BF-R Report “RAD-Bro”

Data By:

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Purpose

-To develop a radiation profile for the area around Tobin James Winery.

-To study varying forms of radiation from both ground and atmospheric sources.

Source of Data

Data was collected at the field adjacent to Tobin James Winery off of Union Road in Paso Robles, California. Beginning at 8AM, we unloaded our equipment which consisted of a helium filled balloon, a gondola, the LabQuest, the Geiger counter, and the USB GPS monitor. We connected the sensors to the LabQuest which was strapped to the gondola. The LabQuest was setup for the collection of usable data for analysis. The gondola was connected to the balloon. We experimented with the balloon once. We kept the balloon at the ground, 300 feet, and 600 feet for 5 minutes each with 5 minutes of increasing altitude between each. The balloon was kept at 900 feet for 10 minutes and then was brought back to the ground for a total of 45 minutes of experiment time. The recorded data was uploaded to the laptop for analysis.

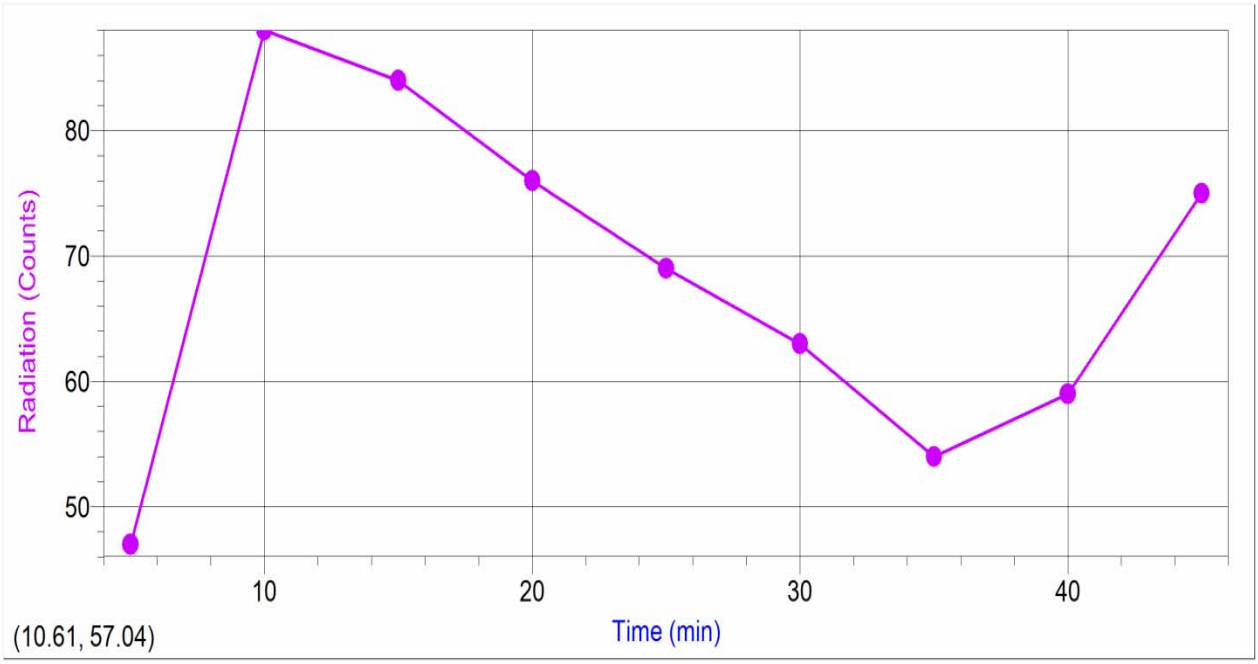
Data Table

Balloon Action	Time(min)	Altitude (m)	Counts	CPM
Rising	10	390	88	17.6
	15	407	84	16.8
	20	486	76	15.2
	25	503	69	13.8
Stationary	30	579	63	12.6
	35	578	54	10.8
Falling	40	580	59	11.8
	45	328	75	15.0

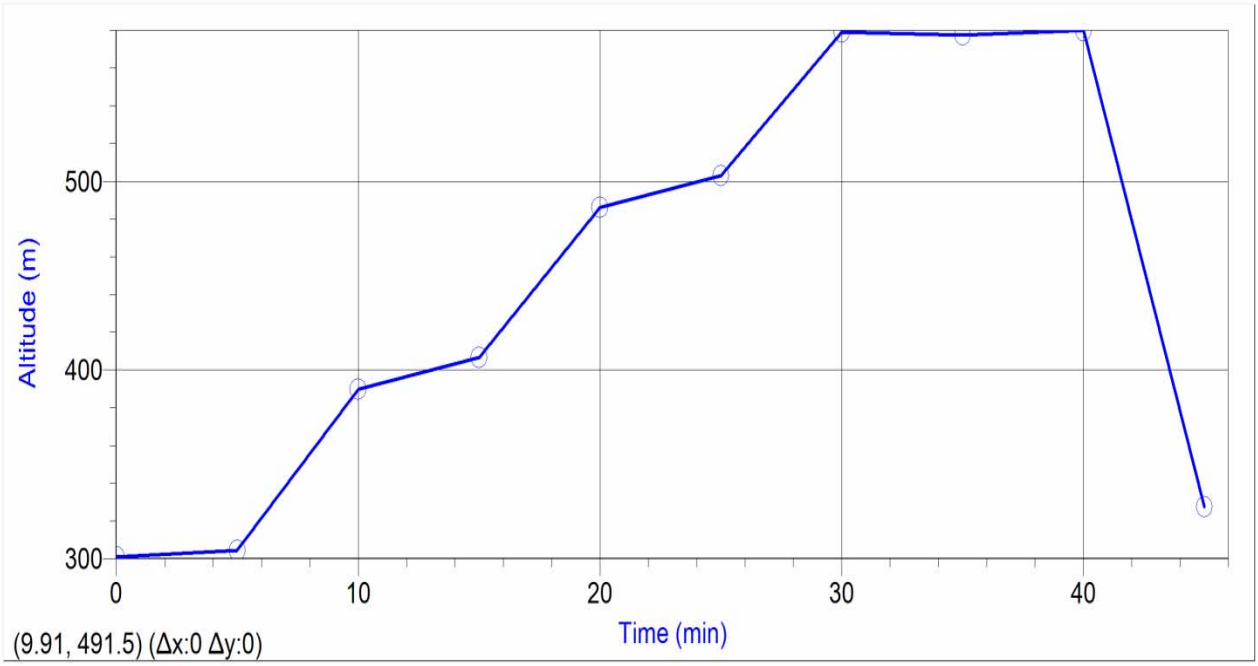
The data table above shows the data collected after our experimental launch. The data shows us several things. First of all, it shows that the highest count rate is found at ground level at a rate of 17.6 CPM. The data also shows a constant decrease in the count rate when the balloon is rising. The count rate is nearly constant at 900 feet with rates of 10.8 and 11.8 CPM. As the balloon returned to the ground, the rate increased. The data above is accurate and shows us some trends that can be used to draw a conclusion.

Graphs

Graph A- Counts vs Time



Graph B- Altitude vs Time



Hypothesis

The amount of particle radiation will decrease as altitude increases and will increase as altitude decreases. We believe that our instrumentation will be sensitive enough to notice a decrease in CPM as the altitude increases within the uncertainty.

Test A-

The count rate is highest at ground level.

Test B-

The count rate decreases until a maximum altitude.

Test C-

The count rate is steady while the balloon is left at maximum altitude.

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Test D-

The count rate increases as it returns to the ground.

Error Analysis:

It is important to consider error in our experiment in order to thoroughly analyze the data. This error can be found by taking the square root of the amount of counts per recording over the amount of counts in the recording period.

This produces errors of:

23.8%	**28.2%**
24.4%	**30.4%**
25.6%	**29.1%**
26.9%	**25.8%**

Conclusion

From the analysis of the data, the data we collected clearly passes all four tests set up to experiment with our hypothesis. Because of this, our group believes that our hypothesis is true. As altitude increases count rate decreases and when altitude decreases count rate increases. There is an exception to our theory though. If the altitude increases beyond a threshold altitude that is clearly greater than 1000 feet, then the radiation will not decrease as altitude increases. This is due to the atmosphere and space becoming the primary source for radiation rather than the ground. Error analysis shows that our data may not support our hypothesis as clearly as our data may suggest. In the future, a longer test is needed to verify the consistency of data. Further investigation can include an experiment which tests radiation rates at higher altitudes.