

## **LAB#1**

### **THE VERTICAL STRUCTURE OF THE ATMOSPHERE**

In this lab the goal is to discover the vertical temperature structure of the atmosphere. We will do this by using Microsoft Excel and creating one graph with three data plots.

When the graph is complete, that includes aesthetic adjustments to enhance communication; we will label various layers and features and answer the questions that follow. As in all labs this is a group effort but each student must hand in her/his own work. If all goes well you will submit your work electronically by emailing it to me as an attachment.

Materials: This pdf document (lab1.pdf) and the Excel spreadsheet (lab1.xls)

#### **Graphing Procedures**

##### **A. A First Look at Your Data**

1. Look over your data. There are 4 columns one each for temperatures at various altitudes at 10°N, 40°N and 70°N. Each column represents the latitudinal average temperatures around the globe at that latitude.
2. Get a feel for the data. Do you notice anything that stands out?
3. What do you know about the weather differences between the latitudes?
- 4.

##### **B. THE GRAPH YOU WILL CREATE**

The graphs we create will be scatter plots. Important: why scatter plots and not line plots? The answer lies in your data. We will go over creating them in class. There are differences between Excel 2003, Excel 2007 and Open Office in how the graphs are created.

##### **E. FINISHING TOUCHES (NOT OPTIONAL)**

1. Color was long shunned in scientific reporting, but it adds another dimension in visual communication and scientific papers now often make use of color. We will use color to enhance how our graphs communicate.
2. Vary line weights and colors to emphasize or de-emphasize an item.

3. San serif fonts look clean and un cluttered. Vary text size and attribute (bold, italic etc.) to emphasize different text elements.
4. Axes must be labeled and the weight of axis lines should be heavier, while grid lines should be light in weight and a shade that partially blends into the background.
5. The graph must have a title and legend.
6. Your graph should be clean and uncluttered and it should be easy to quickly see what it being communicated.

## **F. Labeling Features**

You can use the text box tool or as I often do just type text in MS Word then cut and past the text to the chart and move it to the location.

Label the following features - use the world's greatest information resource - the internet - do a search

Troposphere

Tropopause

Stratosphere

Stratopause

Mesosphere

Mesopause

Thermosphere

The three inversions

Ozone Layer

## **G. Save Graph as an Image**

Copy your graph to the clipboard, open MS Paint and save the graph as a jpeg file. If you know a better way to do this I am open to suggestions, but I want to avoid VBA scripts. MAC users we will figure this out in class

## **H. Answer the questions.**

**I. Save and Email the pdf and your graph as attachments.** If you want to save this I have enabled local save for Acrobat forms.

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**SUBJECT LINE !!! MUST HAVE !!! geo165**

NAME \_\_\_\_\_

We will have an open discussion in class to help answer the questions.

1. What is an inversion? Explain the cause of each of the three on your graph.

2. A layer is more likely to overturn (have significant vertical motion) if it is unstable. What is it about inversion layers that inhibit vertical motion, that is why are they so stable?

3. How does the elevation of the tropopause vary from the tropics to the polar regions? Why?

4. What is ozone and what is the importance of the ozone layer?