

# The Geology of Pacific Northwest Volcanoes, Mountains and Earthquakes

## GEO143 Online Activity 4: Columbia River Basalt Group

**Part I.** (10 pts) 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.

After you watch the videos, write a 2 page paper and email to the instructor.

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

**Part II.** The table below lists the areal extent ( $\text{km}^2$ ), the volume ( $\text{km}^3$ ), 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 ( $\text{km}^3$ ), 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/GEO143/online\\_activities/activity\\_04/GEO143\\_online\\_activity\\_4\\_grid\\_plots.pdf](http://www.science.earthjay.com/instruction/chemeketa/2015_spring/GEO143/online_activities/activity_04/GEO143_online_activity_4_grid_plots.pdf)

1. (2.5 pts) Use the linear-linear grid. Plot the Volume ( $\text{km}^3$ ) 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 ( $\text{km}^3$ ) 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 (or on the back side of the paper), shortly discuss the advantages and/or disadvantages of both the linear-linear and log-linear plots.

The **deadline** for this lab is 5/26/2015 at 6 PM.

# The Geology of Pacific Northwest Volcanoes, Mountains and Earthquakes

## GEO143 Online Activity 4: Columbia River Basalt Group

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

CRBG Unit	Areal Extent (km <sup>2</sup> )	Volume (km <sup>3</sup> )	Volume Percent	Est. Number of Flows	Average Volume per Flow (km <sup>3</sup> )	Isotopic Age (Ma)
<b>Saddle Mountains Basalt</b>						
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	
<b>Composite Saddle Mountains</b>	<b>30,570</b>	<b>2410</b>	<b>1.38</b>	<b>19</b>	<b>127</b>	
<b>Wanapum Basalt</b>						
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	
<b>Composite Frenchman Springs</b>	<b>69,740</b>	<b>6410</b>	<b>3.68</b>	<b>21</b>	<b>305</b>	
Eckler Mountain Member	6090	170	0.10	8	21	
<b>Composite Wanapum</b>	<b>95,950</b>	<b>10,680</b>	<b>6.12</b>	<b>36</b>	<b>297</b>	
<b>Grande Ronde Basalt</b>						
N <sub>2</sub> Grande Ronde Basalt	114,460	27,900	16.00	33	845	15.6
R <sub>2</sub> Grande Ronde Basalt	117,730	53,100	30.46	45	1180	
N <sub>1</sub> Grande Ronde Basalt	102,340	31,400	18.01	15	2093	16.5
R <sub>1</sub> Grande Ronde Basalt	96,650	36,200	20.76	27	1340	
<b>Composite Grande Ronde</b>	<b>149,000</b>	<b>148,600</b>	<b>85.23</b>	<b>120</b>	<b>1238</b>	
<b>Prineville Basalt</b>						
	11,440	590	0.34	8	74	
<b>Picture Gorge Basalt</b>						
	10,680	2400	1.38	61	39	
<b>Imnaha basalt</b>						
	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	
<b>CRBG—TOTALS</b>	<b>163,700</b>	<b>174,356</b>	<b>100</b>	<b>311</b>	<b>561</b>	<b>17 - 6</b>

\*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, 1987  
 Priest Rapids 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