

## REMOTE SENSING (Glaciers) - BISOT 2013

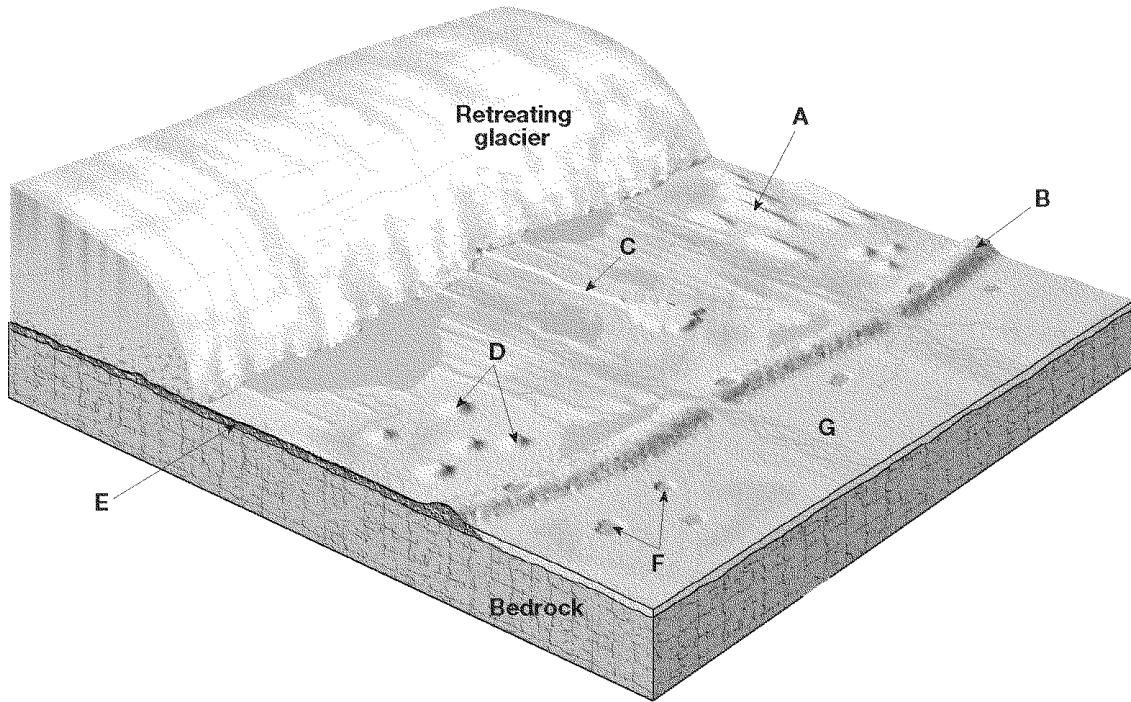
### Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_ 1. Which of the following is true about ice sheets?
- They are the smallest type of glacier.
  - They flow in all directions.
  - They usually flow down valleys.
  - They are found only in high mountain areas.
- \_\_\_ 2. The Antarctic Ice Sheet in the Southern Hemisphere \_\_\_\_.
- is the only true ice sheet that remains on the planet
  - holds almost one-half of Earth's salt water
  - holds almost two-thirds of Earth's fresh water
  - contains about one-fourth of the world's ice
- \_\_\_ 3. A thick ice mass that forms over the land from the accumulation, compaction, and recrystallization of snow is a \_\_\_\_.
- fjord
  - glacier
  - drumlin
  - cirque
- \_\_\_ 4. Currently, about what percent of Earth's land surface is covered by glaciers?
- 70%
  - 25%
  - 10%
  - 40%
- \_\_\_ 5. Which of the following is NOT true about glaciers?
- They originate on land.
  - They exist only in the Northern Hemisphere.
  - They show evidence of past or present flow.
  - They form from the recrystallization of snow.
- \_\_\_ 6. Where do glaciers form?
- only at the poles
  - only in high mountains
  - only in oceans
  - in areas where more snow falls than melts
- \_\_\_ 7. The loosening and lifting of blocks of rock by glaciers is called \_\_\_\_.
- plucking
  - wastage
  - abrasion
  - till
- \_\_\_ 8. Material deposited directly by a glacier is called \_\_\_\_.
- a kettle
  - rock flour
  - till
  - stratified drift
- \_\_\_ 9. Icebergs are produced when large pieces of ice break off from the front of a glacier during a process called \_\_\_\_.
- wastage
  - plucking
  - accumulation
  - calving
- \_\_\_ 10. What is the term for all sediments of glacial origin?
- till
  - stratified drift
  - glacial drift
  - loess
- \_\_\_ 11. One characteristic of glacial movement is that \_\_\_\_.
- all glaciers, regardless of size, move at about the same rate
  - new snowfall accumulates in a zone at the bottom of the glacier
  - the zone of wastage is at the top of the glacier

d. the movement depends on the balance between accumulation and wastage

- \_\_\_ 12. What is the zone above the snowline on a glacier called?  
a. zone of accumulation                      c. zone of wasting  
b. zone of melting                            d. zone of crevasses
- \_\_\_ 13. A bowl-shaped depression at the head of a glacial valley is a(n) \_\_\_\_\_.  
a. glacial trough                              c. horn  
b. arête    d. cirque



**Figure 7-1**

- \_\_\_ 14. What feature is labeled B in Figure 7-1?  
a. kame                      b. esker                      c. drumlin                      d. end moraine
- \_\_\_ 15. What features are labeled A in Figure 7-1?  
a. kames                      b. eskers                      c. drumlins                      d. end moraines
- \_\_\_ 16. What features are labeled F in Figure 7-1?  
a. kames                      b. eskers                      c. kettle lakes                      d. drumlins
- \_\_\_ 17. What feature is labeled G in Figure 7-1?  
a. end moraine                      b. kame                      c. kettle lake                      d. outwash plain
- \_\_\_ 18. What features, illustrated in Figure 7-1, were deposited by streams flowing in tunnels beneath the ice?  
a. kames                      b. eskers                      c. drumlins                      d. kettle lakes
- \_\_\_ 19. What is the moraine called that marks the farthest advance of a glacier?  
a. lateral moraine                      c. medial end moraine  
b. terminal end moraine                      d. ground moraine

- \_\_\_\_\_ 20. During the most recent ice age, what percentage of Earth's surface was covered by glaciers?
- a. 90%
  - b. 30%
  - c. 75%
  - d. 10%
- \_\_\_\_\_ 21. Which one of the following is NOT an effect that Pleistocene glaciers had on the landscape?
- a. changes in river drainage
  - b. climate changes
  - c. worldwide changes in sea level
  - d. extinction of the dinosaurs
- \_\_\_\_\_ 22. Which of the following features was formed by glacial erosion?
- a. the Mississippi River
  - b. the Basin and Range
  - c. the Great Lakes
  - d. the Missouri River
- \_\_\_\_\_ 23. Evidence about ancient climates indicates that \_\_\_\_\_.
- a. glacial ice once covered much of what is now India and Australia
  - b. continents in the Northern Hemisphere today were once centered over the South Pole
  - c. continents in the Southern Hemisphere today were once centered over the North Pole
  - d. the Earth's average temperature stays nearly the same for thousands of years
- \_\_\_\_\_ 24. What must happen for an active glacier to acquire several medial moraines?
- a. The glacier must flow over previously glaciated terrain.
  - b. The glacier must be joined by several tributary glaciers, each of which has lateral moraines.
  - c. The glacier must distribute the sediments of its own lateral moraines into a number of strips of moraine sediment.
  - d. The glacier must have frequent periods of retreating and advancing.
- \_\_\_\_\_ 25. Which of the following glacial features would be the best clue for determining the direction a former continental glacier flowed?
- a. discovery of aretes
  - b. presence of erratics
  - c. determination of terminal moraine
  - d. striations on bedrock
- \_\_\_\_\_ 26. Eskers form
- a. on top of the glacier
  - b. in front of the glacier
  - c. beneath the glacier
  - d. none of these
- \_\_\_\_\_ 27. On Earth, which of the following factors is most likely to increase the formation of glaciers?
- a. increase in the atmospheric concentration of carbon dioxide
  - b. increase in the eccentricity of Earth orbit
  - c. increase in the tilt of the Earth's axis in relationship to the orbital plane
  - d. increase in area of exposed Arctic Ocean in the summer
- \_\_\_\_\_ 28. During the most recent period of Earth's glaciation, the climate of the southwestern part of the current United States, was
- a. drier than it is today
  - b. wetter than it is today
  - c. the same in terms of amount of rainfall
  - d. erratic with periods of greater and lesser rainfall than today
- \_\_\_\_\_ 29. Kettle ponds would be mostly found in which of the following states?
- a. Connecticut
  - b. Georgia
  - c. Kentucky
  - d. Nevada
- \_\_\_\_\_ 30. The discovery of which of the following might increase the rate at which the Greenland ice sheet disappears

- a. creavases
- b. monadnocks
- c. moulins
- d. rock flour

- \_\_\_ 31. During an ice age, what happens to the ratio of 18-oxygen to 16-oxygen in the ocean?
- a. increases
  - b. decreases
  - c. remains the same
  - d. nothing can be predicted
- \_\_\_ 32. A large boulder is found in the middle of a field. Which of the following conditions best suggest that the boulder was carried to this location by a glacier?
1. The field is at the end of a deep canyon.
  2. The boulder is granite and the bedrock under the field is limestone.
  3. Exposed patches of limestone show parallel gouges all aligned in the same direction.
- a. 2 only      b. 3 only      c. 1 and 2      d. 2, and 3      e. 1, 2, and 3

The following 3 questions use the Lake Missoula Color Image #1 on the color images pages.

- \_\_\_ 33. Lake Missoula was a lake that formed from ice melt. Periodically the ice dam holding back the water would break, resulting in enormous volumes of water suddenly being released. A typical release might result in the flow of 10 cubic kilometers of water per hour. At this rate, the lake could be entirely drained in two days. If the lake covered approximately 800 sq. kilometers, which of the following is closest to the average depth of the lake. For calculation purposes, assume that the lake had a uniform depth.
- a. 60,00 meters    b. 600 meters    c. 60 meters    d. 6 meters    e. 0.6 meters
- \_\_\_ 34. If Lake Missoula were losing water at 10 cubic kilometers per hour, by how much would the water level in a deep canyon rise if the canyon were 0.5 km across at the bottom and the river was determined to be moving at 36 m/sec. For calculations, assume the canyon walls are vertical, a true "box" canyon. Pick the answer that is closest to the calculated amount.
- a. 0.1 m      b. 1 m      c. 10 m      d. 100 m      e. 1000 m
- \_\_\_ 35. Which of the following would NOT be a potential result of a Lake Missoula flood.
- a. Loss of topsoil in the area now known as eastern Washington
  - b. Cutting of deep canyons along the flood path
  - c. Cutting of deep gouges or scratches in igneous bedrock
  - d. Deposition of large volumes of sediment at mouth of current Columbia River.

The next 3 questions use the Ayer Ma topographic map, color image 2

- \_\_\_ 36. Which of the following letters or letter pairs represents a drumlin? Write the letter or letter pair for the answer. For example, if your choice were labeled C on the map, you should darken choice C on the answer sheet. If your choice were AE on the map, you would fill in both choices A and E on the answer sheet. If none of the labeled spots are drumlins, fill in both letters D and E.
- a. see above      b. see above      c. see above      d. see above
- \_\_\_ 37. Which of the following letters or letter pairs represents a former ribbon lake? Write the letter or letter pair for the answer.
- A B C D E AB AC AD none is choice = DE
- a. see above      c. see above
- b. see above      d. see above
- \_\_\_ 38. Which of the following letters or letter pairs represents a cirque? Write the letter or letter pair for the answer.
- A B C D E AB AC AD none is choice = DE
- a. see above      c. see above

b. see above

d. see above

The following 3 questions use the Antarctica map, color image 3

- \_\_\_ 39. Which of the following closest represents the area of the west Antarctica ice sheet?
- a.  $1.5 \times 10^4 \text{ km}^2$
  - b.  $1.5 \times 10^5 \text{ km}^2$
  - c.  $1.5 \times 10^6 \text{ km}^2$
  - d.  $1.5 \times 10^7 \text{ km}^2$
  - e.  $1.5 \times 10^8 \text{ km}^2$
- \_\_\_ 40. Which of the following is closest to the volume of the ice in the area of the East Antarctic ice sheet? Assume that bedrock elevation underneath the ice is sea level. The contour interval of the map is 500 meters.
- a.  $2.0 \times 10^7 \text{ km}^3$
  - b.  $2.0 \times 10^8 \text{ km}^3$
  - c.  $2.0 \times 10^9 \text{ km}^3$
  - d.  $2.0 \times 10^{10} \text{ km}^3$
  - e.  $2.0 \times 10^{11} \text{ km}^3$
- \_\_\_ 41. A reseacher cuts a block of ice from the deep center of the ice sheet in an area where there are no cracks, crevices, or erosion debris. The block measures 0.15 m x .445 m x 20.7 cm. Which of the following is closest to the mass of the ice block?
- a. 1.2 kg
  - b. 12 kg
  - c. 14 kg
  - d. 140 kg
  - e. 1400 kg
- \_\_\_ 42. The following question uses the diagrams of the Muir Glacier, Color image 4. Which of the following is closest to the average annual rate of glacier recession between 1982 and 1941. Assume the maps were both made in November.
- a. 10.5 meters per year
  - b. 16.5 meters per year
  - c. 260 meters per year
  - d. 400 meters per year
  - e. 680 meters per year
- \_\_\_ 43. The following question uses the 2012 Arctic Ocean decline of ice coverage, Color Image 5. The current frozen Arctic Ocean as seen in the image is closest to what percentage of the area once covered, as shown by the area enclosed by the yellow line?
- a. 15 %
  - b. 30%
  - c. 45%
  - d. 60%
  - e. 75%
- \_\_\_ 44. The following questions uses the color image 6, Twin Glacier topographic maps. Which of the following is closet to how high the surface of the West Twin Glacier is above the water at the point marked by the circled letter.
- a. 700 ft
  - b. 750 ft
  - c. 800 ft
  - d. 750 m
  - e. 800 m
- \_\_\_ 45. The following question uses the set of images labeled color image 7, ice calving images. Which of the images most recently broke off the main glacier?
- a. A
  - b. B
  - c. C
  - d. D

Mendenhall Glacier, color image 8

- \_\_\_\_\_ 46. The Mendenhall Glacier images show three images of the Mendenhall Glacier, a receding glacier, in Alaska. Which of the following time intervals represents the time when the topographic map was made? The lookout is part of the visitor center.
- a. 1935-1949
  - b. 1950-1964
  - c. 1965-1979
  - d. 1980-1994
  - e. 1995-2010

- \_\_\_\_\_ 47. Image D in the color images 8 (Mendenhall Glacier) shows the terminal moraine for the Mendenhall Glacier. If the Glacier receded steadily from the point marked on image C at the same rate it did between 1760 and 1832, what year may have been the last time the glacier touched the terminal moraine?
- a. 1400
  - b. 1500
  - c. 1600
  - d. 1700

Use the image of Gilkey and Thiel Glaciers Color image 9, to answer the following 3 questions.

- \_\_\_\_\_ 48. On the image of the topographic map of the Gilkey Glacier, the letter “X” represents the location of a large post drilled into the glacier when glacier expolorers first found the glacier over 100 years ago. Which of the locations marked by letters A, B, C, D, E, or AB represent the most likely location where the post was inserted into the glacier. Write the letter or letter combination of the location for your answer.
- a. A
  - b. B
  - c. C
  - d. D
  - e. E
  - f. AB
- \_\_\_\_\_ 49. If you were to travel up the Thiel Glacier, how many glaciers would you eventually see that merge into the Thiel Glacier?
- a. 0
  - b. 1
  - c. 2
  - d. 3
  - e. 4
- \_\_\_\_\_ 50. On the Gilkey Glacier topographic map image, you will notice a number in the middle of each square. In which of the following numbered squares would you find an arete?
- a. 31
  - b. 5
  - c. 10
  - d. 14
  - e. none contain an arete

**glaciers**  
**Answer Section**

**MULTIPLE CHOICE**

1. ANS: B                   PTS: 1                   DIF: L2                   REF: p. 189  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: knowledge
2. ANS: C                   PTS: 1                   DIF: L2                   REF: p. 189  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: knowledge
3. ANS: B                   PTS: 1                   DIF: L1                   REF: p. 188  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: knowledge
4. ANS: C                   PTS: 1                   DIF: L2                   REF: p. 188  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: knowledge
5. ANS: B                   PTS: 1                   DIF: L2                   REF: p. 189  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: comprehension
6. ANS: D                   PTS: 1                   DIF: L2                   REF: p. 189  
OBJ: 7.1 Describe the different types of glaciers and where each type is found.  
STA: SES3.d           MSC: comprehension
7. ANS: A                   PTS: 1                   DIF: L1                   REF: p. 192  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: knowledge
8. ANS: C                   PTS: 1                   DIF: L1                   REF: p. 194  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: knowledge
9. ANS: D                   PTS: 1                   DIF: L1                   REF: p. 191  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: knowledge
10. ANS: C                   PTS: 1                   DIF: L1                   REF: p. 194  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: knowledge
11. ANS: D                   PTS: 1                   DIF: L3                   REF: p. 190  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: analysis
12. ANS: A                   PTS: 1                   DIF: L2                   REF: p. 190  
OBJ: 7.2 Explain how glaciers move and describe the different types of glacier drift.  
STA: SES3.d           MSC: comprehension
13. ANS: D                   PTS: 1                   DIF: L1                   REF: p. 194  
OBJ: 7.3 Identify the landscape features that glaciers form.           STA: SES3.d  
MSC: knowledge
14. ANS: D                   PTS: 1                   DIF: L2                   REF: p. 195  
OBJ: 7.3 Identify the landscape features that glaciers form.           STA: SES3.d  
MSC: application
15. ANS: C                   PTS: 1                   DIF: L2                   REF: p. 196

- OBJ: 7.3 Identify the landscape features that glaciers form. STA: SES3.d  
 MSC: application
16. ANS: C PTS: 1 DIF: L2 REF: p. 196  
 OBJ: 7.3 Identify the landscape features that glaciers form. STA: SES3.d  
 MSC: application
17. ANS: D PTS: 1 DIF: L2 REF: p. 196  
 OBJ: 7.3 Identify the landscape features that glaciers form. STA: SES3.d  
 MSC: application
18. ANS: B PTS: 1 DIF: L3 REF: p. 196  
 OBJ: 7.3 Identify the landscape features that glaciers form. STA: SES3.d  
 MSC: analysis
19. ANS: B PTS: 1 DIF: L2 REF: p. 196  
 OBJ: 7.3 Identify the landscape features that glaciers form. STA: SES3.d  
 MSC: comprehension
20. ANS: B PTS: 1 DIF: L2 REF: p. 197  
 OBJ: 7.4 Explain the causes of the most recent ice age. MSC: knowledge
21. ANS: D PTS: 1 DIF: L3 REF: p. 198  
 OBJ: 7.4 Explain the causes of the most recent ice age. MSC: analysis
22. ANS: C PTS: 1 DIF: L2 REF: p. 198  
 OBJ: 7.4 Explain the causes of the most recent ice age. MSC: comprehension
23. ANS: A PTS: 1 DIF: L2 REF: p. 250  
 OBJ: 9.2 Evaluate the evidence in support of continental drift. MSC: application
24. ANS: B PTS: 1
25. ANS: D PTS: 1
26. ANS: C PTS: 1
27. ANS: C PTS: 1
28. ANS: B PTS: 1
29. ANS: A PTS: 1
30. ANS: C PTS: 1
31. ANS: A PTS: 1
32. ANS: D PTS: 1
33. ANS: B PTS: 1
34. ANS: D PTS: 1
35. ANS: C PTS: 1
36. ANS: A PTS: 1
37. ANS: B PTS: 1
38. ANS: D PTS: 1
39. ANS: C PTS: 1
40. ANS: D PTS: 1
41. ANS: B PTS: 1
42. ANS: D PTS: 1
43. ANS: D PTS: 1
44. ANS: B PTS: 1
45. ANS: B PTS: 1
46. ANS: C PTS: 1
47. ANS: D PTS: 1
48. ANS: D PTS: 1
49. ANS: D PTS: 1



50. ANS: D

PTS: 1