



Ocean Literacy Essential Principle 2

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Georgia Association of Marine Educators Conference:
Ocean Literacy Rebooted
November 13, 2021





Essential Principle 2

**Principle 1:
Grades 3-5**

Strand Topic

Properties of Ocean Water

Major concept of this strand

97% of all water on Earth is salt water in the ocean.

2 ideas that support bigger ideas in this strand

A.1.
Only 3% of all water on Earth is fresh water stored in lakes, rivers, underground aquifers, glaciers, and other places.

A.4.
Salinity and temperature vary throughout the ocean.

Supporting ideas on properties of ocean water discussed in further detail

A.2.
Most of all the fresh water in the world is stored in ice caps and glaciers.

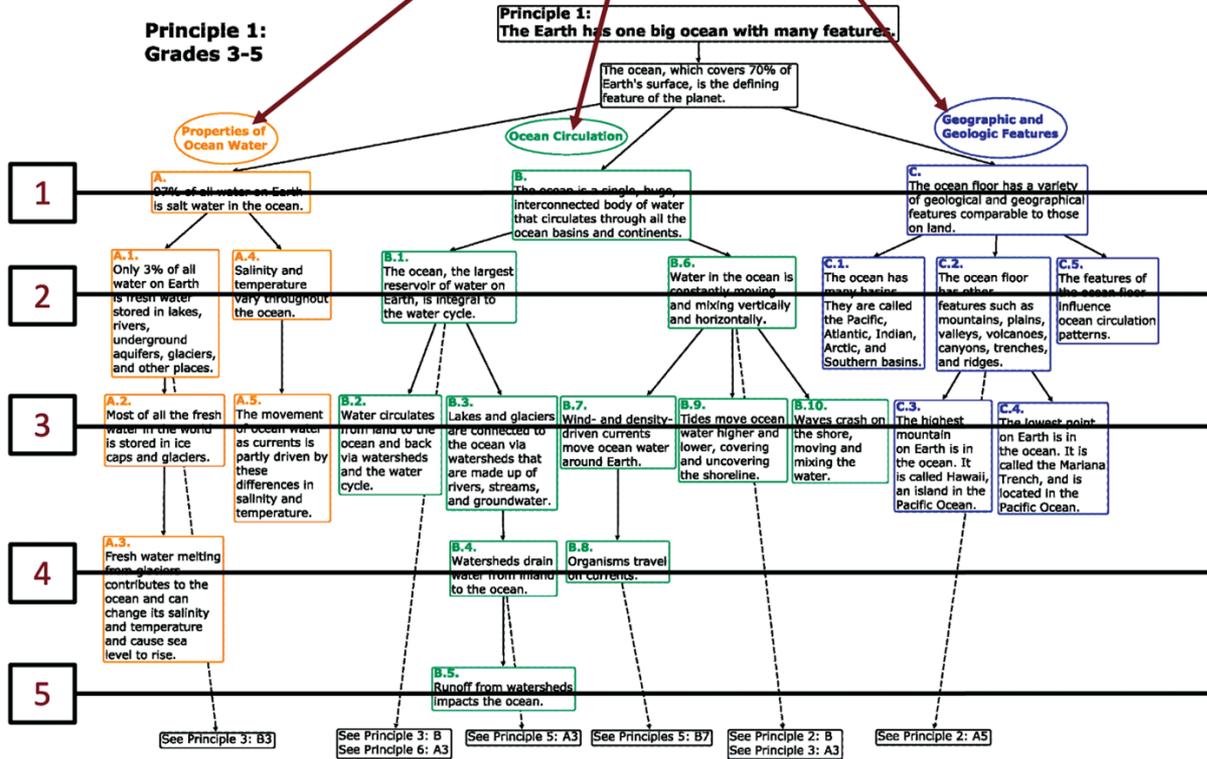
A.5.
The movement of ocean water as currents is partly driven by these differences in salinity and temperature.

A.3.
Fresh water melting from glaciers contributes to the ocean and can change its salinity and temperature and cause sea level to rise.

For Grades 3-5, concept A2 in Principle 1 is connected to concept B3 in Principle 3

See Principle 3: B3

Strand A → Strand B → Strand C



Dashed lines lead to cross-referenced concept statements in other essential principles.



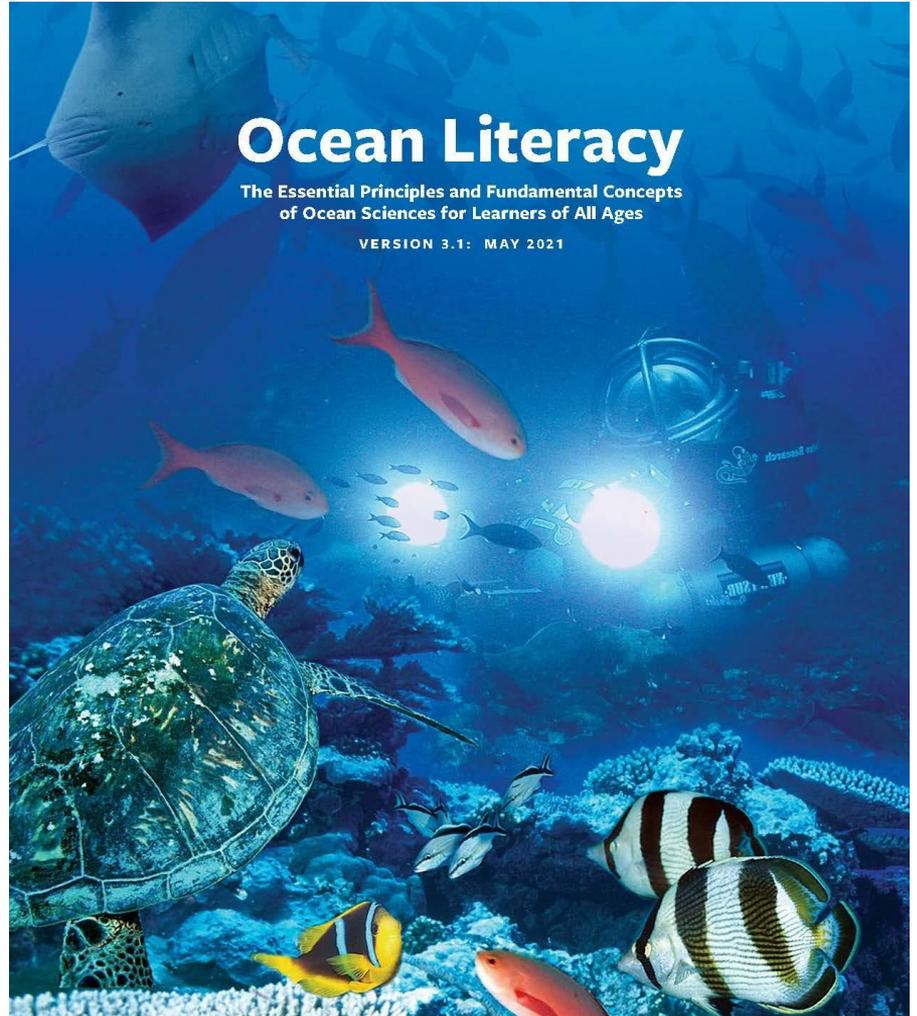
Using the OL Framework with Your Learners

1. **Look at the Guide** to determine the Essential Principles and Fundamental Concepts you want &/or need to address with your learners.
2. Then **look at the Scope and Sequence** for that principle for your grade level, and locate the concepts you decided to focus on.
3. Finally, **choose an activity** that addresses one or more of those concepts, following the flow shown in the scope and sequence.

Ocean Literacy Guide:

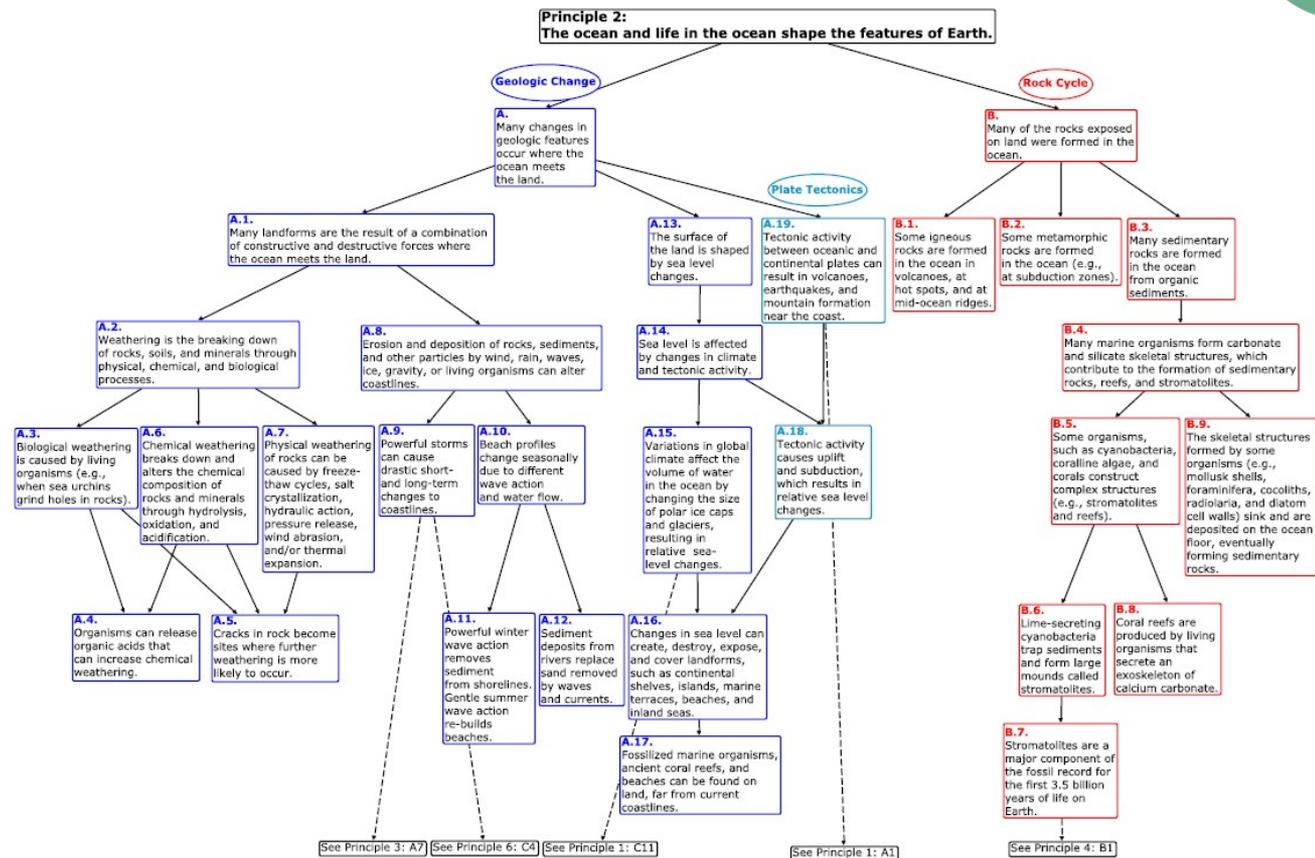
The Essential Principles & Fundamental Concepts of Ocean Sciences

<http://www.marine-ed.org/ocean-literacy/guide>



The ocean and life in the ocean shape the features of Earth.

- a. Many **earth materials and geochemical cycles** originate in the ocean. Many of the sedimentary rocks now exposed on land were formed in the ocean. Ocean life laid down the vast volume of siliceous and carbonate rocks.
- b. **Sea level changes** over time have expanded and contracted continental shelves, created and destroyed inland seas, and shaped the surface of land.
- c. **Erosion**—the wearing away of rock, soil and other biotic and abiotic earth materials—occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.
- d. **Sand** consists of tiny bits of animals, plants, rocks and minerals. Most beach sand is eroded from land sources and carried to the coast by rivers, but sand is also eroded from coastal sources by surf. Sand is redistributed by waves and coastal currents seasonally.
- e. Tectonic activity, sea level changes, and force of waves influence the **physical structure and landforms of the coast**.



See p.34 of your copy of the Handbook



S&S P2A strand: a particular portion of the Ocean Literacy Scope & Sequence

**Principle 2:
The ocean and life in the ocean shape the features of Earth.**

Geologic Change

Rock Cycle

Plate Tectonics

A. Many changes in geologic features occur where the ocean meets the land.

B. Many of the rocks exposed on land were formed in the ocean.

A.1. Many landforms are the result of a combination of constructive and destructive forces where the ocean meets the land.

A.11. The surface of the lands is shaped by sea level changes.

A.19. Tectonic activity between oceanic and continental plates can result in volcanoes, earthquakes, and mountain formation near the coast.

B.1. Some igneous rocks are formed in the ocean in volcanoes, at hot spots, and at mid-ocean ridges.

B.2. Some metamorphic rocks are formed in the ocean (e.g., at subduction zones).

B.3. Many sedimentary rocks are formed in the ocean from organic sediments.

A.2. Weathering is the breaking down of rocks, soils, and minerals through physical, chemical, and biological processes.

A.8. Erosion and deposition of rocks, sediments, and other particles by wind, rain, waves, ice, gravity, or living organisms can alter coastlines.

A.14. Sea level is affected by changes in climate and tectonic activity.

B.4. Many marine organisms form carbonate and silicate skeletal structures, which contribute to the formation of sedimentary rocks, reefs, and stromatolites.

A.3. Biological weathering is caused by living organisms (e.g., when sea urchins grind holes in rocks).

A.6. Chemical weathering breaks down and alters the chemical composition of rocks and minerals through hydrolysis, oxidation, and acidification.

A.7. Physical weathering of rocks can be caused by freeze-thaw cycles, salt crystallization, hydraulic action, pressure release, wind abrasion, and/or thermal expansion.

A.9. Powerful storms can cause drastic short- and long-term changes to coastlines.

A.10. Beach profiles change seasonally due to wave action and water flow.

A.15. Variations in global climate affect the volume of water in the ocean by changing the size of polar ice caps and glaciers, resulting in relative sea-level changes.

A.18. Tectonic activity causes uplift and subduction, which results in relative sea level changes.

B.5. Some organisms, such as cyanobacteria, coralline algae, and corals construct complex structures (e.g., stromatolites and reefs).

B.9. The skeletal structures formed by some organisms (e.g., mollusk shells, foraminifera, coccoliths, radiolaria, and diatom cell walls) sink and are deposited on the ocean floor, eventually forming sedimentary rocks.

A.4. Organisms can release organic acids that can increase chemical weathering.

A.5. Cracks in rock become sites where further weathering is more likely to occur.

A.11. Powerful winter wave action removes sediment from shorelines. Gentle summer wave action re-builds beaches.

A.12. Sediment deposits from rivers replace sand removed by waves and currents.

A.16. Changes in sea level can create, destroy, expose, and cover landforms, such as continental shelves, islands, marine terraces, beaches, and inland seas.

A.17. Fossilized marine organisms, ancient coral reefs, and beaches can be found on land, far from current coastlines.

B.6. Lime-secreting cyanobacteria trap sediments and form large mounds called stromatolites.

B.8. Coral reefs are produced by living organisms that secrete an exoskeleton of calcium carbonate.

B.7. Stromatolites are a major component of the fossil record for the first 3.5 billion years of life on Earth.

See Principle 3: A7 | See Principle 6: C4 | See Principle 1: C11

See Principle 1: A1

See Principle 4: B1

See p.34 of your copy of the Handbook



Essential Principle 2

Activity



S&S P2A strand: a particular portion of the Ocean Literacy Scope & Sequence

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B. Many of the rocks exposed on land were formed in the ocean.

A.1. Many landforms are the result of a combination of constructive and destructive forces where the ocean meets the land.

A.1.1. The surface of the lands is shaped by sea level changes.

A.1.9. Tectonic activity between oceanic and continental plates can result in volcanoes, earthquakes, and mountain formation near the coast.

B.1. Some igneous rocks are formed in the ocean in volcanoes, at hot spots, and at mid-ocean ridges.

B.2. Some metamorphic rocks are formed in the ocean (e.g., at subduction zones).

B.3. Many sedimentary rocks are formed in the ocean from organic sediments.

A.2. Weathering is the breaking down of rocks, soils, and minerals through physical, chemical, and biological processes.

A.8. Erosion and deposition of rocks, sediments, and other particles by wind, rain, waves, ice, gravity, or living organisms can alter coastlines.

A.14. Sea level is affected by changes in climate and tectonic activity.

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A.3. Biological weathering is caused by living organisms (e.g., when sea urchins grind holes in rocks).

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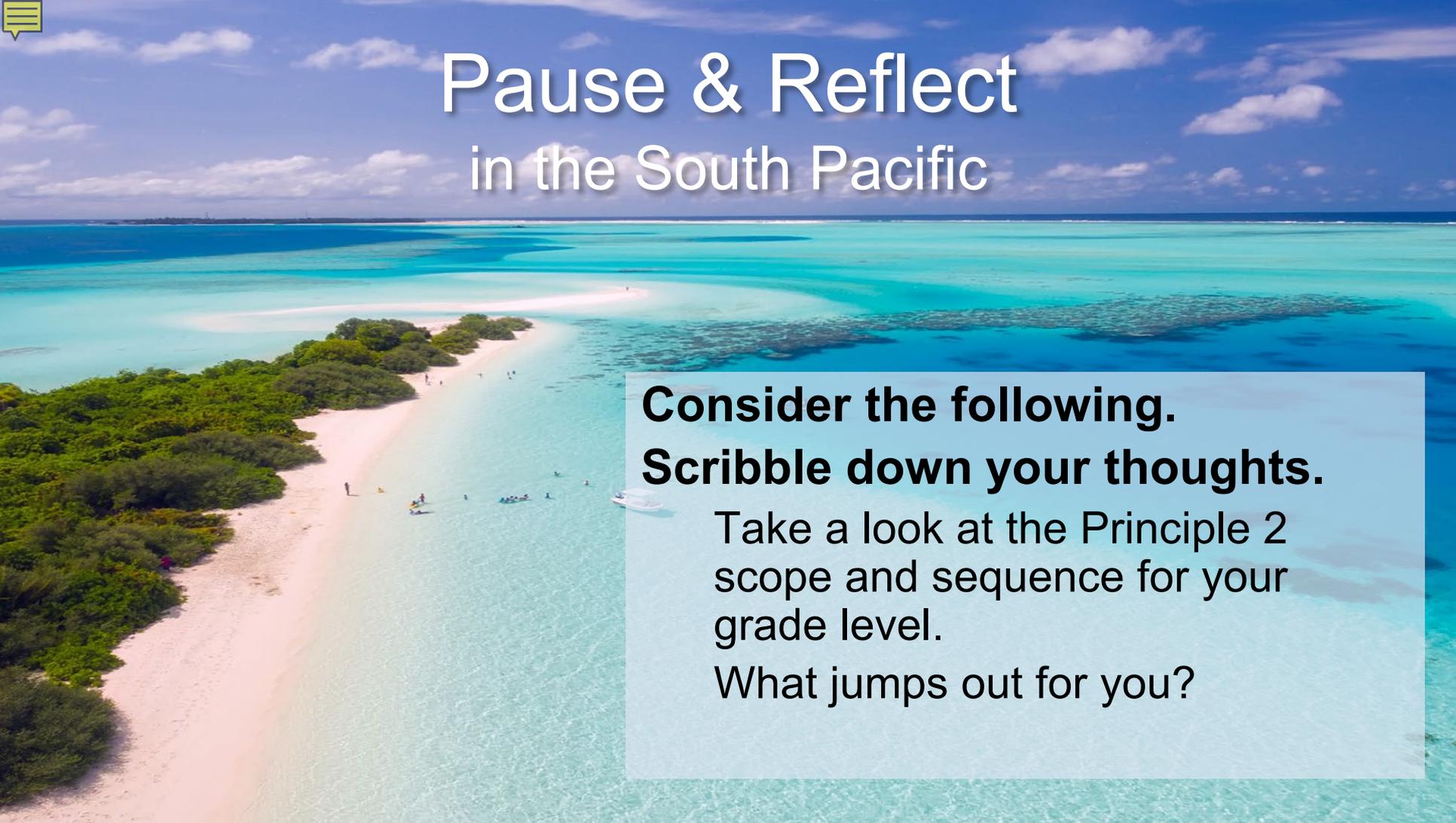
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See Principle 1: A7 | See Principle 6: C4 | See Principle 1: C11

See Principle 1: A1

See Principle 4: B1



An aerial photograph of a tropical beach. The water is a vibrant turquoise color, transitioning to a deeper blue further out. A white sandbar runs diagonally across the frame, separating a shallow lagoon from the open ocean. The beach is lined with lush green vegetation. Several people are visible on the sandbar and in the shallow water. A small white boat is anchored near the sandbar. The sky is bright blue with scattered white clouds.

Pause & Reflect in the South Pacific

**Consider the following.
Scribble down your thoughts.**

Take a look at the Principle 2
scope and sequence for your
grade level.

What jumps out for you?