

The Geology of Pacific Northwest Volcanoes, Mountains and Earthquakes

GEO142 Online Activity 4: Columbia River Basalt Group

Part I. Watch the video and consider the different aspects of the Columbia River Basalt Group eruptions. Think about the igneous processes presented in Chapter 5 of your text book.

1. (5 pts) After you watch the videos, submit a discussion “Thread.” There is an instructional pdf that I provide on the web page for this Online Activity to help one remember how to submit a discussion “Thread” and then later to submit a comment “Post.” Here is a link to that document:

http://www.science.earthjay.com/instruction/chemeketa/2015_spring/GEO142/online_activities/GEO142_online_activity_discussion_instructions.pdf

Write about three important facts that you learned from the video.

The **deadline** to submit a discussion thread is 4/24/2015 at midnight.

2. (5 pts) Select two discussion threads (from your fellow students) to read.

Read those discussion threads and make a constructive comment using a “Post” to one of the threads.

The **deadline** to make a comment is 4/27/2015 at 2 PM.

Part II. (10 pts) The table below lists the areal extent (km^2), the volume (km^3), the volume percent (the percent that the flow comprises of the total of all the CRB volume), the estimated number of flows, the average volume per flow (km^3), and the Isotopic Age (Ma; based upon radioactive half-lives) for the Columbia River Basalt Group Units. I provide two grids for you to plot these data upon. One is a linear-linear plot (both the horizontal and vertical scales are linear scales) and one is a log-linear plot (the horizontal scale is linear and the vertical scale is logarithmic). Print out the grid sheets. We will be plotting only the CRBGs that have age data in the table.

Here is a link to the grid paper to turn in:

http://www.science.earthjay.com/instruction/chemeketa/2015_spring/GEO142/online_activities/activity_04/GEO142_online_activity_4_grid_plots.pdf

1. (2.5 pts) Use the linear-linear grid. Plot the Volume (km^3) on the vertical axis and the Age (Ma) on the horizontal axis. Use points as your plotting style. Label the axes and label the points for which CRBG the point stands for.

2. (2.5 pts) Use the log-linear grid. Plot the Volume (km^3) on the vertical axis and the Age (Ma) on the horizontal axis. Use points as your plotting style. Label the axes and label the points for which CRBG the point represents.

3. (5 pts) In the space given below the grids, shortly discuss the advantages and/or disadvantages of both the linear-linear and log-linear plots.

Turn in these plots at our next class meeting.

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TABLE 3. REVISED ESTIMATES OF THE PHYSICAL DIMENSIONS OF CRBG UNITS*

CRBG Unit	Areal Extent (km ²)	Volume (km ³)	Volume Percent	Est. Number of Flows	Average Volume per Flow (km ³)	Isotopic Age (Ma)
Saddle Mountains Basalt						
Lower Monumental Member	430	15	0.01	1	15	6
Ice Harbor Member	2150	75	0.04	4	19	
Buford Member	580	20	0.01	1	20	10.5
Elephant Mountain Member	13,450	440	0.25	2	220	
Pomona Member	20,550	760	0.44	1	760	12
Esquatzel Member	2710	70	0.04	1	70	
Weissenfels Ridge Member	1210	20	0.01	4	5	
Asotin Member	6440	220	0.13	1	220	
Wilbur Creek Member	3090	70	0.04	2	35	
Umatilla Member	15,110	720	0.41	2	360	
Composite Saddle Mountains	30,570	2410	1.38	19	127	
Wanapum Basalt						
Priest Rapids Member	57,300	2800	1.60	3	933	14.5
Roza Member	40,350	1300	0.74	4	325	
Frenchman Springs Member						
basalt of Lyons Ferry	5900	90	0.05	1	90	15.3
basalt of Sentinel Gap	38,760	1190	0.68	4	297	
basalt of Sand Hollow	67,110	2660	1.52	7	380	
basalt of Silver Falls	28,840	710	0.41	4	177	
basalt of Ginkgo	37,170	1570	0.90	4	392	
basalt of Palouse Falls	8890	190	0.12	1	190	
Composite Frenchman Springs	69,740	6410	3.68	21	305	
Eckler Mountain Member	6090	170	0.10	8	21	
Composite Wanapum	95,950	10,680	6.12	36	297	
Grande Ronde Basalt						
N ₂ Grande Ronde Basalt	114,460	27,900	16.00	33	845	15.6
R ₂ Grande Ronde Basalt	117,730	53,100	30.46	45	1180	
N ₁ Grande Ronde Basalt	102,340	31,400	18.01	15	2093	16.5
R ₁ Grande Ronde Basalt	96,650	36,200	20.76	27	1340	
Composite Grande Ronde	149,000	148,600	85.23	120	1238	
Prineville Basalt	11,440	590	0.34	8	74	
Picture Gorge Basalt	10,680	2400	1.38	61	39	
Imnaha basalt	50,200	9500	5.45	26	365	17 - 16.5
Craigmont member	280	6	0.003	1	6	
Swamp Creek member	140	3	0.002	1	3	
Grangeville member	520	11	0.006	1	11	
Icicle Flat member	350	7	0.004	1	7	
basalt of Feary Creek	60	1	0.0005	3	0.33	
Onaway member	370	7	0.004	2	3.5	
basalt of Cuddy Mountain	70	1	0.0005	4	0.25	
Weiser basalt	2130	140	0.080	28	5	
CRBG—TOTALS	163,700	174,356	100	311	561	17 - 6

*Number of flows within units taken from the following sources:

Lower Monumental Member—Swanson and others, 1979b
Ice Harbor Member—Heiz, 1978
Buford Member—Ross, 1978
Elephant Mountain Member—Swanson and others, 1979b; Reidel and Fecht, 1981
Pomona Member—Swanson and others, 1979b, 1981
Esquatzel Member—Swanson and others, 1979b; Reidel and Fecht, 1981
Weissenfels Ridge Member—Hooper and others, 1985; Reidel and others, 1989
Asotin Member—Swanson and others, 1979b; Reidel and Fecht, 1987
Wilbur Creek Member—Swanson and others, 1979b; Reidel and Fecht, 1987
Umatilla Member—Swanson and others, 1979b; Reidel and Fecht, 1981
Roza Member—Martin, 1987
Frenchman Springs Member—Beeson and others, 1985
Eckler Mountain Member—Swanson and others, 1979b; Hooper and Swanson, 1989

Grande Ronde magnetostratigraphic units—Reidel and others, this volume
Prineville basalt—J. L. Anderson and M. H. Beeson, unpublished data; Smith, 1986
Picture Gorge Basalt—Bailey, 1986
Imnaha Basalt—Hooper and others, 1984
Craigmont, Swamp Creek, Grangeville, Icicle Flat, Onaway members and basalt of Feary Creek—Camp, 1981
basalt of Cuddy Mountain and Weiser basalt—Fitzgerald, 1984
Sources used to compile isotopic ages:
Lower Monumental, Elephant Mountain, and Pomona Members—McKee and others, 1977
Priest Rapids Member—Rockwell Hanford Operations, unpublished data, 1982
basalt of Sand Hollow—Beeson and others, 1985
Grande Ronde Basalt—Long and Duncan, 1983
Imnaha Basalt—McKee and others, 1981