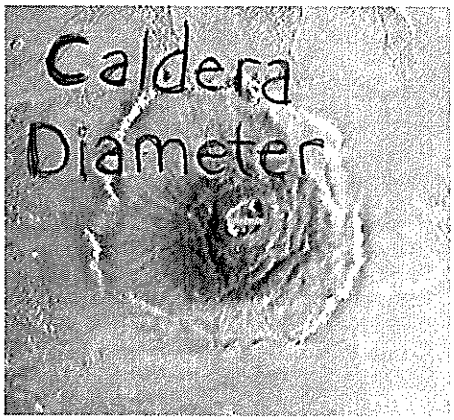
Introduction

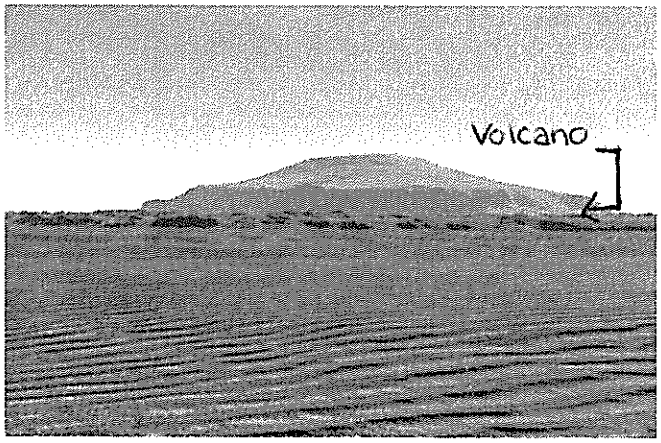
Our Mercury Mine MSIP team has been working since 2011 to complete the MSIP program. Our question is: *How does the diameter of the caldera affect the height of the volcano?* This is important because if we find that there is a connection between the two, it could be used as a tool for scientists studying volcanoes. This could lead to a new discovery pertaining to volcanoes. Our hypothesis was that there is no connection between the caldera diameter and the volcano height.

Background

We looked at caldera diameters and volcano heights on Mars.

See p9. 5-9





A volcano is a rupture in the crust of Mars from which smoke, magma, and volcanic ash erupt. Even though many scientist are studying volcanoes on Mars, we are not aware of anyone else who is studying the exact same thing as we are.

We think that volcanoes on Earth form the same way that volcanoes on Mars form. Volcanoes form by the magma piling on top of other layers of magma from previous eruptions.

Methods

We used the THEMIS camera on the Mars Odyssey spacecraft to target our primary and secondary images.

This is the process that we used to answer our question:

1. select an area to work with
2. find a specific volcano to work with
3. measure the caldera diameter (North - South) using Jmars
4. measure the caldera diameter perpendicular to step 3
5. average the two measurements
6. measure the volcano height (North - South) using Jmars
7. measure the volcano height perpendicular to step 6 using Jmars

8. average the two measurements
9. determine the ratio of the caldera diameter to the height of the volcano
10. repeat steps for all areas you are working with

Websites:

Jmars - www.Jmars.com

Google Mars - www.GoogleMars.com

ASU Mars Space Facility- www.themis.asu.edu

Books

dictionaries
books about Mars
other informational books

Data

We collected two images. We took one primary image and one secondary image.

See pg. 1-4

Image ID #	Latitude (N)	Longitude (E)	Diameter	Height	Ratios

Discussion

Based on the data in the above data section we found that:

- 19 volcanoes were measured
- 13 were different measurements
- one or two volcanoes were different than the others
- some volcanoes could have erupted more than once
- certain areas we measured had a similar measurements for height and diameter

Throughout our process, we made a few mistakes. Some examples are, we were mostly focused in the northern hemisphere, calderas are not always formed perfect circles, (average diameter could be off), reversed latitude and longitude (3x), and reversed meters and kilometers (fixed later.)

Conclusion

Our original hypothesis is that there is no connection between the height of a volcano and the caldera diameter. After our trip to ASU,we found out that there is a connection between the height of a volcano and the caldera diameter This may lead to future investigations ex: Future Astronauts, trips to Mars, and looking inside of magma chambers.

Acknowledgements:

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Jeff Collins

References

THEMIS
www.Themis.asu.edu
Google Mars
www.google.com/mars
NASA
www.nasa.gov
MSSS
www.msss.com/msss_images/subject/volconoes.html

Bibliography

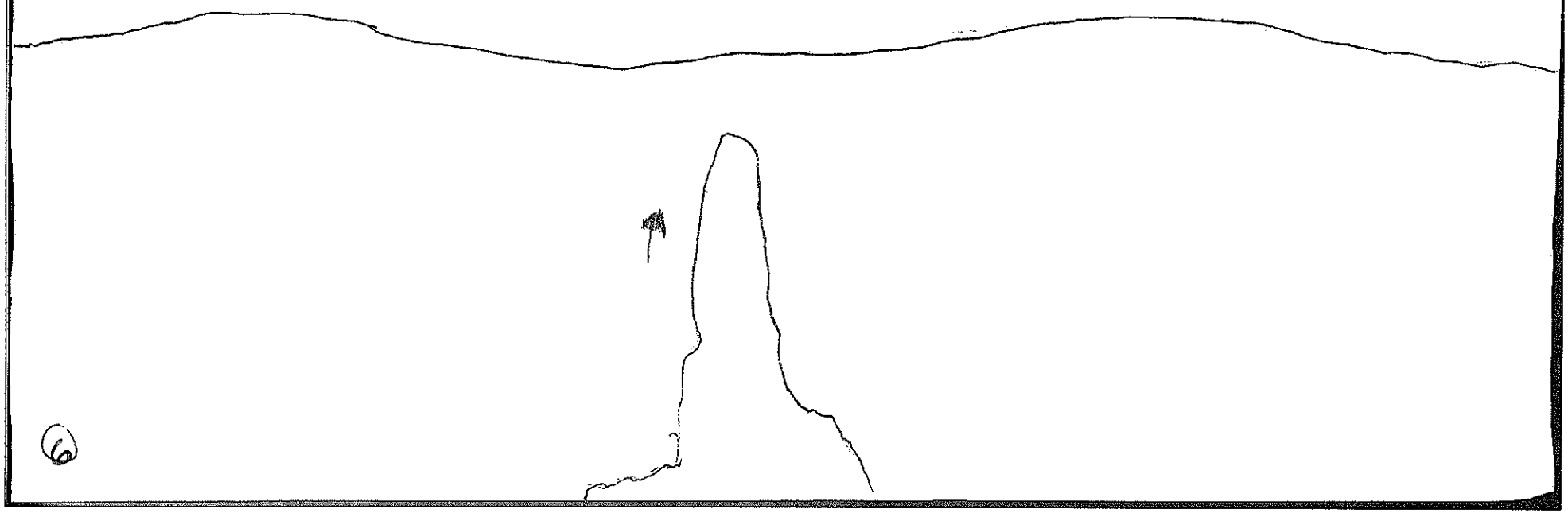
"Olympus Mons." *blogspot*. N.p., n.d. Web. 10 May 2012. <4.bp.blogspot.com/_qEyew0gVMFA/TS>

"Olympus Mons." *wikimedia*. N.p., n.d. Web. 10 May 2012. <upload.wikimedia.org/wikipedia/commons/thumb/0/00/Olympus_Mons_alt.jpg/220px-Olympus_Mons_alt.jpg>.

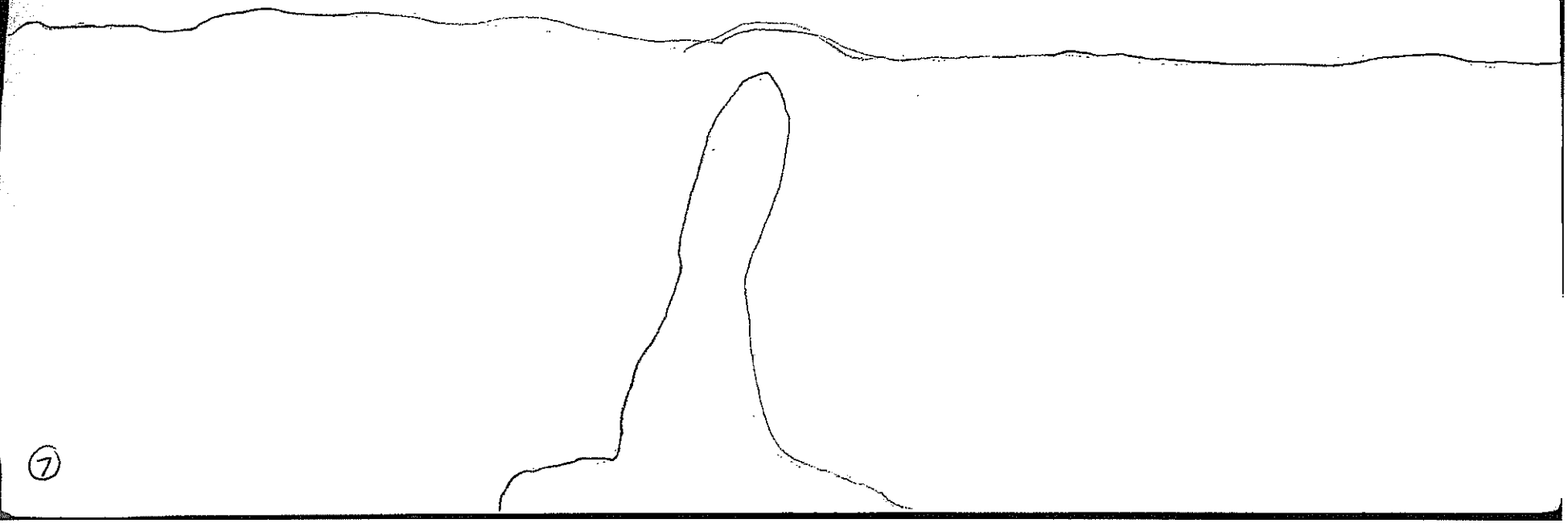
Magma builds in chamber.

(5)

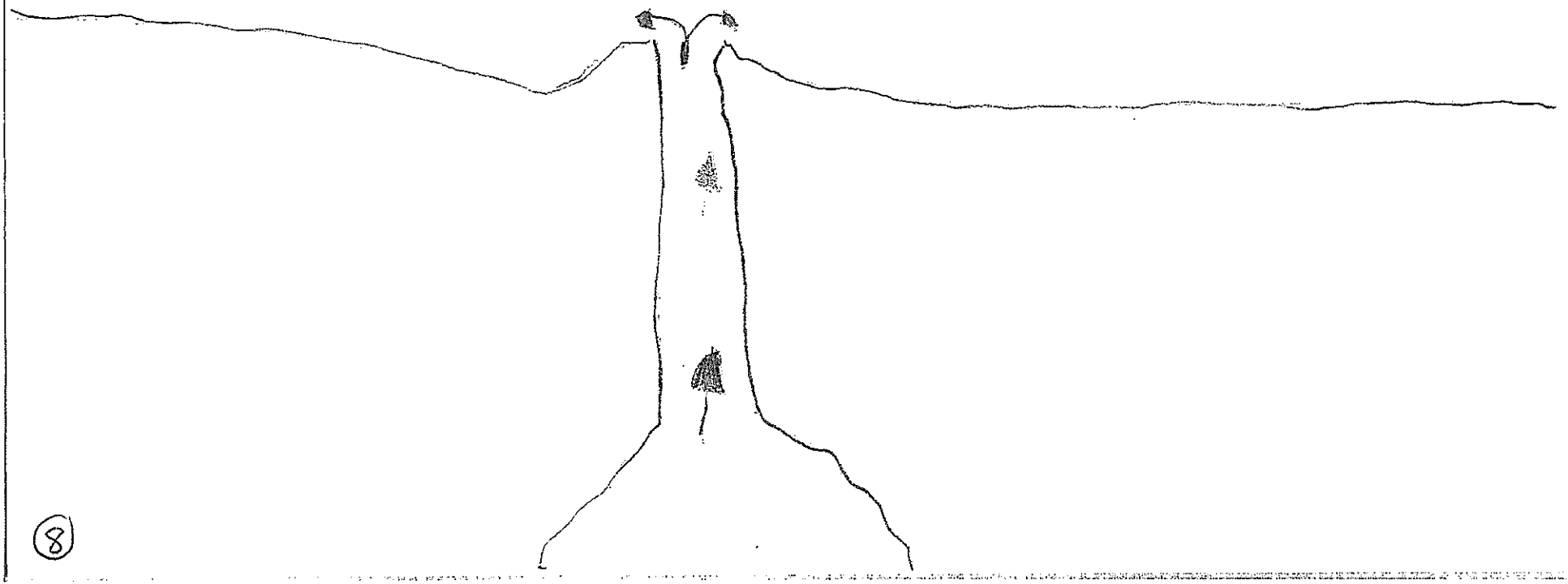
pressure continued to push magma upward.



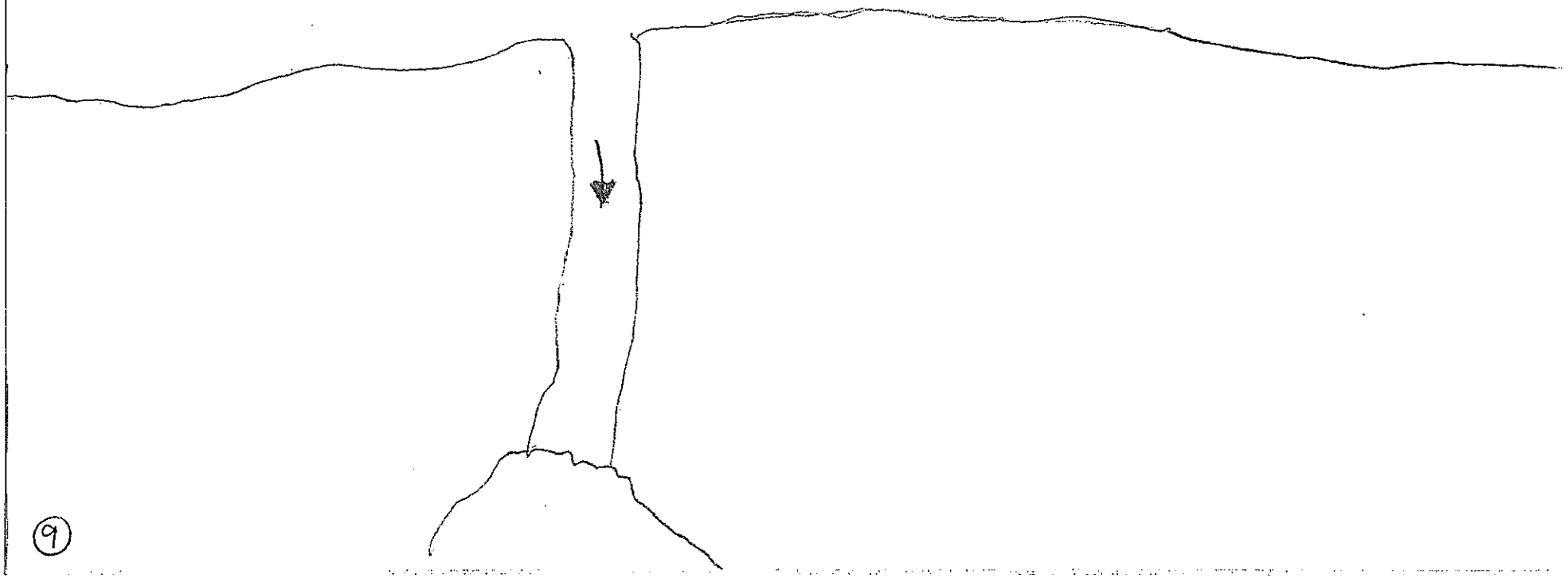
Pressure continues to build.



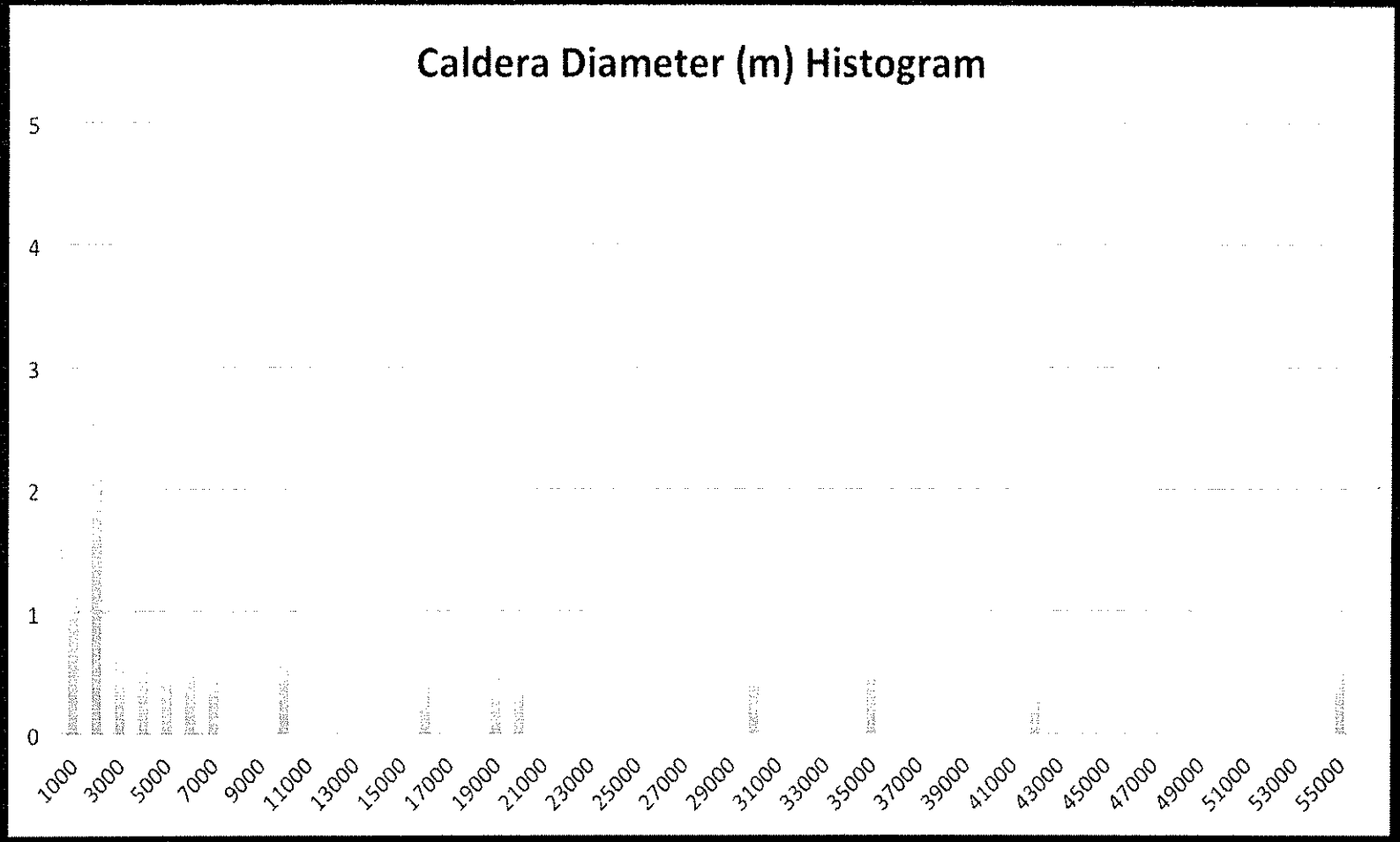
The volcano erupts



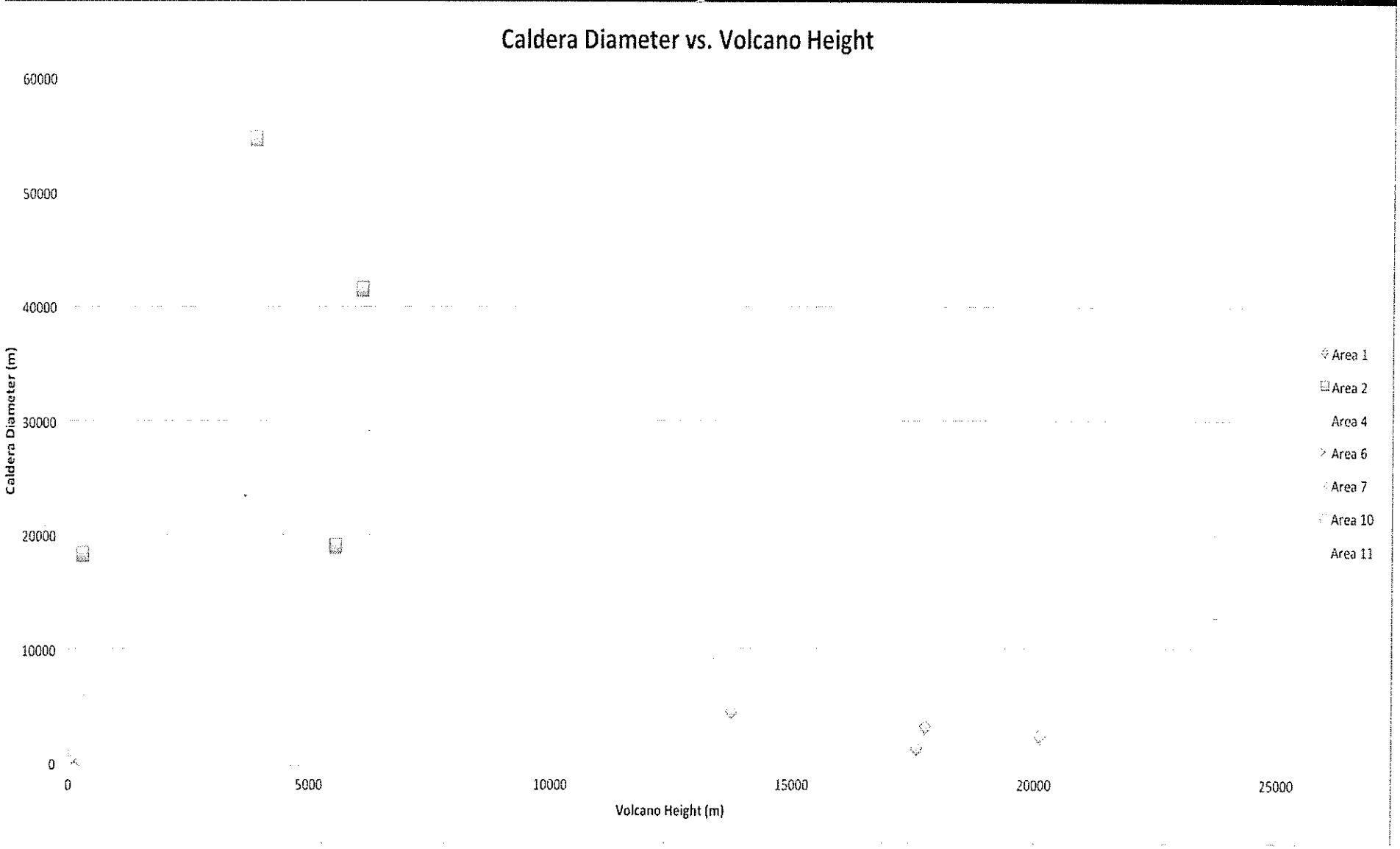
Magma retreats and volcano is formed due to collapse.



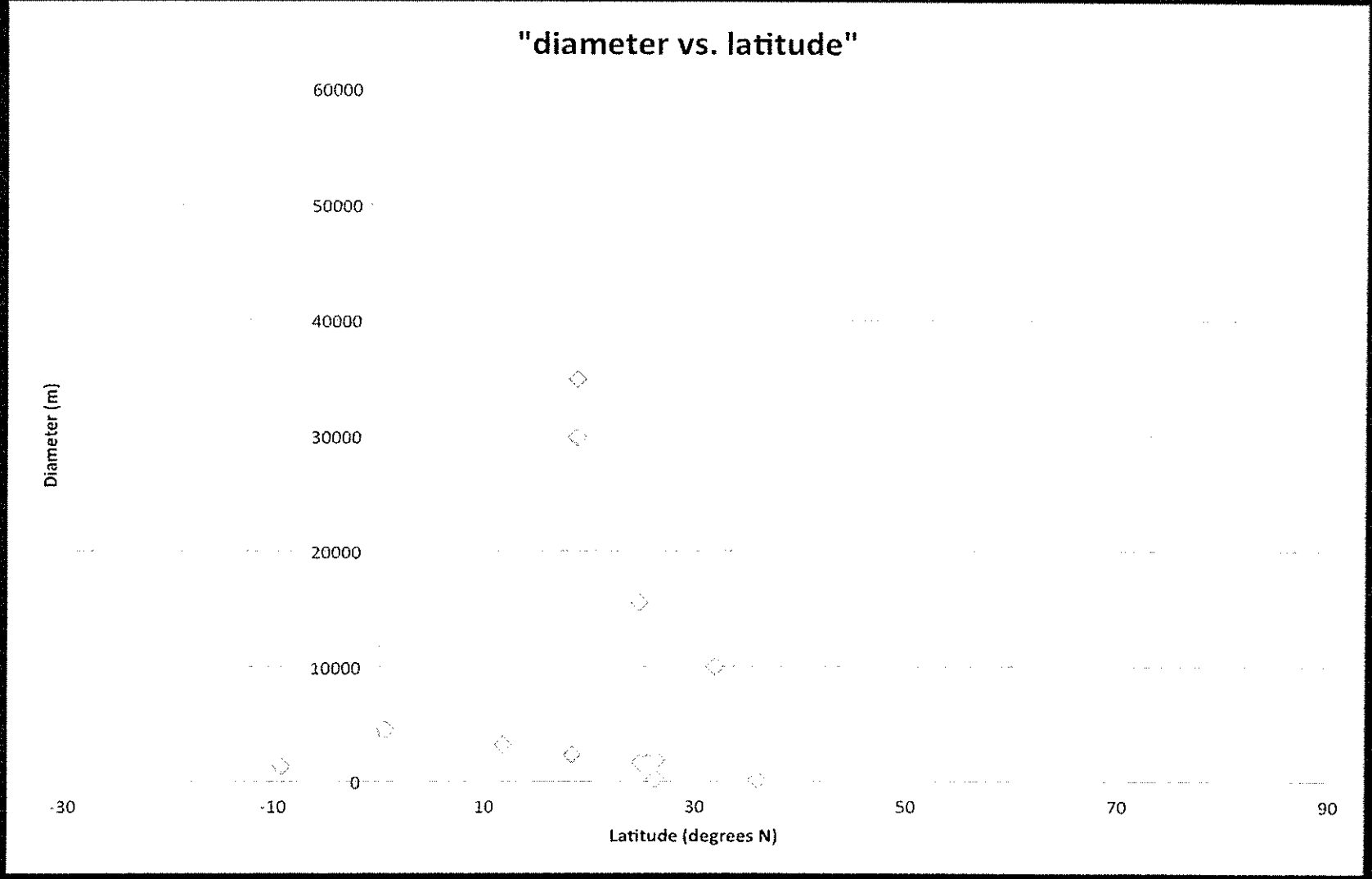
Data Graphs


Caldera Diameter (m) Histogram
5
4
3
2
1
0
1000
3000
5000
7000
9000
11000
13000
15000
17000
19000
21000
23000
25000
27000
29000
31000
33000
35000
37000
39000
41000
43000
45000
47000
49000
51000
53000
55000

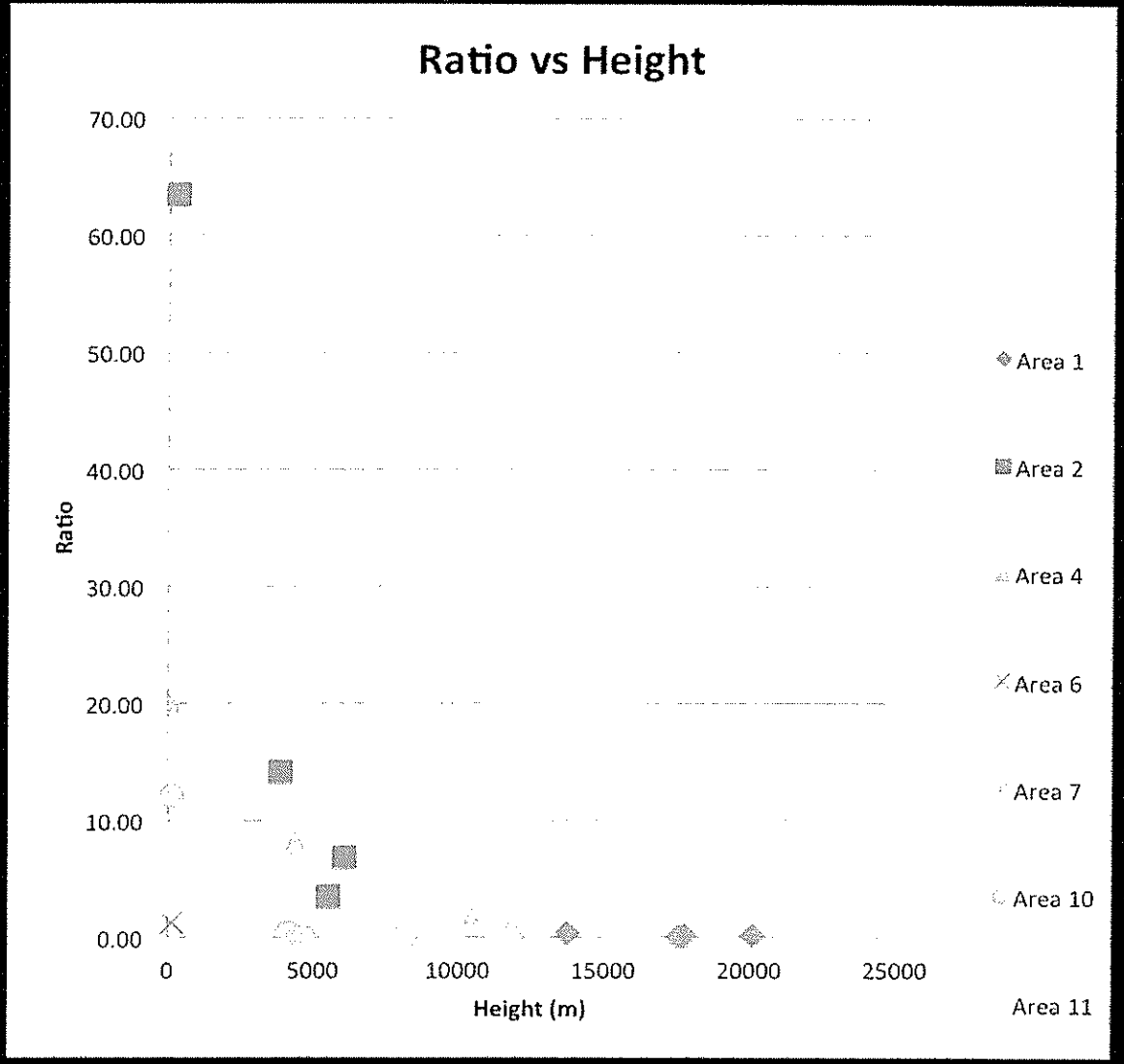
Data Graphs


Caldera Diameter vs. Volcano Height
60000
50000
40000
30000
20000
10000
0
Caldera Diameter (m)
0
5000
10000
15000
20000
25000
Volcano Height (m)
Area 1
Area 2
Area 4
Area 6
Area 7
Area 10
Area 11

Data Graphs


"diameter vs. latitude"
60000
50000
40000
30000
20000
10000
0
Diameter (m)
-30
-10
10
30
50
70
90
Latitude (degrees N)

Data Graphs


Ratio vs Height
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Ratio
0
5000
10000
15000
20000
25000
Height (m)
Area 1
Area 2
Area 4
Area 6
Area 7
Area 10
Area 11