

## PART 1: D\_Volcano Volumes

At the end of the activity, each group member will turn in:

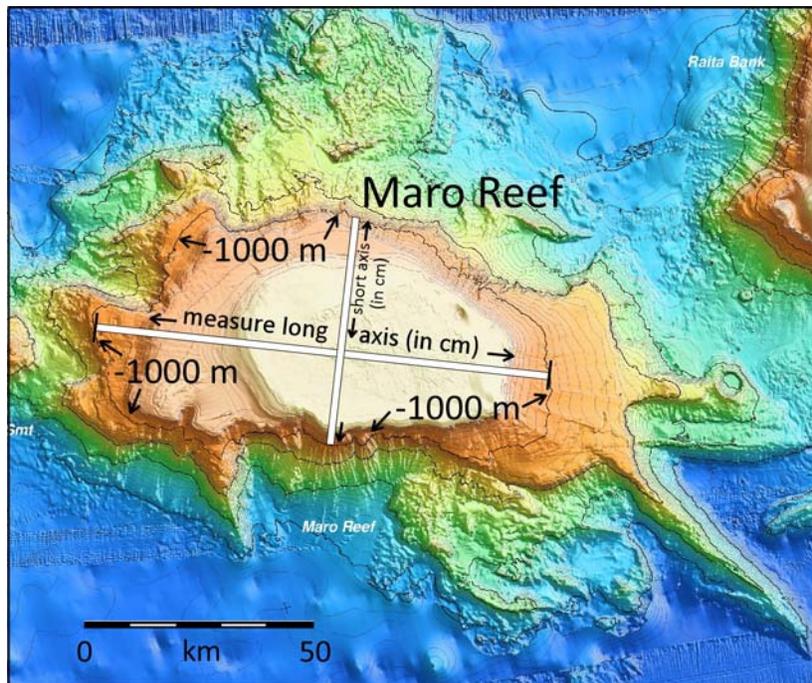
1. One completed table of Volcano Volumes for Hawaiian Ridge Volcanoes.
2. One graph with plotted Volcano Volume versus Distance from Kīlauea.
3. Complete discussion question below.

### Overview

- You will estimate the volume of complexes of volcanoes of the Hawaiian Ridge.
- After you share your results with your group members, you will plot Volcano Volume versus Distance from Kīlauea for the Hawaiian Ridge.
- Finally you will discuss with your group possible explanations for the variation in Volcano Volume along the Hawaiian Ridge.

### Directions and Questions

1) **COMPLETE TABLE PROVIDED:** Each group member should complete one section of the table of **Volcano Volumes for Hawaiian Ridge Volcanoes**. Each group member should select one section of the ridge, or you can team up and do these in pairs. For the measurements of **Long axis** and **Short axis (Example shown in figure below)**, make the measurements with a metric ruler using the large strip map. Once you have measured Long and Short axis lengths, you can complete the other columns using a calculator to estimate volcano volumes. Share the results from your section with your group members **so each group member has a completed table.**



[\*\***Estimating Long and Short axis length**-with your ruler measure the longest and shortest horizontal dimensions of the volcano (or island) at a depth of 1000 m below sea level. That is, where the longest and shortest dimensions of the volcano intersect the **-1000 m contour line.**\*\*]

[\*\*\***For measurements for the Main Hawaiian Islands**- measure long and short axis lengths for the whole island, **not individual volcanoes**. For O'ahu, Moloka'i and Lāna'i-Maui measure long and short axis lengths at depths indicated on table, not -1000 m.]

2) **COMPLETE GRAPH PROVIDED:** Once the table is completed, each group member will plot the Volcano Volume on the graph provided of Volcano Volume ( $\text{km}^3$ ) versus Distance from Kīlauea (km). After all of the Volcano Volumes are plotted, draw a smooth line connecting all of the data points.

3) What you have just accomplished is to have calculated how the volume of the volcanoes and islands of the Hawaiian Ridge have changed over time.

—What may be **TWO** possible causes of the variation in the Volcano Volumes for the Hawaiian Ridge?

*[Hint: Look at the Pre-activity reading for ideas]*

Discuss the variation in your graph with your group members.

4) **Summarize your observations and ideas in several sentences** below, and list **TWO** possible **explanations** for the variation in the Volcano Volumes for the Northwestern and Main Hawaiian Islands of the Hawaiian Ridge.

**VOLCANO VOLUMES FOR HAWAIIAN RIDGE VOLCANOES**

#	Volcano name	Long axis	Long axis (kilometers)	Short axis	Short axis (kilometers)	Volume (km <sup>3</sup> )	Dist. from Kilauea (km)
		measure on map cm	calculate cm (on map) x 4 = km (on ground)	measure on map cm	calculate cm (on map) x 4 = km (on ground)	calculate $V=4/3 \pi$ (long x short) x 4 km depth	
Northwest Hawaiian Islands	1	Academician Berg					2608
	2	Turnif					2586
	3	Kure					2543
	4	Nero					2492
	5	Midway					2447
	6	Ladd					2391
	7	Salmon Bank					2316
	8	Pearl & Hermes					2293
	9	Bank 9					2265
	10	Kilo Moana					2114
	11	Lisianski					2052
Northwest Hawaiian Islands	12	Pioneer Bank					1998
	13	W. Northampton					1886
	14	E. Northampton					1846
	15	Laysan					1831
	16	Maro					1747
	17	Raita					1611
	18	Gardner					1449
	19	West St. Rogatien					1365
	20	St. Rogatien Bank					1339
	21	Brooks Bank					1302
Northwest Hawaiian Islands	22	Kānehunamoku					1235
	23	French Frigate Shoals					1230
	24	Mokumanamana					1080
	25	Keoea					963
	26	Twin Banks					920
	27	Westpac Bank					871
	28	Nihoa					810
	29	Middle Bank					702
Main Hawaiian Islands	30	Ni'ihau					565
	31	Kaua'i					519
	32	O'ahu (at -400 m)					357
	33	Moloka'i (at -400 m)					268
	34	Lāna'i-Maui (-200 m)					202
35	Hawai'i					64	

\*\*\* For measurements for Main Hawaiian Islands, measure long and short axes for whole island, not individual volcanoes.

Volume =  $4/3 \pi$  (long x short) x 4 km depth

