

Atmospheric Science Experiments

Main Experiment: Study of the Atmosphere

You will launch your experiment into space using a tethered weather balloon.

Each team will do 3 experiments during the launch.

1. Altitude Calibration. You can use different methods (laser range finder, pixel distance in a digital camera, your idea). Compare to the altitude from Barometer (pressure reading). An accurate altitude measurement is necessary for results of the other two experiments.
2. Pressure, Temperature vs. altitude and comparing to the exponential model and also to the NASA empirical model.
3. Your experiment idea (see senior scientist for equipment)

Each team will also need to design a gondola to carry the equipment into space. The Gondola will attach to the balloon using a carabineer that easily hooks onto a 3 inch diameter key ring. The team is to work together in all phases and help each other out as needed. The final paper is the responsibility of the team as a whole. The Project Leader is responsible for putting it all together, but the team members must adhere to his/her deadlines and be responsible for good quality work on their parts.

You will hand into the senior scientist a publishable paper which includes the following:

- Introduction (Which includes background on the layers of the atmosphere and its composition. The greenhouse effect –what it is, the positive feedback loop, as motivation for studying the atmosphere. Explain the pressure, temperature models –both exponential and NASA empirical model and how it relates to atmosphere. A little about your contour map. Also, detail how you carried out the experiments)
- Data Tables (it should be thoroughly thought out and comprehensive)
- Graphs with error bars. Also include here or in the introduction your map with contour lines of the neighborhood you chose. This map will also include a key denoting the accuracy.
- Sample Calculations (mainly talking about converting pressure to altitude and $PV=nRT$ correction to it. Also, all calculations used to estimate the error bars on the graphs)
- Error and accuracy discussion section
- Conclusion
- Bibliography and citations
- Appendix1: Experiment protocol sheets and data gathering sheets
- Appendix2: Spec sheet on the equipment used
- Appendix3: How NASA Model and exponential model compare all the way up through the atmosphere (be sure to cite your source!)
- Appendix4: Table comparing atmospheric composition vs. altitude

You may turn in one big paper (working all together) or 3 separate papers (dividing into 3 teams of 2), where you cite each other's papers where needed.