Graphing Tides

Instructor Notes

Martin B. Farley

Department of Geology & Geography

University of North Carolina at Pembroke

Pembroke, NC 28372

martin.farley@uncp.edu

(910) 521-6478

This activity serves two functions 1) giving students practice in making graphs and 2) introducing them to the importance of location in what tides you get (as opposed to what tides equilibrium or dynamic theory say you should get). The first of these is in some ways the most important as my experience is that students do not have enough facility with graphs. Once I recognized this, I started to put graph activities into all my classes as I described at GSA in 2012 (Farley, 2012).

Materials:

Graph paper. I have sometimes given students blank graph paper and sometimes graph paper with scales already labeled:

X-axis: days with subdivisions of AM and PM is sufficient time detail;

Y-axis: tidal level with zero above the x-axis. Some versions have a scale of about -1 to 10 ft on the left (most locations) and -1 to 40 ft on the right (for Joggins Wharf).

Having students figure out the axis scales takes my students considerably more time, so I more often use labeled axes.

Students can connect high and low tide points by eye or using a ruler.

Wilmington Beach (NC) is the tidal “official” name for the Carolina Beach/Kure Beach, NC region of coast.

I have now been to Joggins and have pictures of the shore at low tide and a couple of hours after to show the students.

Comments on Student Performance

My students have some trouble getting their minds around how the times of the tides (given in the data to the nearest minute) would fit in a graph paper block or two that holds 12 hours (am or pm). I had thought the gross level of approximation would be easier, but it isn’t the case in my experience.

Assessment

The spreadsheet includes a tab for the Galveson Pleasure Pier. This, like Pensacola, is a Gulf of Mexico diurnal location, but we can see on these data that there are a couple of shoulders on the diurnal transition to low tides. These are the semi-diurnal forcing peeking through.

I ask students to graph the 5-day data and identify the dominant tidal type. Then I ask if there anything different from the dominant type and what it might suggest.

Explanation of tabs in Tide exercises.xlsx

4 locations for 226

Data for students for all four locations for Oceanography formatted to print conveniently on one landscape sheet

All four graphs

The graphs that result for the main locations

115 am-pm with instructions

Data for students for all locations for general education Earth Science class (where each group gets one location) formatted to print conveniently. I have found it works best for this version to have the instructions directly on the data sheet.

4 locations for 115

Data for students for all locations for Earth Science (where each group gets one location) with time on 24-hour clock. After experimentation with various classes, I have found am-pm works better.

4 locations for 115 am-pm

Data for students for all locations for Earth Science (where each group gets one location) with time on 24-hour clock. Version without instructions on sheet.

Wilmington Beach, Pensacola, Seattle, Joggins Wharf

Data for each place and individual graph

Galveston, Galveston 2 week

Data for a diurnal location that shows the semi-diurnal forcing peeking through. I’ve used Galveston data for exams (see above).

References

Farley, M.B**.**, 2012, Let's Graph Some Data! Increasing Student Facility with Graphs in Geology Courses [abstr.]: Geological Society of America, Annual Meeting, Abstracts with Programs, v. 44 (7), p. 102.

As the Excel spreadsheet notes, I got these values from the WWW Tide Predictor at <http://tbone.biol.sc.edu/tide>.