9˚C
    - High level Clouds: Cirrostratus
    - Mid-Level Clouds: Altostratus or Nimbostratus
    - Low-Level Clouds: Stratocumulus

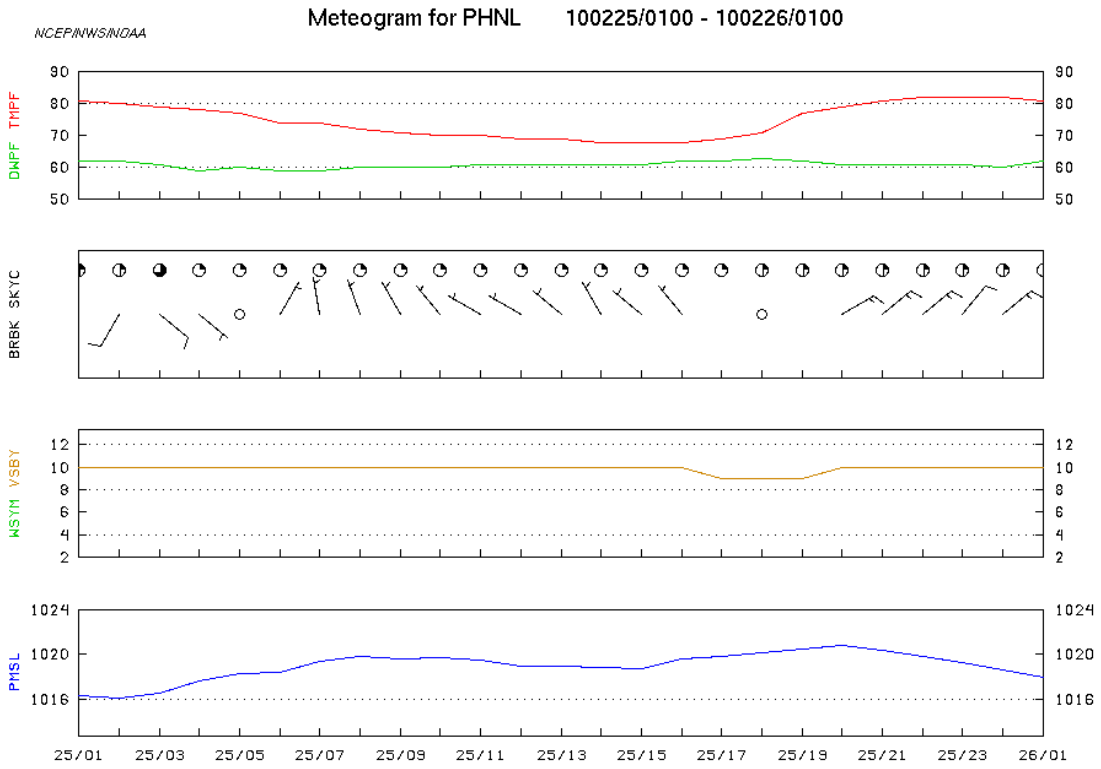


14. Interpret Meteograms



Describe the changing weather in this city based on the information in the above meteogram in terms of (2 pts each answer):

- Temperature
  - Starts above 40 goes down then up over the 24 hour period.
- Sky cover and winds
  - Mostly complete cloud cover, windy.
- Precipitation
  - Drizzle / freezing rain / rain
- Visibility
  - lousy
- Barometric Pressure
  - Pressure stays consistent for half the day, then it drops about 20 mb



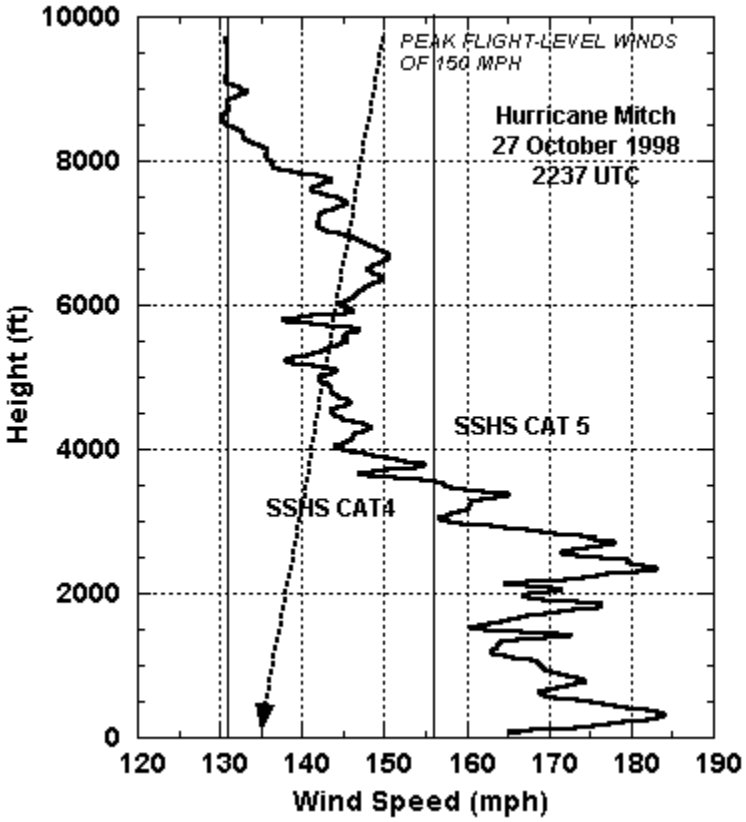
Describe the changing weather in this city based on the information in the above meteogram in terms of (2 pts each answer):

- Temperature
  - Starts at 80, drops to 70, then goes back up to 80.
- Sky cover and winds
  - Scattered clouds – light and variable breezes
- Precipitation
  - No precipitation
- Visibility
  - 10 miles
- Barometric Pressure
  - Slightly raising and lowering (4 mb)

Would BOS or PHNL be better for a picnic? (1 pt) – describe why.

- PHNL would be more pleasant for a picnic due to comfortable temperatures and less wind and no precipitation, While BOS is windy cold and rainy.

15. Look at the graph below, which shows wind speed along the x-axis and height along the y-axis taken from an actual hurricane. Use this graph to answer the questions below. (2 Points each answer)



http://www.nhc.noaa.gov/aboutwindprofile.shtml

A. What are the highest wind speeds that you can see on the graph?

Answer: 184 mph

B. Are the strongest winds near top, bottom, or middle of the graph?

Answer: Bottom

C. If you had to fly a plane into a hurricane, for safety reasons would you rather fly at 2,000 or 10,000 feet above the surface?

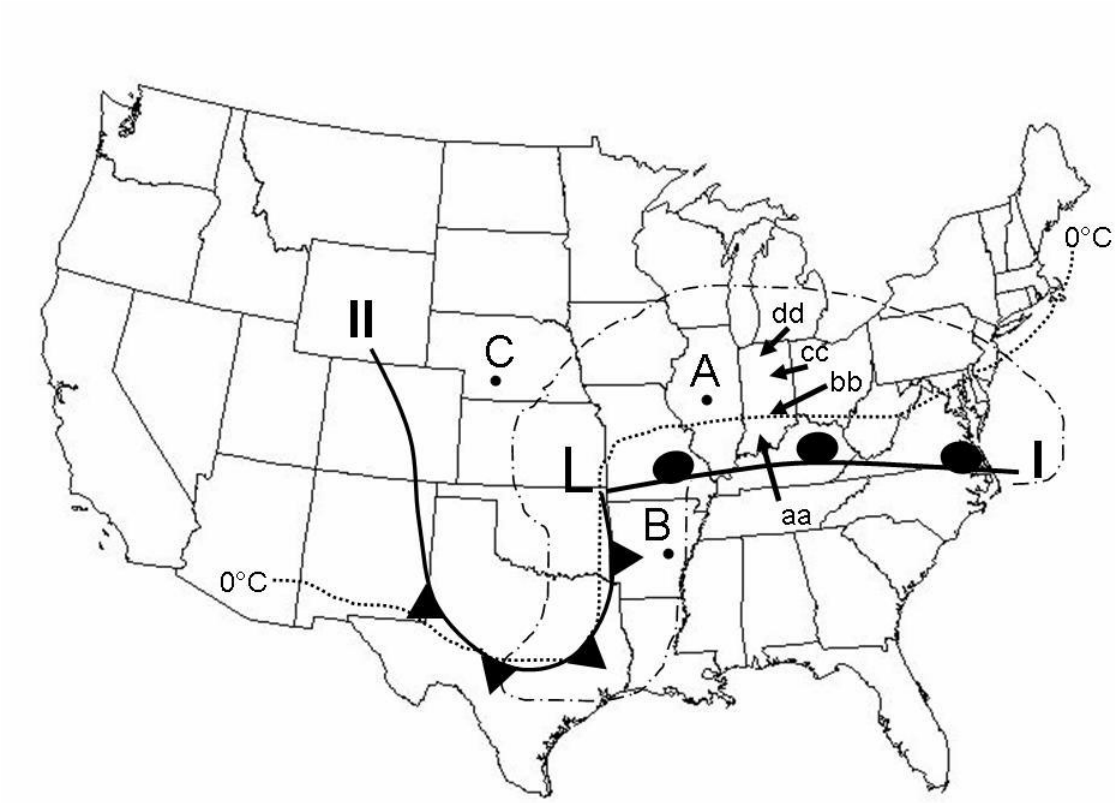
Answer: 10,000 feet

16. Which is not a factor in flash flooding? (2 point)

a. Moist Soil
b. High Rain Rate
c. Type of ground or soil
d. The temperature of the rain

Answer: d

17. Assuming all other factors are the same, which of the following will be most likely to experience flash flooding? (2 point)
a. Forest
b. Prairie
c. Parking Lot
d. Cornfield
Answer: c



18. The figure above shows a low pressure system over the central plains. In the figure, the
fronts are denoted by I and II, the areas with clouds are encircled by the dash-dot line, and the dotted line is the 0°C line.
TB 1) Identify what types of fronts are I and II (2 points)
I - Warm Front
II – Cold Front

19. On February 4, 2008, the Champaign-Urbana area experienced dense fog. Select all the things that might helped in the formation of the fog: (1 point)
a) snow covered ground
b) warm air
c) clear skies
d) strong or fast winds close to the ground
Answer: a, b, c

What is a glacier? (from: http://nsidc.org/cryosphere/glaciers/questions/what.html)

Glaciers are made up of fallen snow that, over many years, compresses into large, thickened ice masses. Glaciers form when snow remains in one location long enough to transform into ice. What makes glaciers unique is their ability to move. Due to sheer mass, glaciers flow like very slow rivers. Some glaciers are as small as football fields, while others grow to be over a hundred kilometers long. Presently, glaciers occupy about 10 percent of the world's total land area, with most located in polar regions like Antarctica and Greenland. Glaciers can be thought as remnants from the last Ice Age, when ice covered nearly 32 percent of the land, and 30 percent of the oceans. An Ice Age occurs when cool temperature endure for extended periods of time, allowing polar ice to advance into lower latitudes. For example, during the last Ice Age, giant glacial ice sheets extended from the poles to cover most of Canada, all of New England, much of the upper Midwest, large areas of Alaska, most of Greenland, Iceland, Svalbard and other arctic islands, Scandinavia, much of Great Britain and Ireland, and the northwestern part of the former Soviet Union.

Within the past 750,000 years, scientists know that there have been eight Ice Age cycles, separated by warmer periods called interglacial periods. Currently, the Earth is nearing the end of an interglacial, meaning that another Ice Age is due in a few thousand years. This is part of the normal climate variation cycle. Greenhouse warming may delay the onset of another glacial era, but scientists still have many questions to answer about climate change. Although glaciers change very slowly over long periods, they may provide important global climate change signals

How do glaciers move? (from: http://nsidc.org/cryosphere/glaciers/questions/move.html)

The sheer weight of a thick layer of ice and the fact that it deforms as a "plastic" material, combined with gravity's influence, causes glaciers to flow very slowly. Ice may flow down mountain valleys, fan across plains, or in some locations, spread out to the sea. Movement along the underside of a glacier is slower than movement at the top due to the friction created as it slides along the ground's surface. Glaciers periodically retreat or advance, depending on the amount of snow accumulation or ablation that occurs. This retreat or advance refers only to the position of the terminus, or snout, of the glacier. Even as it retreats, the glacier still deforms and moves downslope, like a conveyor belt. For most glaciers, retreating and advancing are very slow occurrences, noticeable only over a long time. However, when glaciers retreat rapidly, movement may be visible over a few months or years. For instance, massive glacier retreat has been recorded in Glacier Bay, Alaska.

Alternatively, glaciers may surge, racing forward several meters per day for weeks or even months. In 1986, the Hubbard Glacier in Alaska began to surge at the rate of 10 meters per day across the mouth of Russell Fjord. In only two months, the glacier had dammed water in the fjord and created a lake. This illustrates how quickly a surging glacier can change its surroundings