

Storm Surges and Seiches - Lesson 2 Activity: Impacts Part 4 Data sheet (Key)

The graphs below illustrate a seiche in Lake Ontario between Olcott, New York and Cape Vincent, New York on November 13-14, 2003. The horizontal red line on November 12 and 15-18, 2003 represents the 'normal' water level (Round answers to the nearest 0.1).

Google map – Olcott, NY and Cape Vincent, NY



- 1. What is the normal average water level at Olcott, New York? 74.6 meters (244.8 feet)
- 2. What is the normal average water level at Cape Vincent, New York? **74.6 meters (244.8 feet)**
- At Olcott, New York, what is the highest water measurement? 74.7 meters (245.1 feet) What time did the high water measurement occur? November 13, 2003 12am
- 4. At Olcott, New York, what is the lowest water measurement? 74.4 meters (244.1 feet) What time did the low water measurement occur? November 13, 2003 12pm



- 5. What is the time difference between high and low water measurements? **12 hours**
- At Cape Vincent, New York, what is the highest water measurement? 75.1 meters (246.4 feet) What time did the high water measurement occur? November 13, 2003 12pm
- At Cape Vincent, New York, what is the lowest water measurement? 74.5 meters (244.4 feet) What time did the low water measurement occur? November 13, 2003 6pm
- 8. What is the time difference between high and low water measurements? 6 hours
- 9. What is the difference in depth between the highest measurement at Olcott and Cape Vincent? **0.4 meters (1.3 feet)**
- 10. What is the difference in depth between the lowest measurement at Olcott and Cape Vincent? **0.1 meters (0.3 feet)**
- 11. Why was the difference in the highest measurements greater than the lowest measurements?

Winds associated with storms typically move from west to east. The higher water level on November 13 at Cape Vincent is caused by a storm surge created by strong winds from the west (from November 13 at 5 a.m. to November 14 at 12 a.m., winds were primarily from the west and speeds ranged from 9 to 19 miles per hour with gusts up to 23 mph).

TEACHING WITH GREAT DATA LAKES







- 12. Use the Cape Vincent USGS topographic map and Google Earth image to complete the tasks and answer the questions below.
 - Find the 260 foot contour line on the map and label the same location on the Google Earth image. (Hint: Use road visible on both the USGS map and Google image as a guide.)
 - Label the fish hatchery (labeled on the Cape Vincent North topographic map) on the Google Earth image.
 - Draw a topographic profile of the area from the lake to the fish hatchery. Draw the profile starting at the shore and ending at the fish hatchery.
 - Could a storm cause flooding at Cape Vincent? Use USACE historical water levels and storm probability tables to get data.

Lake Ontario water level record high is 75.8 meters (248.6 feet). According to the USACE storm probability tables there is a 1 percent chance of a 0.6 meter (1.9 foot) storm surge. The contour line at the Cape Vincent, NY shoreline is 76.2 meters (250 feet). A 0.6 meter (1.9 foot) storm surge would raise the record high water level to 76.4 meters (250.5 feet). (See breakwater visible on Google Earth image.)

Cape Vincent, NY breakwater – additional information http://chl.erdc.usace.army.mil/Media/4/4/2/TechReport3eF.pdf



Topographic map of Cape Vincent, NY



Google Earth image – Cape Vincent, NY





Example topographic profile





USACE Lake Ontario - Historical water levels

H DE	TRON	[DIS	TRIC	ĊΤ.								
United States Army	Corps of Engin	eers										
R Return To The Pre	vious Page ater Level Ta	able for La	ake Ontari	o								
Lake Ontario: 1980-1990 (Meters, IGLD 1985)	1											
				His	toric Great L	akes Water	Levels					
Year	Jan	Feb	Mar	Арг	llay	Jun	Jul	Λug	Sep	Oct	Nov	Dec
1980	74.60	74.61	74.60	74.99	75.14	75.13	76.12	75.08	74,88	74.66	74.55	74.54
1961	74.51	74,51	74.75	74.74	74.64	74.95	75,01	74,98	74.93	74.00	74,76	74.65
1982	74.59	74.62	74.62	74.91	75.00	75.07	75.03	74.85	74.71	74.58	74.53	74.54
1983	74.64	74.76	74.77	74.87	75.15	75,17	75.00	74.92	74.79	74.64	74.53	74.82
1984	74.73	74.76	74.90	75.12	75.30	75.32	75.21	75.02	74.82	74.63	74.52	74.49
1985	74,66	74.63	74.55	75.09	75.10	75.17	75.11	74.93	74.50	74.64	74.67	74.79
1986	74.90	74.98	75.06	75.29	75.29	75.34	75.33	75.25	75.11	75.16	75.04	75.02
1987	75.00	75.04	75.00	75.21	75.13	75.42	74.93	74.75	74.62	74.51	74.44	74.54
1988	74.53	74.59	74.59	74.75	74.88	74.92	74.65	74.00	74.65	74.50	74.54	74.45
1989	74.42	74.43	74.39	74.70	74.95	75.22	75.19	75.02	74.84	74.70	74.65	74.58
1990	74,54	74.62	74,77	74.98	75.11	75.14	76.01	74.87	74.78	74.64	74.82	74.65
Record High	75.16	75.27	75.37	75.65	75.73	75.76	75.65	75.50	75.41	75.22	75.50	75.20

USACE Storm probability tables – Cape Vincent, NY

H DET	ROIT DISTR	ICT			
United States Army Corp	ps of Engineers				
Return To The Previous	s Page				
Lake Ontario at Ca	pe Vincent, NY				
Possible Storm Induced Rise	s (in feet)				
		Probability of	Exceedance		
Month	20%	10%	3%	25	1%
January.	1.00	1.20	1.40	1.50	1.70
February	0.90	1.10	1.50	1.60	1.90
March	0.50	1.00	1.20	1.30	1.50
April	0.80	0.90	1.20	1.20	1.40
May	0.60	0.70	0.80	0.90	0.90
June	0.50	0.60	0.50	0.90	1,00
July	0.50	0.60	0.70	0.80	0.90
August	0.50	0.60	0.70	0.80	0.8.0
September	0.70	0.00	1.00	1.10	1.20
October	0.60	1.90	1.10	1,10	1.10
November	1.00	1.20	1.60	1.70	1.90
December	1.10	1.50	1.50	1.60	1.80