The Habitable Planet, Unit 3: Oceans

Reading Guide

Section 1: Introduction

1. How do oceans affect land?
2. What questions do we still have about oceans? How may these questions be addressed?
3. Why is it difficult to study oceans?
4. What human impacts is the ocean vulnerable to?

Section 2: Ocean Structure and Composition

1. What happens to pressure as depth increases?
2. Describe the three layers of the ocean.
3. What is the thermocline?
4. How do ocean trenches form?
5. What causes underwater earthquakes and their resulting tsunamis?
6. What is the Pacific Ring of Fire?

Section 3: Ocean Currents

1. Why is mixing important?
2. What causes waves and surface currents?
3. How does the Coriolis force affect winds?
4. What is Thermohaline Circulation?
5. What is coastal upwelling?
6. How does ocean circulation affect Earth’s climate?
7. What determines surface water temperature and short-term variations in ocean surface temperature?
8. Why do oceans respond slowly to temperature changes?

Section 4: Thermohaline Circulation

1. Describe the course of the thermohaline.
2. What drives thermohaline circulation?
3. What determines water salinity?
4. Why is water more saline in the subtropics and less saline at higher latitudes?
5. What water masses help drive thermohaline circulation?
6. Is thermohaline circulation a constant or permanent pattern? Explain.

Section 5: Ocean Circulation and Climate Cycles

1. Describe a summer monsoon and a winter monsoon.
2. What is required for formation of a hurricane?
3. Describe the El Niño Southern Oscillation (ENSO).
4. What happens in an El Niño year?
5. What was the result of the 1982-1983 and 1997-1998 El Niño cycles?
6. Describe a La Niña event.
7. What are two other ocean/atmosphere climate cycles?

Section 6: Biological Activity in the Upper Ocean

1. What directly or indirectly nourishes most organisms in the ocean?
2. Describe phytoplankton.
3. What is the major limiting factor for primary productivity in the ocean?
4. What is compensation depth? At what depth does it occur in clear water? In turbid water?
5. How does mixing affect phytoplankton?
6. What does phytoplankton need besides light?
7. What may cause a large stretch of red, brown, or yellow-green ocean water?
8. What problems are associated with blooms?
9. What triggers blooms?
10. How are blooms beneficial?
11. What are some important primary consumers of phytoplankton?
12. How do climate cycles affect primary productivity of oceans?

Section 7: The Biological Pump

1. What is marine snow?
2. Why is marine snow important?
3. Describe the “biological pump”.
4. Why is the biological pump important?
5. What factors play a role in the efficiency of the biological pump?