

Exercise walk-through

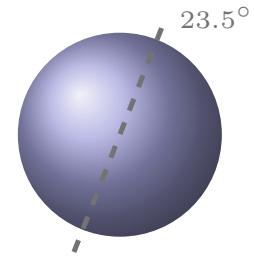
4.9

El Nino and La Nina

AP Environmental Science

What we will cover

- 1 Plate tectonics
- 2 Soil
- 3 The atmosphere
- 4 Global wind patterns
- 5 Seasons and radiation
- 6 Climate and El Niño



The atmosphere

The **atmosphere** is $\sim 78\%$ N_2 ,
 21% O_2 .

- **troposphere** : weather; cools with height
- **stratosphere** : holds the ozone layer

Ozone absorbs UV, so temperature **rises** again in the stratosphere – the shield for land life.



Climate desert

Worked example – a water budget

A region gets 80 cm of rain a year; 50 cm evaporates and 10 cm runs off. How much recharges the groundwater?

- Water in = water out + storage:
precipitation =
evaporation + runoff + infiltration.
- $80 = 50 + 10 + \text{infiltration}$
- $\text{Infiltration} = 80 - 60 = 20 \text{ cm yr}^{-1}$
- Paving the region **raises runoff** and **cuts recharge** $\Rightarrow$ wells drop and floods worsen.

Every APES budget question is **in = out + change in storage**. Name where the water goes; impervious surfaces shift it from **infiltration to runoff**.

Exercises 2.1-2.3

2.1 In El Niño, which way does warm water spread across the Pacific? [1]

2.2 What happens to upwelling off South America during El Niño? [1]

2.3 How is La Niña different from El Niño? [1]

Exercises 2.1-2.3

2.1 In El Niño, which way does warm water spread across the Pacific? [1]

2.1

- Eastward
-

2.2 What happens to upwelling off South America during El Niño? [1]

2.2

- It is suppressed (reduced)
-

2.3 How is La Niña different from El Niño? [1]

2.3

- In La Niña the trade winds strengthen and upwelling off South America is stronger (the opposite of El Niño)

Exercise 3.1

3.1 During El Niño, the fishing industry off South America suffers because [1]

☐

A upwelling and nutrients decrease

B upwelling increases

C the water freezes

D trade winds strengthen

Exercise 3.1

3.1 During El Niño, the fishing industry off South America suffers because [1]

☐

A upwelling and nutrients decrease

B upwelling increases

C the water freezes

D trade winds strengthen

3.1 A

- upwelling and nutrients decrease

Exercise 3.2 (a)

3.2 An El Niño year begins.

(a) Describe what happens to the trade winds and warm water.

[2]

Exercise 3.2 (a)

3.2 An El Niño year begins.

(a) Describe what happens to the trade winds and warm water.

[2]

(a)

- The trade winds weaken, so warm surface water spreads eastward across the Pacific

Exercise 3.2 (b)

3.2 An El Niño year begins.

(b) Explain the effect on plankton and fish off South America.

[2]

Exercise 3.2 (b)

3.2 An El Niño year begins.

(b) Explain the effect on plankton and fish off South America.

[2]

(b)

- Warm water suppresses the cold nutrient upwelling, so plankton decline and fish populations crash

Exercise 3.3

3.3 Explain why upwelling of cold water supports rich fisheries.

[2]

Exercise 3.3

3.3 Explain why upwelling of cold water supports rich fisheries. [2]

3.3

- Upwelling brings cold, nutrient-rich water to the surface, fueling plankton growth that supports fish and the whole food web