MEASURING VARIATIONS IN TEMPERATURE AND PRESSURE

A Balloon Experiment

by:

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Purpose of the Balloon Experiment

Pressure and temperature vary with altitude: pressure because there's less atmosphere higher up, so there's less weight per area; and temperature because there's less atmosphere for insulation (?)

A balloon takes data as it goes up, thus measuring these trends with increasing altitude

Etc.

NASA Empirical Model

$$P = Po(1 - h/145442\ ft)^{5.255876}$$

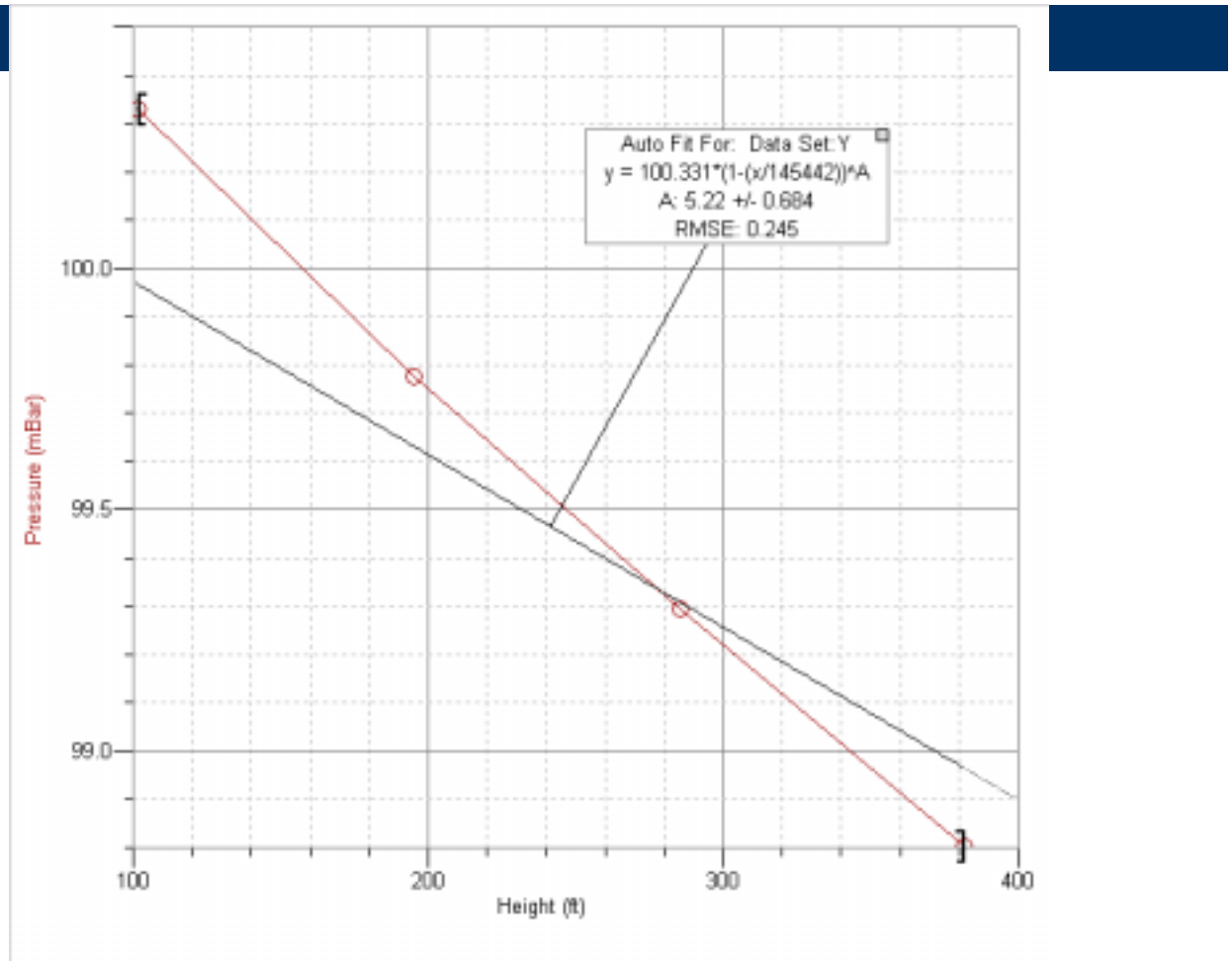
Our Data

$$P = Po(1 - h/145442\ ft)^{5.22}$$

Our Experiment obtained good results,

since our data was close to the NASA model

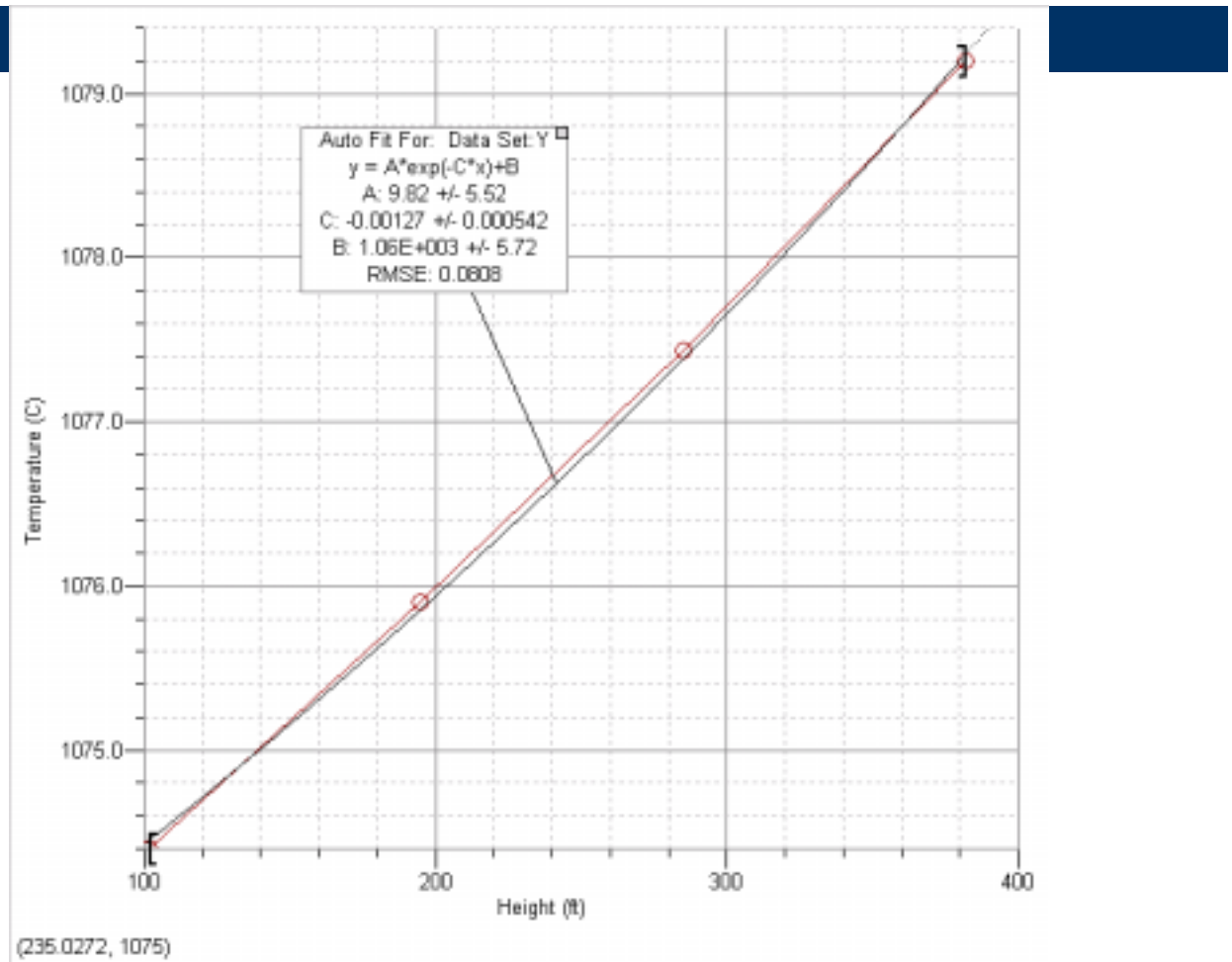
Pressure:
P vs. h



Temperature:

Exponential Curve Fit

Note: this is a curve, not a line



Data Analysis

Our pressure readings best fit the exponential curve. Although the temperature was not constant, the change in pressure was due to the difference in weight of the air.

Despite atypical readings due to a non-calibrated probe, our temperature readings still fit the exponential curve best.

Sources of Error

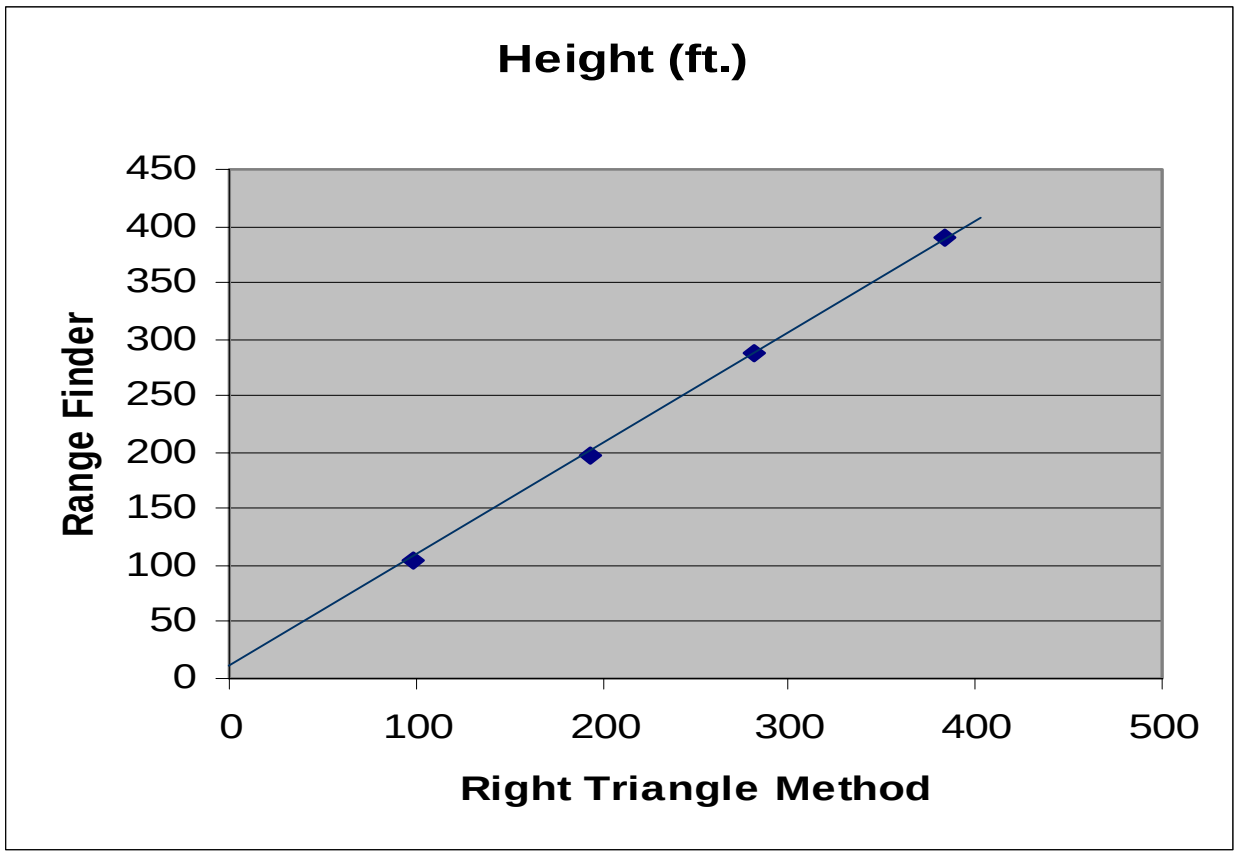
We started our readings on the top of the school building and accepted that as the origin. We did not take an accurate reading for the top of the building.

We only obtained four readings during the experiment.

Our temperature probe was not calibrated at the start of the experiment, which gave us atypical readings.

y=.9798x+10.325
r^2=.997696

Range Finder vs. Right Triangle Method



For Next Time...

The string method of measuring altitude had reliable angle measure but unreliable hypotenuse due to bowing

The range finder had a perfectly straight hypotenuse but unreliable angle (hard to make it exactly 90 degrees)

By putting the range finder on a tripod and using a plumb bomb on it, we can combine the strengths and eliminate the weaknesses of the two methods