

Core the Hidden Layers: Reconstruct Strata You Cannot See

Investigation question: How well can a few narrow cores reveal the order of hidden layers and the events that changed them, and what can a single core never tell you?

Physical model

Groups of 4

1 session

Setup 5 · Activity 40 · Cleanup 8 min

MS-ESS1-4 · practice

MS-ESS2-2 · supports

Name _____

Group _____

Date _____

Your role today

- ☐ **Builder:** Rolls each play-dough layer to the thickness on the recipe card and presses it into the container in order; applies the event (dike, fault base or missing layer) exactly as the card says.
- ☐ **Marker:** Places the pasta fossil markers in the layers named on the recipe, counts them in, and seals the container with the foil lid; keeps the recipe card hidden in the envelope.
- ☐ **Driller:** During the coring phase, pushes each straw straight down at the marked position, twists a quarter turn, lifts it out and holds it against the ruler for reading.
- ☐ **Logger:** Reads each core from the top down with the Driller, records colors, thicknesses and markers in the core log, and leads the group's reconstruction.

Safety

- Play-dough and pasta are not food: store-bought dough contains wheat and a lot of salt, and homemade dough is very salty. Nothing goes in mouths. Students with wheat allergy should wear gloves or use a gluten-free dough; use rice or lentils instead of pasta if needed.
- Cut straw ends can be sharp; cut them square and push with the palm, not a fingertip.
- Plastic knives only. Keep dough off the floor; stepped-on dough is a slip hazard on hard floors.
- Wash hands after handling dough and before leaving the room.

Procedure

1. Build phase (12 minutes). Open your recipe envelope. The Builder rolls the bottom layer to the thickness on the card, checks it against the ruler, and presses it flat into the container. The Marker adds any pasta markers for that layer, spreading them across the whole layer. Repeat for each layer in order, bottom to top.
2. Apply the event on your card exactly as drawn: the diagonal dike, the raised left half, or the missing blue layer on the left half. Then press the foil lid on with the A to E marks running left to right across the container, write your group name on the lid, and seal the recipe card back in the envelope.
3. Swap models with your assigned partner group. Do not open the envelope you receive. Before coring, each student writes a prediction on the recording sheet: what could one core tell you, and what could it

not?

4. Core 1 at position C (center). The Driller pushes a clear straw straight down until it touches the bottom, twists a quarter turn, and lifts it out. Hold the straw against the ruler. The Logger records, from the top down, each color, its thickness in millimeters and any pasta markers visible in the core.
5. Write your first reconstruction from this single core: the order the layers were deposited, oldest first, and the rule you used. Note anything odd in the core, such as a color that does not form a flat band.
6. Core 2 at position A and core 3 at position E (the two edges). Log each the same way. Lay the three straws side by side in order A, C, E and look across them: are the same layers at the same depths? Is any layer missing in one core? Does any color appear as a column rather than a band?
7. Revise your reconstruction. Decide which event happened to this model (a dike, a fault or a missing layer), say which core comparison revealed it, and write the full order of events with the rule for each step. If the group disagrees, take one more core at B or D to test the disagreement, and record it.
8. Draw the three (or four) cores to scale as side-by-side columns on the recording sheet, with depths in millimeters and markers shown.
9. Open the envelope and compare the recipe with your reconstruction. Fill in the scoring table: layer order, event identified, event placed correctly in the sequence, index-marker layer identified. Record how many of these you had right after one core and after three.
10. Cleanup: pull the lid, peel the layers apart and sort dough by color into the class zip bags; pasta-contaminated dough and cores go in the discard bag. Rinse straws for reuse or recycle them.

Record your observations

Lab 1 recording sheet: Core the hidden layers

You are reconstructing another group's hidden stack. Read every core from the **top down**, record exactly what you see, and separate what you observed from what you infer. Write your prediction before the first core goes in.

1. Prediction before coring: what could one core at the center tell you about the hidden stack, and what could it not tell you?

Core log (fill a row for each layer in each core, top layer first)

Core position	Layer number from top	Color	Thickness (mm)	Pasta markers seen (shells, stars, none)	Anything odd
C	1				
C	2				
C	3				

Core position	Layer number from top	Color	Thickness (mm)	Pasta markers seen (shells, stars, none)	Anything odd
C	4				
C	5				
A	1				
A	2				
A	3				
A	4				
A	5				
E	1				
E	2				
E	3				
E	4				
E	5				
Extra core (B or D)					

2. First reconstruction, from core C only: list the layers in the order they were deposited, oldest first, and name the rule you used.

 Draw cores A, C and E (and any extra core) side by side as columns to scale, with a depth scale in millimeters down the left side. Color each layer, mark pasta markers with small symbols, and draw lines connecting the same layer across the cores. Label the event you identified.

Scoring: your reconstruction against the builders' recipe

Item	Your answer after one core	Your answer after three cores	Builders' recipe	Correct after one core? (yes/no)	Correct after three? (yes/no)
Order of layers, oldest first					
Type of event (dike, fault, missing layer)					
Where the event goes in the order of events					
Which layer holds the star markers					

Analysis questions

3. Which layer in the model you cored was deposited first? State the rule that tells you, and state the assumption the rule depends on.
-
-
-

4. Describe how comparing cores A, C and E revealed the event in your model. Name the rule (superposition, lateral continuity or cross-cutting relationships) that let you interpret the difference between cores.

5. Suppose a core from a different group's model shows one star marker. Which layer must that core have passed through, and how sure can you be? Which marker, stars or shells, is the better index fossil, and why?

6. A core passes through the blue layer but shows no star markers. A classmate concludes that the blue layer in that model has no stars. Is that conclusion justified? What does this tell you about using the absence of a fossil as evidence?

7. In a fault model, the top of the blue layer is at 18 mm depth in core A and at 23 mm depth in core E. How much were the layers offset? Can you tell from these two cores which side moved up and which moved down? Explain.

8. Your group spent about the same time pressing in the 6 mm white layer as the 10 mm red layer. In real rock, does a thicker layer mean it took longer to form? Use the model and one real-world example in your answer.

9. List two ways the play-dough model is unlike real strata and one way it behaves like them. For each unlike, say what a geologist would need to consider that your model skipped.
