

## ES202 Lab 10: Coastal Processes and Landforms

Updated March 2009 – AGI Lab Manual 8<sup>th</sup> Ed.

### Part 1. Lab Activities.

#### *Map Station 1 - Barnegat, N.J. Raised-Relief Map*

1-1. Use pages 285-287 of your lab books to identify the following coastal geomorphic features.

- A. Island Beach \_\_\_\_\_
- B. Tom's River \_\_\_\_\_
- C. The marshy area at the mouth of Cedar Creek \_\_\_\_\_

Read the first paragraph of "Part 15C" on p. 294 and answer the following questions.

1-2. What would be the minimum height of a storm surge that would completely inundate Island Beach? Explain your answer.

1-3. Assess the relative hurricane damage potential of Barnegat City, NJ vs. that of Tom's River, NJ. Include in your analysis wind damage, storm surge damage, flooding, and permanent geomorphic change of the landscape.

1-4. What possible geomorphic actions could impact ship travel through Barnegat Inlet.

1-5. Assume that global warming is a reality, and that polar ice caps are melting. How much of a sea-level rise would be required to totally inundate the town of Tom's River, NJ? Explain your answer.

*Map Station 2 - Baltimore, MD-PA-VA-WV Raised-Relief Map*

1-6. What type of coastal geomorphic feature is represented by Chesapeake Bay?

1-7. What are tides and how might they impact Chesapeake Bay?

1-8. What will be the net geomorphic effect on Chesapeake Bay if we enter another glacial climate, with massive build-up of North American ice sheets analogous to the Late Wisconsinan Laurentide Ice Sheet? Discuss your answer in terms of climate change, ice volume, sea level change, and the net erosional and/or depositional effect on the Chesapeake.

*Map Station 3 - San Luis Obispo, CA Raised-Relief Map*

1-9. What well-known geologic feature is marked by the heavy dark line labelled "A" on the map? Is this feature marked by mountains or a valley? Why do you think that is (what processes make it so)?

1-10. Use p. 285-287 of your book to identify the following coastal geomorphic features.

- Landform B. \_\_\_\_\_
- Landform C. \_\_\_\_\_
- Landform D. \_\_\_\_\_
- Landform E. \_\_\_\_\_

1-11. What is the direction of longshore drift associated with landform D?

1-12. Examine the coastline northwest of landform E, does this shoreline appear to be tectonically emergent or submergent? Why, explain your answer.

*Air Photo Station - 1 San Clemente Island, CA*

Note the stair-case benches, labelled A, B, C, and D, at the western shoreline of San Clemente Island.

1-13. Given that San Clemente lies along the tectonically active California borderlands, what is the geomorphic name of the "stair-case benches" shown on the photo?.

1-14. Draw a series of 4 cross-sectional diagrams to show how these four features (A-D) develop through time.

1-15. Fossil shell fragments from old beach deposits on each of the benches were dated by using Radiocarbon dating techniques. The results of the analysis are provided below.

Bench I.D.	Shell Carbon Date (years ago)	Elevation of Surface Above Sea Level (m)	Uplift Rate (cm / yr)
A	10,000 yrs	100 m	_____
B	15,000 yrs	125 m	_____
C	18,050 yrs	150 m	_____
D	25,000 yrs	200 m	_____

Fill out the table by calculating the tectonic uplift rate for each of the benches listed above. Determine the tectonic uplift rate in cm / yr, and answer the following questions.

1-15A. Which "bench" shows the highest tectonic uplift rate? Which the slowest?

1-15B. How do you know which bench is related to tectonic uplift, and which might be the result of global sea level change (think about the kinds of data that you might collect to determine the relative importance of each process in "bench" formation).

*Air Photo Station - 2 Mt. Deseret, Maine*

1-16. Observe the north-south oriented bays on this coast line. The north-south bays represent glacial troughs that were deeply scoured by glaciers of the Laurentide Ice sheet. What is the name applied to these bays and how do they form? (hint: look up "drowned glacial valleys" in your text book)

## Part 2 - Lab Book Exercises

### Questions 1-16 is on page 287-289

Q.1, (hint: measure distance from Adria to present shoreline, divide by time)

Q.2,

Q. 3, (hint: is this area tectonically active?)

Q. 4,

Q. 5,

Q. 6,

Q. 7,

Q. 8,

Q. 9,

Q. 10, Explanation: this question refers to the two types of sediment shown in the map. If sand is one type, the other type should be found beneath the sand as it is deposited on top.

Q. 11, Think hurricane, high winds, and waves on this question.

Q. 12, hint: it's on the list of definition on p. 249.

Q. 13, hint: think about your answer in Q 12.

Q. 14,

Q. 15,

Q. 16, hint: think about our current climate condition and global glacier budget... are we currently under a relatively high sea level stand or low?

### Questions 17-21 is on page 292

Q. 17,

Q. 18,

Q. 19,

Q. 20, hint: think about hurricane force winds and storm surge

Q. 21, think about it

### Questions 22-24 is on page 294

Q. 22, All of these questions are analogous to the flood map questions we had a while back!

Q. 23,

Q. 24,