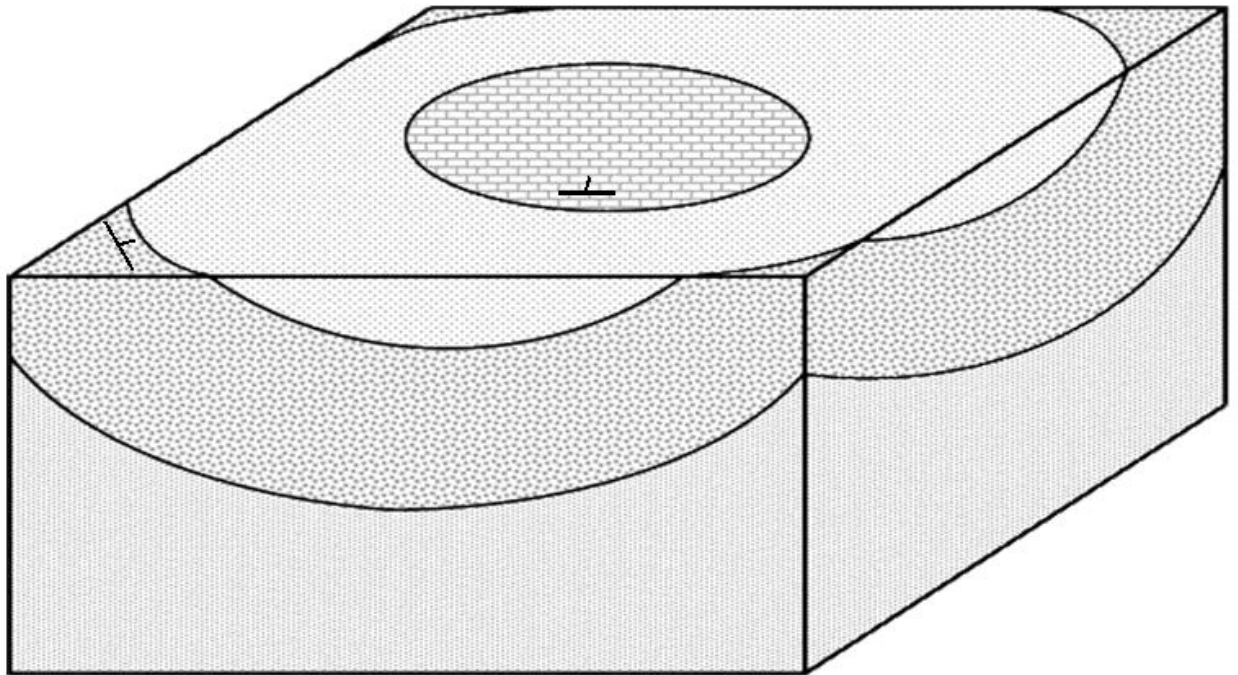


1. Define "rock".
2. Define "mineral."
3. Define "lithosphere."
4. Define "weathering."
5. What structure is this? Is the central stratum the oldest or youngest?



6. Assuming the unit in the center is the oldest layer, what structure is this? What is the approximate strike (nearest multiple of 15)?



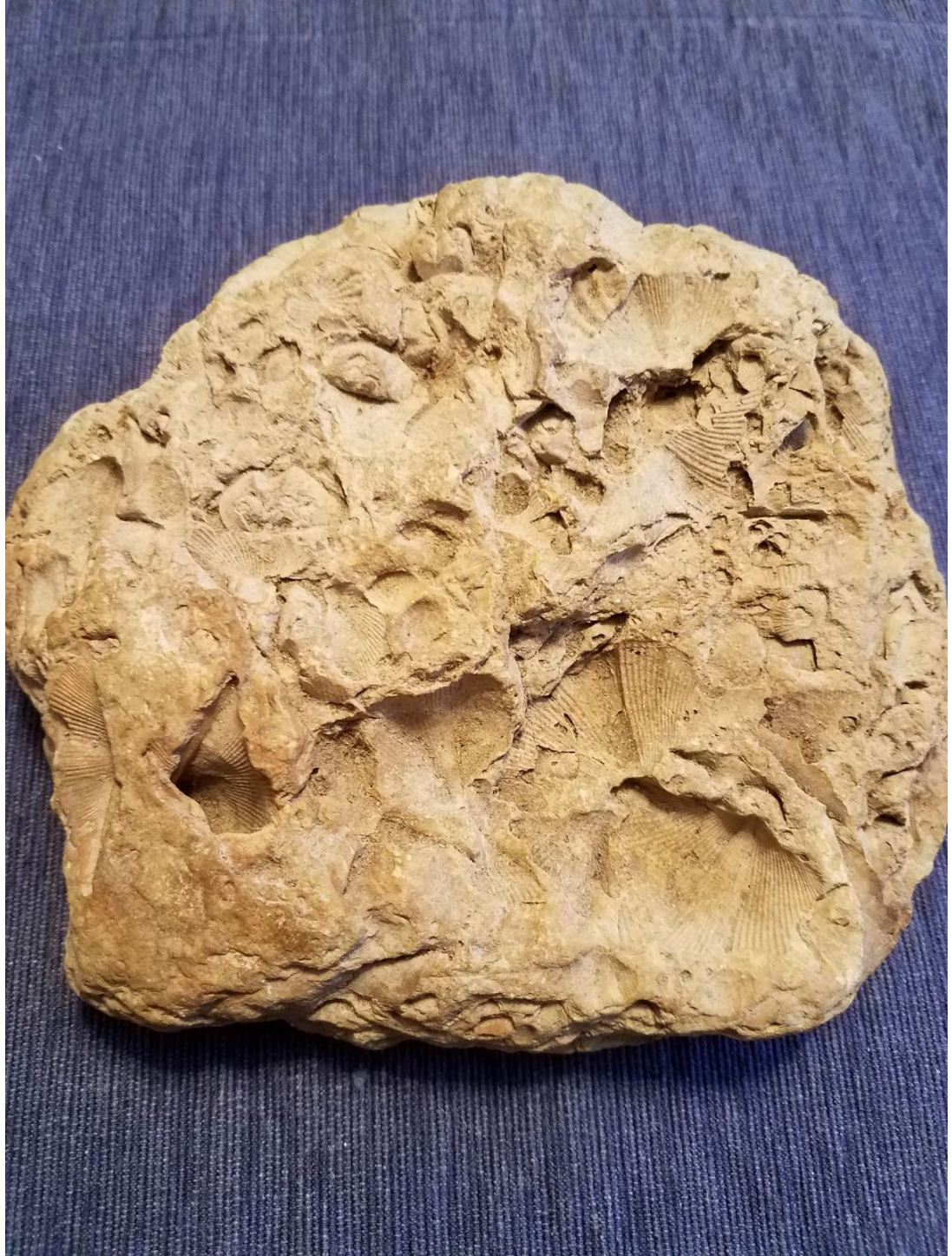
7. What type of fold is this? What general type of structure underlies it? (3)



8. What are two of the main forces driving plate tectonics? Explain how these forces occur. (6)
9. Why does volcanism occur at subduction zones? Explain the process from subduction to the formation of the volcanoes. Why does the lava at these zones tend to be andesitic? (5)
10. An oblique fault with a strike of 067° NE and dip of 87° displaces one sign from another after an earthquake by 8m to the NE. This sign is located on the hanging wall block. This indicates that the fault has a _____ strike-slip component. (2)
- a. Left-lateral
 - b. Dextral
 - c. Right Lateral
 - d. Reverse
 - e. Normal
11. Which of these is NOT a hazard posed by earthquakes? (2)
- a. Surface waves
 - b. Tsunamis
 - c. Liquefaction
 - d. Landslides
 - e. Calving
12. River valleys have a (2):

- a. U-shaped cross section
 - b. Rectangular cross section
 - c. V-shaped cross section
 - d. Stairstep cross section
 - e. Wide U cross section
13. A fold which eventually has its limbs almost parallel to the surface is (2):
- a. Symmetric
 - b. Asymmetric
 - c. Isoclinal
 - d. Recumbent
 - e. Overturned
14. A scenario in which a measure of rake would be useful is (2):
- a. Determining the orientation of a ridge
 - b. Indicating the steepness of a fault
 - c. Illustrating bedrock striations on a face
 - d. Calculating the thickness of a folded stratum
 - e. Finding the intersection of two rock units
 - f. Optimizing a plan to minimize house chores
15. True or False: The west coast of Africa is an example of a passive margin. (2)
16. True or False: The Andes Mountains are considered fault-block mountains. (2)

17. True or False: Ocean-ocean subduction zones produce little or no volcanism. (2)
18. True or False: The Sea of Japan is an example of a back arc basin (2)
19. True or False: New Zealand is classified as a Large Igneous Province (LIP) (2)
20. What type of faults are associated with convergent boundaries? What is the force that produces these faults called? (3)



21.

What rock is this? What is it primarily composed of? What environment is it characteristic of? (5)



22.

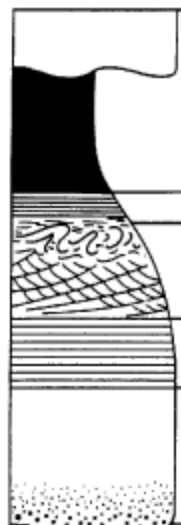
What rock is this? Are samples with these types of clasts mature or immature? What are potential events that can form these samples? (5)

23. What type of silicate mineral are clays primarily made of? What is the size range of clay particles (4)?

24. Why do cross beds change from angular to curved deposition as velocity increases (3)?

25. How does Bowen's Reaction Series tie into the composition of sand? Can this explain why sand is primarily made of quartz? If so, why? (5)

26. Can radiometric dating be used to determine the age of sediments or sedimentary rock? Why or why not? How else are accurate numeric dates obtained for these units? (4)
27. Explain the differences among alluvium, eluvium, and colluvium. (6)
28. What are the differences between mature versus immature sediments? Knowing this, what might we be able to know about the surrounding area from an immature fluviially deposited sediment? (5)

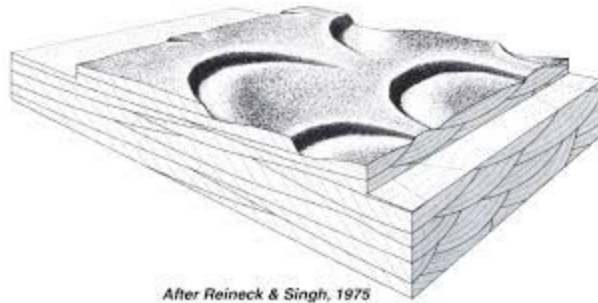


	GRAIN SIZE	BOUMA (1962) DIVISIONS	INTERPRETATION
	Mud	E Laminated to homogeneous mud	Deposition from low-density tail of turbidity current \pm settling of pelagic or hemipelagic particles
	Silt	D Upper mud/silt laminae	Shear sorting of grains & flocs
	Sand	C Ripples, climbing ripples, wavy or convolute laminae	Lower part of lower flow regime of Simons <i>et al.</i> (1965)
		B Plane laminae	Upper flow regime plane bed
	Coarse Sand	A Structureless or graded sand to granule	Rapid deposition with no traction transport, possible quick (liquefied) bed

29.

What is this structure called? In what environment do they form?
 Why is the base of the structure irregular? (7)

30. What is this structure called? What activity does it indicate? (5)



31. How do ooids form? Why do preserved samples tend to be calcite instead of aragonite? (5)

32. Why are almost all carbonate deposits before the Jurassic located exclusively in shallow sea environments? Where did carbonate start forming after the Jurassic? What environmental factor predominantly controlled these deposits? How? (4)

33. What sedimentary structures do we use to measure a historical glacier's size? Why can we only know the maximum extent of its existence using these structures? (4)

34. Massive (30ft +) sandstone cross-bedding structures are characteristic of what environment (2):

- a. Deep marine
- b. Beach
- c. Braided stream

- d. Desert
- e. Carbonate Platform Interior
- f. Delta

35. Name 3 ways an alluvial fan can be discerned from a marine fan. (3)

36. Taking a cross section from point A to B on a map over a stream, the following sample sequence is generated: Vegetation, sand, gravel, sand, gravel, sand, vegetation. Does this stream have a higher or lower gradient? What type of stream is this? Is coal likely to form here over time? (4)

37. Which of these is NOT characteristic of deep marine environments?

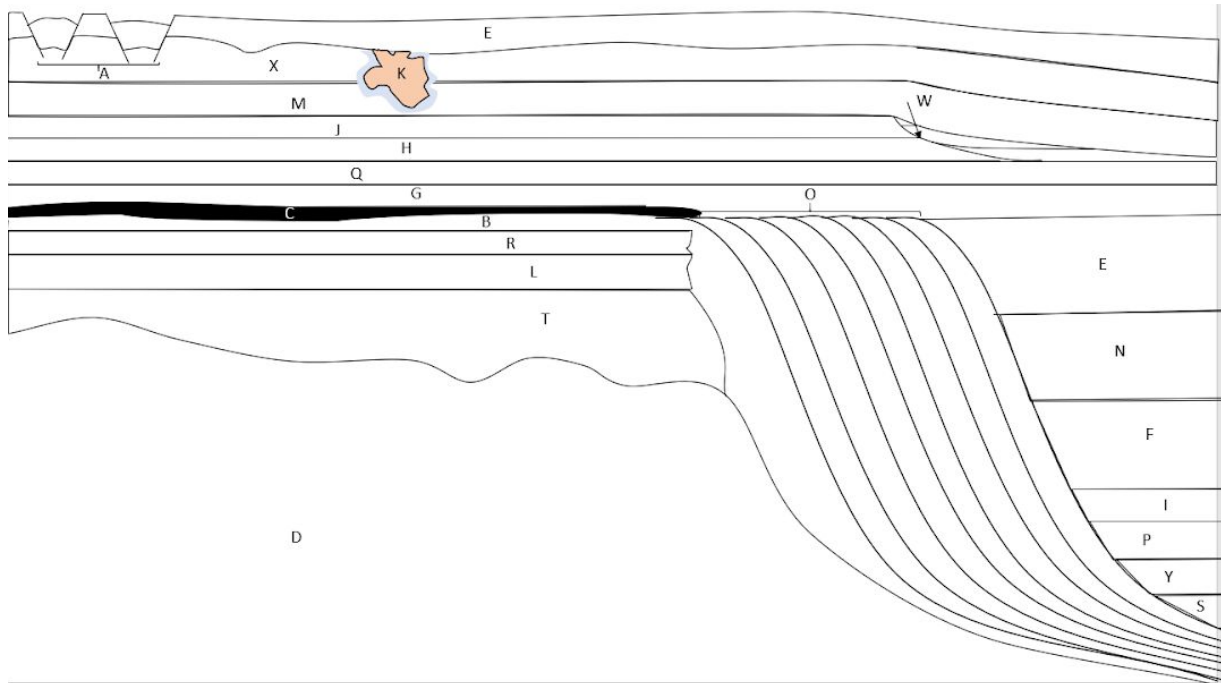
- a. Linear bedforms
- b. Turbidite sequences
- c. High carbon content
- d. Sparse coarse clasts
- e. Siliceous Ooze
- f. Predominant shales and siltstones

38. What is the major sequence of evaporite precipitation? (3)

39. Which of these features are indicative of a beach environment?

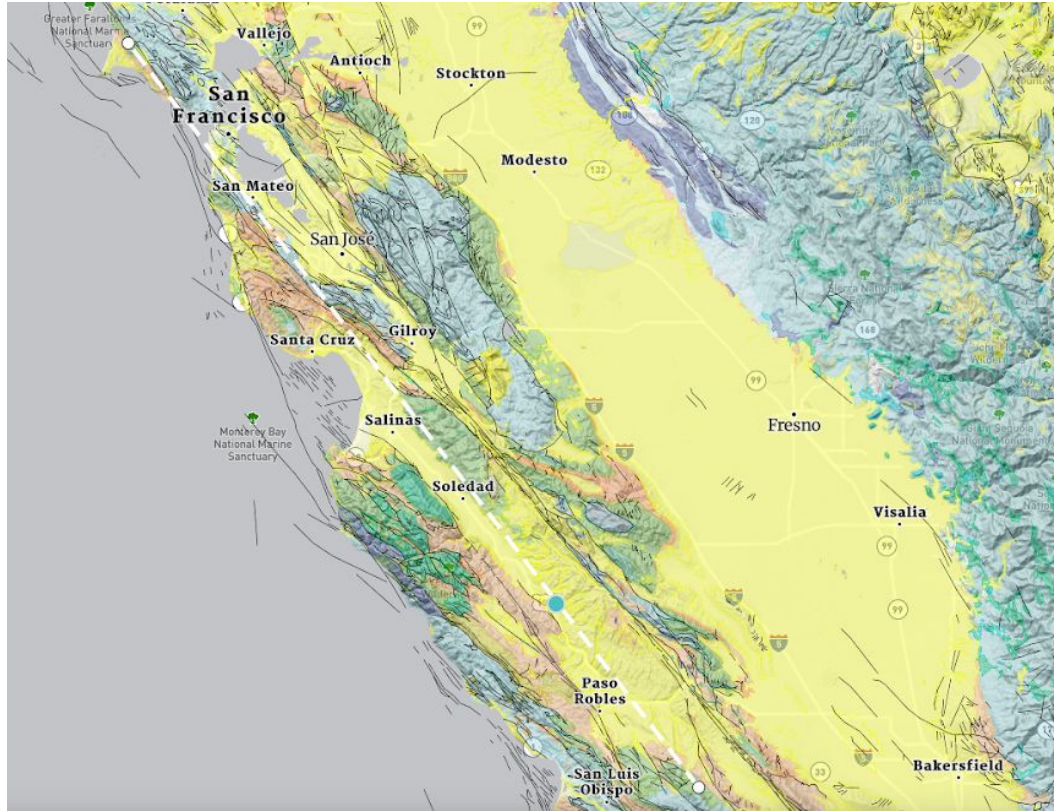
- a. Varves

- b. Aeolian cross bedded sandstones
- c. Loess deposits
- d. Oolites
- e. Coal deposits
- f. Pyritization



40. Order the units from oldest to youngest
41. What type of fault is unit W? What fold overlies it? (2)
42. TB: Unit B appears to have a mottled texture and is full of silts and clays. What is this caused by? (2)
43. Unit C is a coal seam. Would this be likely to have a lignite, bituminous, or anthracite coal composition?

44. Would unit O likely have a high carbonate content? Why or why not? (3)
45. What is the direction of youngest to oldest deposition for unit O? (2)
46. There are two unconformities between B/C and G (a limestone unit) as well as X and E. What types are they? Make sure to say which goes to which. (2)
47. What specific process occurred around unit K (granite)? (2)
48. What types of faults are within area A? What is this geologic system called? (3)
49. What sedimentary environments can be seen in the diagram? (9)

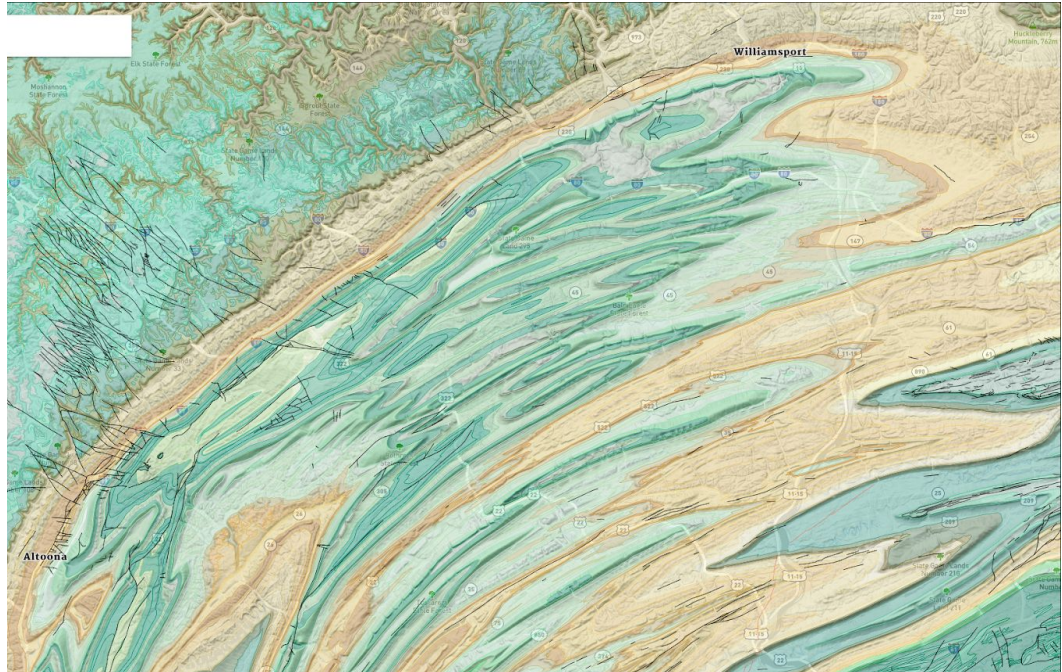


50.

The light green portions of rock connected by the dashed line are both pieces of the same terrane. How did this occur? (3)

51. What city appears to be the only one in the image not situated on a mostly flat aeolian plain? (2)

52. What renown fault is captured in the image? What type of fault is it? (2)



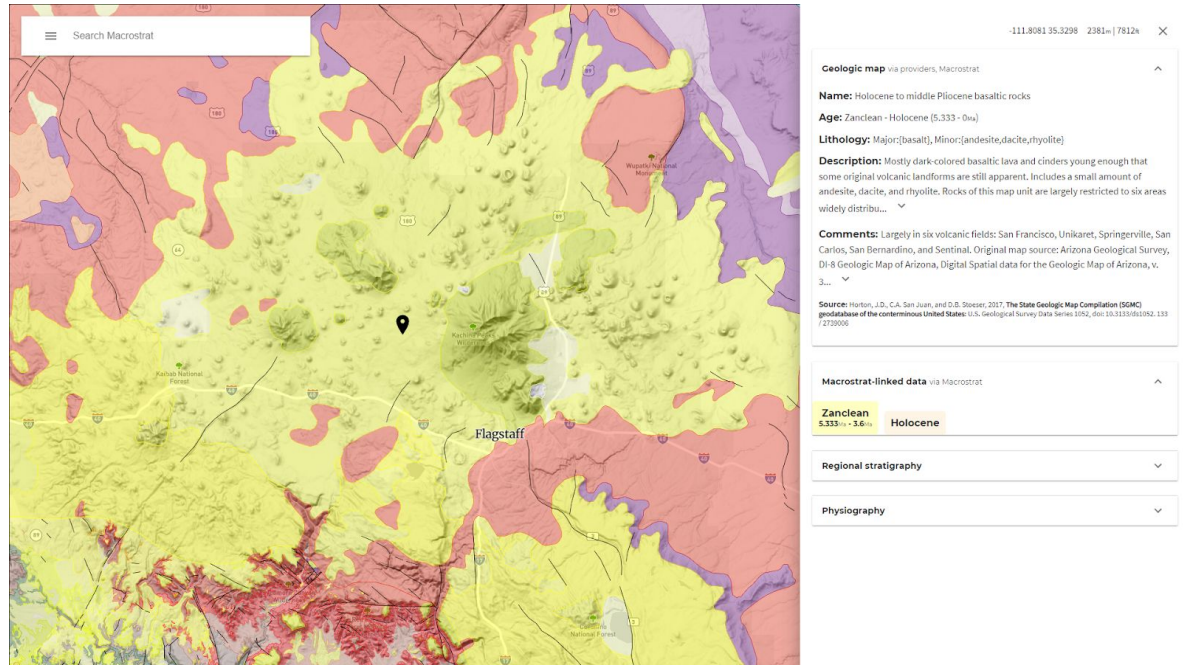
53.

TB: What folding sequence produces the arrangement of rock units in the image? (2)

54. The outermost light brown unit near Altoona is from the Upper Devonian while the dark green unit is from the Upper Ordovician. What structure is this called? (2)

55. This orogeny was formerly unified with (2):

- a. The Zagros Mountains
- b. The Atlas Mountains
- c. The Urals
- d. The Andes
- e. The Pyrennees



56.

What are the structures in the above image in the yellow units called? What are 2 other structures that could potentially be underground? (4)

57. If this area is eventually buried under shale and lithified, what type of unconformities will be found in this area? (2)

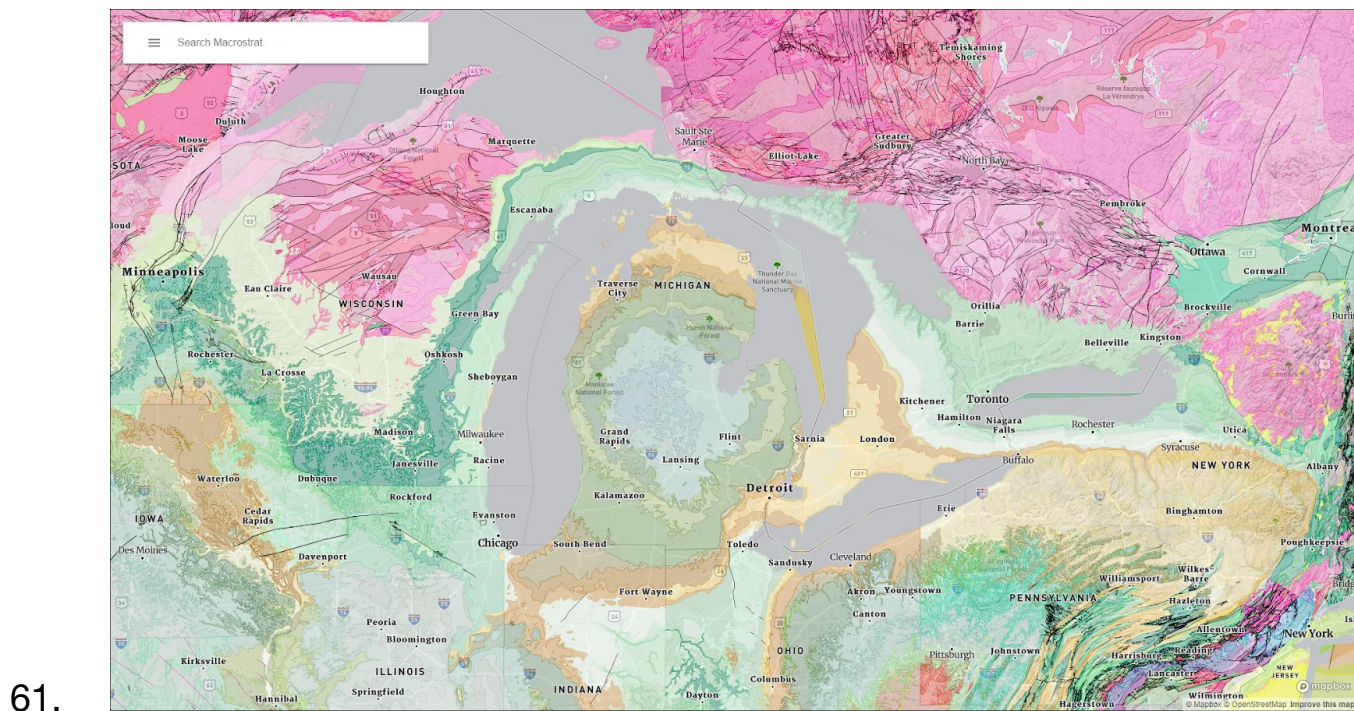
58. True or False: This area appears to likely have had former hotspot activity (2)



59.

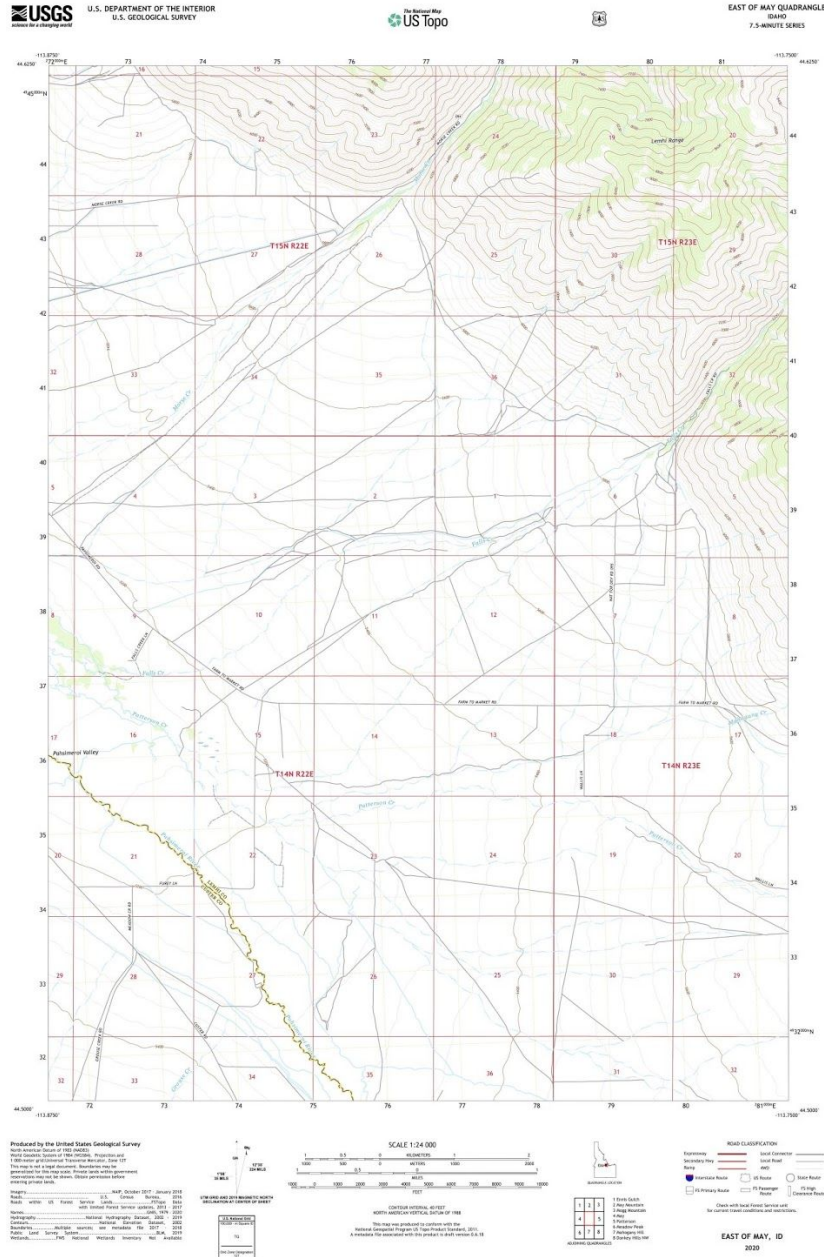
What direction is the leeward side of the dunes? (2)

60. Coal is most likely to form in the _____ area of land on this map
- NE
 - NW
 - SW
 - SE
 - Central



The unit in central Michigan is from the Jurassic while the dark green unit on the eastern Upper Peninsula is from the Early Ordovician. What type of structure is this? (2)

62. The pink units around Duluth and Houghton striking at about 060 NE are deep layers of volcanic rock. What event caused this? Why did it stop? (4)



65. BONUS ROUND: Of the locations listed, identify what resource(s)/gemstone(s) each is majorly associated with; several possible answers and can be multiple (0.5 each answer):

Ex: California: Gold

Arizona:

Nevada:

Michigan:

Montana:

West Virginia:

Indiana:

Alaska:

Texas:

North Dakota:

Chile:

South Africa:

Australia:

Colombia:

Myanmar/Burma:

Sri Lanka:

Tanzania:

Saudi Arabia:

Mexico: