Earth Science Outside – Geology and Heritage Tooele County
First session – Tooele School District Headquarters
October 2, 2019 – so sorry it is parent teachers day…
This year we focus on the Fifth Grade Earth Science curriculum. We'll revisit it again and again, so, yes, sorry teachers missed this first day… but we will review.

Credit: Earth Science Education, www.earthscienceeducation.org
Genevieve Atwood and Peg Alderman, leaders.

1. SYSTEMS… surround us!

Exercise 1… I spy with my little eyes… systems!

I like the idea of making this image one of those "not a robot" grids…
What systems do you identify…?

For sure… a car is a system.

For sure… a house is a system.

For sure… Genevieve's digestive track is a system.

What makes a system a system?
And… what makes Earth's system a system… Please understand this happy concept by the end of class.

2. EVIDENCE of Earth processes

Exercise 2 part A. Try: I spy with my little eyes… I notice, near and far… whatever!
On your own… jot down 5 or 6 observations.

A

B

C

D

E

Exercise 2 part B. Observations associated with Earth's systems.
Work in groups of two or three for a few minutes.
Make at least three observations about the

- Geosphere = solid Earth
- Hydrosphere = water Earth
- Atmosphere = gaseous Earth
- Biosphere = living Earth including humans

Go Outside and try I spy with my little eyes…
Look around. Notice evidence of the solid Earth, of the water Earth, of the gaseous Earth, and the living Earth (including the human footprint).
Classify at least three or four observations as best you can for each of Earth's subsystems.

GEOSPHERE	**HYDROSPHERE**	**ATMOSPHERE**	**BIOSPHERE (incl humans)**
I see mountains.	I see canyons.	I see clouds above the mountains …	I see houses in the valley.

Exercise 2 part C. Interactions between subsystems of Earth's systems.
With your group… Draw arrows to show interactions between subsystems based on your observations.
Discuss: Cause and effect.
Big concept! Systems have subsystems and those subsystems interact.
Note: Standard 5.1.4 suggests that teachers "emphasize interactions between only two systems at a time."

3. Further exploration… INTERACTIONS between two of Earth's four systems (geosphere – hydrosphere).

Earth's systems are characterized by flows of materials.
Earth's systems are characterized by flows of energy.

EXERCISE 3: Have four groups representing the four subsystems of Earth's subsystems.
Ask Biosphere, Hydrosphere, and Atmosphere groups how their system will affect the Geosphere this winter.

4. PATTERNS of Earth's features associated with EROSION… example of flows of materials due to processes acting on Earth's surface.

Big concept! Patterns are due to processes.
Patterns of Earth's features are expressions of Earth's processes.

Exercise 4. Identify effects of the hydrosphere on the geosphere.
Is it possible to associate patterns with those processes … views west toward Deseret Peak… or south to Stansbury Island? Patterns?

Thought question:
Can erosion exist without deposition?
Why don't Earth scientists say "erosion / deposition" instead of "erosion?"
Hmmm why don't Earth scientists say: "weathering, erosion, transport, deposition" instead of "erosion?"
These terms are often on tests. Why? to see whether students draw distinctions on process.

5. PATTERNS are expressions of processes.

DISCUSSION: how to teach patterns. Some patterns seem obvious. But…

What makes a pattern be a pattern?
Discussion… when a student just doesn't "see" what a pattern is… what "works" to teach this oh-so-simple but oh-so-difficult-to-grasp-for-a-few-folks concept?

Conversely:

How does the geosphere affect the hydrosphere along the Wasatch Front?
Coaching… whenever you're asked about processes of the geosphere… think TECTONICS as well as erosion/deposition.
How, where, and why do the channels carry water? There's a "down" to the topography… and why is that?
Tectonics rules!
BIG TOPIC for TOMORROW… TECTONICS… global, regional, local.

6. Big concept: Earth's subsystems energy comes from:

The sun.
Earth's interior.

7. Cause and effect: PATTERNS of Earth's features are due to (a) TECTONICS and (b) EROSION… meaning weathering, entrainment, transport, and deposition.

SUMMARY

1. SYSTEMS… surround us!

2. SYSTEMS… have subsystems.

Memorize: Earth's subsystems for Strand 5.1 are: Geosphere, Hydrosphere, Atmosphere, Biosphere (includes humans).

3. SYSTEMS… subsystems of systems interact. Example: Earth's geosphere and hydrosphere interact.

Earth's systems are characterized by flows of materials.
Earth's systems are characterized by flows of energy.

4. Earth's features are shaped by erosion / deposition. Flows of matter. Erosion takes away. Deposition adds. Erosion and deposition are a couplet.

5. Big concept! Earth's subsystems' energy comes from two sources:
   The sun. Energy from the sun largely drives erosion / deposition.
   Earth's interior. Energy from Earth's interior largely drives tectonics.

6. Earth's features are associated with TECTONICS and EROSION.

PREVIEW of October 3, 2019 session:
TECTONICS RULES! Cause and Effect.
Tectonics is largely responsible for global, regional, and local patterns of Earth's features.
Regions look different because they have had different histories of tectonics and erosion.