Coates: Geologic History

Note that although most of this document follows the order of the PDF reading “Coates Central American Geology”, a couple of sections do not. I have chosen to do this as I think it provides a more logically consistent sequence.

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Regarding the general setting going back 15 million years ago for Central America features, looking to the north - what plate is on the left (west) side of the region?

1. North American
2. South American
3. Oceanic Pacific
4. Nazca

What is the name of the plate on the right?

1. Continental Caribbean
2. West Indian
3. Atlantic

Which of the two plates is pushing under the other?

1. North American
2. South American
3. Oceanic Pacific
4. Nazca
5. Continental Caribbean
6. West Indian
7. Atlantic

What did the southern part of Central America look like some 15 million years ago?

1. It was a solid land mass, much larger than today
2. It was a series of volcanic islands only, there was no continuous land mass
3. It was a lowland limestone reef that had gradually risen from the sea and formed a continuous mass from South to North America
4. There was nothing there at all

The northern part of the Central America, ~15 million years ago, was formed:

1. Of volcanic islands, not connected
2. from rising magma that formed batholiths, which were later exposed, together with other sediments (which formed the Central Crystalline Highlands)

By about 3 million years ago, how deep was the water over the land mass that now forms the Panamanian isthmus?

1. ~50 meters
2. 500 meters
3. It was generally right at sea level (~0 meters)

What was the general trend in water depth over the southern part of Central America from 15 million years ago the 3 million years ago?

1. the water was getting deeper
2. the water was getting more shallow
3. there was little change

What had happened by ~2.5 million years ago?

1. The solid land mass had eroded and all that was left was islands
2. The islands had gradually experienced a filling in of eroding sediments, and there was a falling sea level due to northern hemisphere cooling – both of which created a transition from widely spaced islands to a continuous landmass between the previously isolated continents of North and South America
3. The volcanoes kept erupting but the erosive forces of oceanic water flowing from east to west kept the islands from infilling, and thus no continuous land mass was able to form
4. none of these

In the northern part of Central America, the Maya Terrane (yes this is the correct spelling) is a large mass of land that is generally composed of limestone (formed from old coral reefs). Under the limestone are found large masses of solid granite known as batholiths. (These batholiths were formed by large amounts of magma rising in the area where there has been the subduction of an oceanic plate under a continental plate.) In some places the limestone has been eroded away, causing the granitic batholiths underneath to be exposed. What is the name of these exposed batholiths? (page 12) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

From 5 to 3 million years ago the marine connections between the Pacific and the Caribbean were probably dominantly found in the form of three waterways, the remnants of a particular one being especially important in today’s economic and political geography. Name that particular valley.\_\_\_\_\_\_\_\_\_\_\_\_\_

On page 34 Coates describes a period of where glaciations and warming interglacials were found in intervals of approximately 100,000 years. Variations in what two things were the causes of these temperature fluctuations? \_\_\_\_\_\_\_\_\_\_\_\_\_

A warming period would cause an increase or decrease in global sea levels?

What evidence is there in Central America that scientists utilize to document changes in sea level?

True or false: the shells of marine animals possess differing levels of oxygen isotopes, giving data about prevalent water temperatures when those animals were alive.

Which temperature change, warming or cooling, would tend to favor the formation of a continuous rather than discontinuous land mass in the Central American region?

A study Coates mentioned that utilized coral reef-based animals, estimated the water temperature on the edge of the isthmus fell \_\_\_\_\_\_\_\_ degrees as glaciations happened about 20,000 years ago.

A study of pollen records on land that examined the same time period found what change in air temperature?

1. about the same
2. more
3. less

The graph on page 35 of sea temperatures shows the following:

1. warming happened more rapidly than cooling
2. cooling happened more rapidly than warming
3. cooling and warming happened at about the same rate
4. none of the above

What other major tectonic force besides erosion favored the development of a continuous land mass over the region?

1. tectonic uplift
2. tectonic subsidence
3. faulting

The term “relief” in geography denotes the difference in elevation between two points or areas. What part of the Central American isthmus has the lowest relief today?\_\_\_\_\_\_\_\_\_\_\_\_\_. How many meters is it?

1. 45
2. 15
3. 60
4. None of the above

Another region of the isthmus that has relief almost that low. Name the area\_\_\_\_\_\_\_\_\_\_\_.

The seasonal temperature fluctuations of the Caribbean and Pacific sides of Central America, before closure of the isthmus, would have been about the same on either side of the isthmus. This is because there would have been free flow of water from east to west (Caribbean to Pacific). Therefore, seasonal differences in oxygen isotope ratios on either side would have been:

1. small or nonexistent
2. significant
3. difficult to estimate

Closure of the isthmus allowed for upwelling to the surface of colder subsurface water to happen and persist on the Pacific coast but not the Caribbean side. Evidence of this upwelling from oxygen isotope ratios had emerged by:

1. 15 million years ago
2. 5 million years ago
3. 2 million years ago
4. 20,000 years ago

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