

OCEANOGRAPHY
Reading/Writing Assignments
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I. PLATE TECTONICS

Read: This Dynamic Earth: The Story of Plate Tectonics, online edition
Published by the US Geological Survey
online edition (.pdf) available at the following URL:
<http://pubs.usgs.gov/publications/text/dynamic.html>

Note: You should also review the tsunami animations found at:
<http://serc.carleton.edu/NAGTWorkshops/visualization/collections/tsunami.html>
and at: <http://www.noaanews.noaa.gov/stories2004/s2357.htm>

Other useful websites (optional):
<http://www.ngdc.noaa.gov/mgg/image/images.html#crustage>
<http://earthquake.usgs.gov/eqinthenews/2004/usslav/>

Follow the guidelines and grading scale guide provided in the course syllabus.

Writing Assignment:

Write an essay that describes the various processes involved in the formation of new seafloor (oceanic crust), its "trip" across an ocean basin, and ultimately its descent into a subduction zone. Along the way, this particular piece of oceanic crust was uplifted during an earthquake that released so much energy the seafloor was elevated 6 meters (nearly 20') above the surrounding seafloor. This caused a bulge of water to form at the surface, triggering a tsunami. If you want to include sketches/diagrams, they **MUST**: 1) be your own and not simply photocopied from books and/or the reading; 2) include your explanation of what the sketch/diagram is showing; and 3) not exceed one additional page.

Note: sketches and diagrams are not counted as part of your 1000 word limit.

II. STUDYING THE OCEANS FROM SPACE

Background:

This assignment is designed to help you appreciate how we can learn about the oceans from space. Rather than reading lengthy articles, it seems like the better way to get you to explore the different views of the ocean from space is for you to look at images—lots of them! The websites listed below contain excellent images and interesting background information about how to interpret the images and the kinds of data that we can and have obtained from orbiting satellites.

Assignment:

Spend 1-2 hours looking at images and exploring the websites listed below. Then, select 2 or 3 images that you especially liked and print them out in color. Your essay should describe the images you selected, how the images were collected (part of what program or name of satellite, or other similar kinds of information), and what they tell us about the part of the ocean shown in the image. Your essay should also **describe** how oceanography from space has contributed to advancing our ability to map the seafloor, trace ocean currents, assess coastal erosion, determine levels of biological productivity, monitor El Nino (using SeaWiFS for example, <http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/>), as well as other oceanographic processes.

Web Sites:

SeaWiFS: El Nino on a globe -

<http://svs.gsfc.nasa.gov/vis/a000000/a002000/a002087/index.html>

(note: more information on SeaWiFS and studying the oceans from space can be found at: http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/sanctuary_1.html)

Gulf Stream and warm eddy -

<http://fermi.jhuapl.edu/avhrr/gallery/sst/stream.html>

Shoreline changes following 2004 Indian Ocean tsunami -

http://www.digitalglobe.com/tsunami_gallery.html

Exploring the ocean basins with satellite altimeter data - David Sandwell and Walter Smith's map and background about how it was made - (note: HTML is case sensitive, must be uppercase) -

<http://www.ngdc.noaa.gov/mgg/bathymetry/predicted/explore.HTML>

Other web sites to check out:

Ocean explorer, for animations and QuickTime videos of the seafloor and seafloor features -

<http://oceanexplorer.noaa.gov/gallery/maps/maps.html>

Monterey Canyon and sediment transport events -
http://www.mbari.org/canyon/transport_events.htm

NASA's visible Earth, a catalog of NASA images and animations -
http://visibleearth.nasa.gov/view_set.php?categoryID=817

Interactive global map of sea floor topography based on satellite altimetry and ship depth soundings. Try using different zoom settings -
<http://ibis.grdl.noaa.gov/cgi-bin/bathy/bathD.pl>

III. ENSO EVENTS

Read:

1. "El Niño and La Niña: Tracing the Dance of Ocean and Atmosphere", National Academy of Sciences (provided to you as a handout)
2. El Niño featured link found from <www.pmel.noaa.gov> - Read 'The Basics'
3. La Niña featured link found from <www.pmel.noaa.gov> - Read 'What is La Niña?'

Note: 2 and 3 are sites maintained by NOAA's Pacific Marine Environmental Laboratory.

FOR THIS ASSIGNMENT, ONLY USE THE NOAA WEBSITE AND THE NATIONAL ACADEMY OF SCIENCE ARTICLE. DO NOT USE WIKIPEDIA!

Writing Assignment:

This assignment (two parts) is intended to help you become more knowledgeable about the atmospheric-ocean processes that lead to El Niño and La Niña events. While there are many Internet sites that provide information about El Niño and La Niña's, only use the sites identified in this assignment.

Part I:

Write an essay that addresses the following:

The El Niño record and years with strong El Niño's and its impact on global weather

El Niño and hurricane strength (for this, you can also read a recent press release issued by the National Science Foundation, found at: <nsf.gov/news/news_summ.jsp?cntn_id=108407>)

El Niño and climate change

El Niño and human health

Relationship between El Niño and La Niña (are they simply 'opposites'?)

Part II:

The development of an El Niño is based on temperature anomaly data and the intensity of the event is tracked by these data. This part of your assignment is designed to help you become familiar with Sea Surface Temperature (SST) Anomaly Charts. These charts can be found at: <www.osdpd.noaa.gov/PSB/EPS/SST/climo.html>

Write an essay that uses the SST data to describe differences between non-El Niño and El Niño years in the following regions:

Equatorial Pacific

West Coast of South America

Australia

Other locations of your choice

The best way to view and print out SST charts for your essay is to select similar dates for several consecutive years (for example, early January in five different years). In order for me to understand your essay, print out the SST charts (color or B/W) and attach them to your assignment.

I recommend that you use a color printer to do this part of the assignment. If you cannot find a color printer, print out the B/W version, and make notes directly on the B/W chart.

IV. COASTAL PROCESSES

READ:

"The Follies of Lotus Bay", chapter from *The Earth Around Us*

"Rising Sea Levels and Moving Shorelines" from *Oceanus*, v43, no.1

<http://www.whoi.edu/oceanus/viewArticle.do?id=2484>

Seiches on the Great Lakes

<http://www.geo.msu.edu/geo333/seiches.htm>

Other useful related reading:

Oceanography: An Invitation to Marine Science, chapter 12, Coasts

Follow the guidelines and grading scale guide provided in the course syllabus.

WRITING ASSIGNMENT:

You are a staff writer for the Hamburg *Sun* and have been asked by the managing editor to prepare a front-page story that describes dynamic processes that take place within the coastal zone. You need to educate your readers about shoreline dynamics in general, but you must balance this with 'local color' by describing the processes that influence beach width, bluff erosion, and sediment transport within the Lake Erie coastal zone within Erie County. Your editor reminds you that every story in the Hamburg *Sun* is a human-interest story so you must be sure to interview local residents and include quotes in your article. Your role as a journalist is to educate the general public about processes and issues that are relevant to this community, so you want to be sure to give sufficient background information about coastal processes in your article. You want your readers to have the necessary understanding to appreciate the dynamic processes and why residents need to be cognizant of the realities of living along the lakeshore.

Your article cannot exceed the 1000 word limit, but it can include sketches and/or figures, as long as they are described (captions) and are also referred to within the article (don't just attach them at the end of your essay).

SUGGESTIONS:

You want to write your essay in such a way that it combines the information you obtained from reading the three sources identified above. While focusing your essay on the local region (Lake Erie shoreline and Lotus Bay as an example of what is happening in many other shoreline areas), broaden your essay so that the readers appreciate that the processes at work in Lotus Bay are not unique--that what is

happening there helps us to better understand what is happening throughout the Great Lakes and that many of the processes shaping and modifying the shorelines in our region are the same operating along coastlines of the world. Also, do not confuse short-term lake level changes (caused by storms and strong winds piling up water on the eastern end of Lake Erie) with global changes in sea level related to climate change. The point is, as water level changes, the potential for erosion can significantly increase.

Note: sketches and figures are not counted as part of your 1000 word limit.

V. OCEAN RESOURCES

Read:

1. "The Catch" from the New York Times Magazine, October 23, 2005

2. <http://www.whoi.edu/oceanus/viewArticle.do?id=2468§ionid=1000>

Oceanus, "Down on the Farm ... Raising Fish"

[For an alternative point of view on ocean-farmed salmon: look over the ad in USA Today (October 12, 2005).]

3. Monterey Bay Aquarium website:

(http://www.mbayaq.org/cr/cr_seafoodwatch/sfw_of.asp). Navigate through this site, but at a minimum read the information included in the reading assignment handout ("Overfishing: There's a Limit to Fish in the Sea", "Bycatch: Fish and Animals Caught and Wasted", "Bycatch: Solving the Problem", "Aquaculture: Is Fish Farming the Answer?"). Also review the seafood choices included on the "Seafood Watch" Northeast Seafood Guide (2005)

4. Whales and DNA Testing. Check out the two summaries at:

<http://www.prnewswire.co.uk/cgi/news/release?id=20909> (DNA Detectives Prove Japan's "Scientific" Whaling Shelter Outlaw Trade Meat from Protected Species on Sale in Japanese Markets) and <http://www.abc.net.au/rn/science/earth/stories/s587772.htm> (Whales and DNA Testing).

Note: The scientific journal article often cited on this topic is attached to this assignment.

View Flash movie:

This funny Flash movie produced by the National Environmental Trust (<http://environet.policy.net>). A hip young couple is confronted with the choice of whether or not to eat a rather talkative Chilean sea bass.

Instructions for viewing:

Click on "Please Don't Eat Me!" (<http://environet.policy.net/marine/csb/flash/>)

Writing Assignment:

Janice Okun, Food Critic for the Buffalo News, is taking a much deserved vacation. You have been hired to fill in for Janice and need to prepare a column for the Food Section of the Sunday paper. You decide to take advantage of this opportunity to educate the readers of the Buffalo News about over-fishing and bycatch, why it may be time to take a pass on the 'catch of the day', and what some recommended seafood choices may be healthy alternatives to Chilean Sea Bass and Orange Roughy. Your article should also mention how DNA is being used to identify threatened or endangered species sold in retail whale meat markets.

VI. HARMFUL ALGAL BLOOMS

Read:

1. From *Oceanus*, read the following articles:

Volume 45, no 2, Building a Computer Model to Forecast Red Tides

Volume 43, no 1, The Growing Problem of Harmful Algae

Volume 43, no 1, A Fatal Attraction for Harmful Algae

Volume 43, no 1, Red Tides and Dead Zones

2. Other sources to check out:

<http://www.whoi.edu/redtide/>

<http://www.glerl.noaa.gov/pubs/brochures/IFYLE.pdf>

http://www.cop.noaa.gov/stressors/extremeevents/hab/habhrca/GL_fact_09-06.pdf

http://www.cop.noaa.gov/stressors/extremeevents/hab/habhrca/GoMEX-fact_03-06.pdf

Writing Assignment:

After reading the articles from *Oceanus* and reviewing the information on the websites and fact sheets, write an essay that describes what a HAB is, what factors contribute to producing HABs, what types of algae are found in HABs, and why HABs are a growing concern for marine coastal areas, the Gulf of Mexico, the Great Lakes, and around the world. Also describe monitoring and sampling efforts, and scientific studies, being undertaken to understand the causes and impacts of HABs.