GE254 Geomorphology: The Final Examination

Please respond to ONLY FIVE of these question sets. Ask for assistance if you have trouble envisioning any of the Google Earth imagery!

You will find it will assist you greatly to organize your thoughts before you begin to write - scratch paper will be provided for this purpose, and you may discard or take this with you (no, it needn't be turned in). In all cases, please be as thorough but concise in your responses as you can. Please respond to all questions in complete sentences and proper English.

Please avoid cryptic notation such as "w/", "w/o", "b/c" etc.
It doesn't take THAT much additional work to write the words out properly, and makes it SO much easier to read what you've written 😊.

Please present all of your responses in the blue book(s) provided. And PLEASE try to remember that I can't give credit for anything I can't read! PLEASE label specific items on any photos from the exam to which you refer in your responses, such that there can be no question as to what you are discussing.

You have a space limit of two exam booklets for this exam, and it SHOULD be something you should be able to complete in two hours or so. However, if you need additional time, you can have it, but if you're still writing at three hours you should ask whether you are well-served by continuing longer.

Each question set is worth 40 points; the exam as a whole, then, is worth 200 out of your semester total.

"Perhaps the most valuable result of all education is the ability to make oneself do the thing one has to do, when it ought to be done, whether one likes it or not; it is the first lesson that ought to be learned [but] probably the last lesson that is learned thoroughly."

- T. H. Huxley
1. Compare and contrast thoroughly the coastal sediment dynamics of the New Jersey and southern California coasts, as discussed by Fabio Castiblanco and Molly Cox, respectively, in their class presentations. Include in your discussion the causal factors for erosion and/or deposition in each area, and what the net impacts have been in at least one specific area on each shore. Relate these studies to everything you can see in the Google Earth image of the coastline shown below. (That is an amusement park on a pier complex at the far right.) (40 points)

2. Compare and contrast 2:1 and 1:1 clays, based on both their chemistry and structure. Which are more likely to be created by chemical weathering processes in moist environments (e.g., the eastern U.S.A.), and which are more likely to be weathering products in seasonally dry climates such as those that characterize the American West, and why? Which is more likely to create structural problems for buildings, and result in greater landscape instability, and why? What is C.E.C., and why is it significant for both agriculture and the purification of subsurface waters in the geologic environment? (40 points)

3. What is loess, and what are two major geological environments that can yield sediment that ultimately will become loess? Identify five major reasons why loess is an outstanding parent material for rich agricultural soils. Sketch and relate the Hjulstrom graph on fluvial sediment transport and relate that to the character of the Yellow River (Huang He) of China, that originates in the loess
plateau of the Chinese interior, and is shown at Hukuo Falls in the photo below. (40 points)

4. What's are the major differences between till and outwash, and between end moraines and terminal moraines? How was Long Island formed in New York, and how did Drew relate this to the origin and history of Long Island Sound? How is the creation of Long Island differentiated from the formation of Cape Cod in Massachusetts? Relate these processes as much as you can to the formative history of the lake shown in the Google Earth image below.
5. Identify and describe each of at least three major different geomorphic features that you can identify in the oblique Google Earth image below, as if you were describing this to someone who was visually impaired. (The straight lines at the bottom of the image are roads.)

![Google Earth image](image)

6. Describe the processes involved in the solution of calcite-based limestone to produce karst environments, including the specific chemistry involved in the process. Don't forget to include the critical role that carbon dioxide plays in the environment in this discussion, and why caves form at or near the water table. What are five key factors in the geological substrate that will increase the likelihood of karst formation? What problems did Coron identify in the Johnson City, Tennessee, area that resulted from development in a karst area? What two major types of karst features did Erica discuss in her presentation on the karst of Guangxi Province in China?

7. Compare and contrast the impacts of the resisting framework to the driving forces acting to produce geomorphic change in THREE of the following areas discussed by your classmates (other than your own!):
   (a) Pleasantville, New York (Mary Furth)
   (b) Meriden, Connecticut (Gregory Naigles)
   (c) The Boundary Waters Canoe Area of northern Minnesota (Sam Sinkler)
   (d) The coastal environment of Guilford, Connecticut (Abby Cooper)
   (e) The Fall Line of South Carolina (Alicia Fischer)
   (f) The Green Mountains of Vermont (Alyson Churchill)
   (g) The hills and coast surrounding Halifax, Nova Scotia (George Hill)

8. Discuss the major points of two of the following in-class presentations (other than your own!):
   (a) Causes and Impacts of the Banda Aceh Tsunami (Don Whitcraft)
   (b) Effects of Wildfires on Southern California Chaparral Landscape Geomorphology (Julia Rogers)
   (c) Geomorphology and Possible Origins of the Carolina Bays (Kaci Kus)
   (d) Impacts of River Ice on Stream Geomorphology in New England (Jaime Craig)
9. Compare and contrast the two coasts shown in the Google Earth images below, in terms of ALL processes that are clearly active or that are reasonable to assume are active to create coastlines that look so different from each other.
10. Compare and contrast the dominant features you can see in the Google Earth images below, in terms of ALL processes that are clearly active or that are reasonable to assume are active, or that have clearly been active in the relatively recent past, to create features that look so different from each other. Note that in both images, north is to the top.
11. Discuss **thoroughly** all the processes that have been active in the past, and those that are currently active, to create and maintain the fluvial system shown in the figure below. Differentiate older from younger features when you are able to do so.

12. Discuss **thoroughly** all the processes that have been active in the past, and are currently active, to create and maintain the landform shown in the figure below. **DO** look closely – there is more here than is readily apparent at a quick glance. (The sharply defined white lines are roads; the large white area in the lower left corner is salt in a playa lake basin in this semi-desert environment.)