

Ocean 420 Winter 2007
Project 7
Due: February 22

1. Wave machine (do not turn this one in)

Take a look at this website which predicts significant wave height given the wind speed, the duration and the fetch of a storm.

<http://www.pbs.org/wnet/savage seas/multimedia/wavemachine.html>

Check out how the significant wave height depends on the three parameters.

2. Surfs up!!

Go to the website http://cdip.ucsd.edu/?nav=recent&sub=nowcast&xitem=socal_now.

You are going to be looking at the most recent predicted regional swell height map for the Southern California area. Read the “description and FAQ” at

<http://cdip.ucsd.edu/?nav=documents&sub=faq&xitem=nowcast&xdoc=rec-nowcast> to

understand what the figure is telling you. Your answers will vary depending on the day.

So: be sure to write down the wave height, period and direction of incoming North and South Pacific waves as they are listed on the day you surf this site. This

information appears in a table in the upper right hand corner of the predicted wave height map.

- a) Either print out the wave-height pattern or give a detailed description of it. Explain why wave height has the spatial variation seen.
- b) If all these waves were generated by a single storm, do you expect the period of the waves to be longer or shorter tomorrow (i.e. 24 hours after you access the site)? Why?
- c) Assume that the storm that generated these waves was 5000 km away in the Pacific. How long ago were the waves generated? What would you predict for the wave period tomorrow at the same time? (Choose the North or South Pacific case.)

3. Waves at the beach.

A storm occurs off of the Washington coast in deep water and it generates 10s waves.

- a) What is the energy flux carried by a 1 m length of wave crest if it has amplitude of 50cm?
- b) At what depth will the wave start to behave like a shallow water wave?
- c) The wave approaches shore to a point where the depth is only 2 m. What would its amplitude be there?
- d) At what depth would you expect the wave to break?

4. Wave spectrum.

Take a look at the following three figures from Knauss, Figures 9.11, 9.12, and 9.13 and answer the following questions

- a) We are thinking of going out on Puget Sound for a day on our boat. We know that the wind speed will be about 7 m/s. The wind is coming from the south. I

know that I get seasick when we go out on Lake Washington when the wind is that strong. Using figure 9.13, estimate how much higher the waves will be in Puget Sound. Lake Washington is about 20 km long, while Puget Sound is about 100 km long. You may assume that the wind has been blowing for several days.

- b) Once again we are going out on Puget Sound, and we want to study a fully developed sea. Using Figure 9.12, how long should we wait after the beginning of a storm with wind speeds of 20 knots before we go out to study the wave spectrum?
- c) The next storm is huge and the winds are blowing at 30 knots. Will the sea on Puget Sound be fully developed in this case?