Intro To Excel for use in Introductory Geosciences: Data, Graphs, and Model fit

Activity (II)

Part 4. Data acquisition and graphing

This activity assumes some familiarity with Excel. Parts 1 through 3 of this activity can give you that background if you need it.

The site below is titled "Importing Text Files" and gives a brief outline of some importing methods and might be useful as a reference if you ever get in a bind. **http://www.ncsu.edu/labwrite/res/gt/gt-tim-home.html** You may also want to check out the help menu for Excel as it is usually very helpful or the link"Importing Data into Excel from Easy InnKeeping"
http://www.easyinnkeeping.com/faq/excelreports.htm.

The instructions below should provide enough information for you to complete this activity.

Below are some basic instructions for importing data from a text file (*.txt, or *.prn, *.csv) or using copy paste from a data table in a word document or web page.

Using the file-open command you can open any text file of data and import it into Excel for calculations or graphing. You can also Copy *(edit-copy command)* tables from other Excel spreadsheets, from a word processor document, from a text file, or from a tabular display on the web and then Paste *(Edit-past command)* this data into excel. Sometimes everything works out great and the columns from the original data source remain in tact when pasted into Excel. Often this is not the case and what you get is a single column with all data together. As shown below, fixing this is easy. Once the data are in columns you can then Graph this data and perform calculations with it. This section is intended to help you do this easily.

If the data is already in the Excel format *.xls, open it using the *file-open command*. Navigate to where the file is stored on you computer, click on it and then open.
*(the * here indicates any file name)*

If the data is in a tab delimited text format *.txt, or comma delimited text *.csv open it using the *file-open command*

If the data is in a tab delimited text format *.txt, open it using the *file-open command*. To see text files you have to change file types to All files or Text files in the drop down menu for file type in the Open Dialog Box. Navigate to where the file is stored on your computer, click on it and then open. Excel generally knows what you're trying to import so using the default entries that follow typically does the trick.	
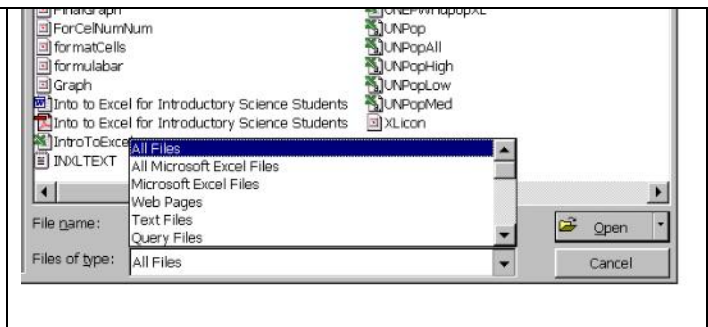
If the data is in a space delimited text format *.prn, open it using the *file-open command*. To see text files you have to change file types to All files in the drop down menu for file types in the Open Dialog Box.
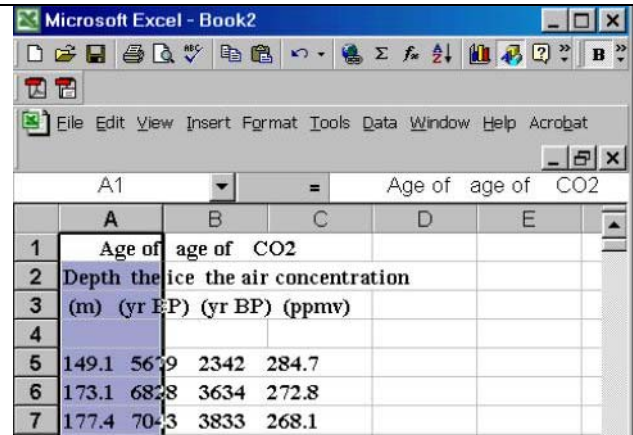
Sometimes you get a single column with all data together when you open *.prn files or when you copy and Paste into Excel from a table on the web or some other document.

For example the digital data found at http://cdiac.esd.ornl.gov/trends/co2/vostok.htm is from the Vostok ice core record and is shown below.

This data was *selected* and then *Edit-copied* from the web page and pasted into a new spread sheet. The result is shown here. The column from A5 to A330 is selected here because that's where the data is, but it is all in column A. Using the *Data-Text to Columns command* fixes this problem and break the data into four neat columns fro Ice core depth, Age of Ice, Mean age of air, and CO_2 concentration.

To easily select A5 to A330 click on A5 and then hold down the Ctrl & Shift keys simultaneously and press then down arrow..

When you get the data the way you want it, it's a good idea to save it as tab delimited text for easy access later. Also, if you modify the worksheet further, do calculations, or make graphs make sure to save it as an MS Excel Work book, otherwise your graphs or formulas will not be saved. Another suggestion is to save different versions of your work by frequently saving but also use the *Edit-Move or Copy Sheet-Create copy command*. This creates an identical sheet that can be modified so if you make some big mistakes you will always have your original. It is conceivable that you would do this several times as you progress from simple data to a more complex graph and calculations sheet. To rename each sheet use Format-Sheet-Rename command. The *Edit-Move or Copy Sheet-Create copy command* is also useful when you want to make several graphs that are only slightly different. You can create a copy of the whole sheet, which includes graphs, and then simply modify the graph on the newly created sheet to meet your needs.
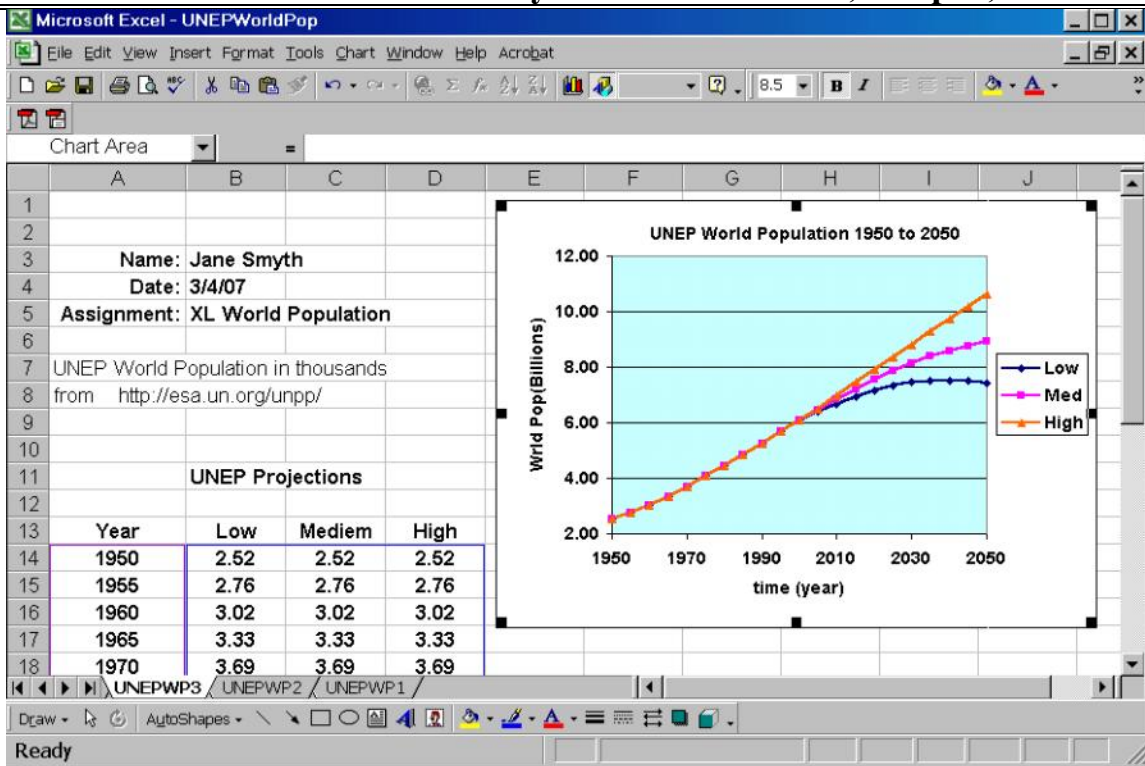
Graphing World Population Data and Projections from UNEP http://esa.un.org/unpp/

One of the nicest features of Excel is that you can easily make a *graph* **of** data that is available on the web as a text file or in tabular data that can be copied directly from a table and pasted. As discussed in Part 3 of "Activity I" you can also make a graph of a table generated by a formula. Here we assume that your data file has four columns and is either obtained from the UNEP site (year, low, medium, and high projections) or from the text file link below.

The site **http://esa.un.org/unpp/** is an interactive site that has a variety of population data for different countries and the world and projections of World population into the future. A tab delimited text file of 1950 to 2050 UNEP data/projected populations is located at:
http://serc.carleton.edu/files/introgeo/models/examples/UNEPPop

You can either retrieve data from the UNEP site yourself or use the above text file. In either case, save your file in a memorable location on the hard drive with a memorable name and open it with Excel.

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The spreadsheet above is obtained from the file UNEP data (1950-2000) and projections (2000-2050) of world population with a few modifications. We selected all of rows 1 through 12 by clicking on the boxes (1 through 12) on the far left and used the ***insert-row-command.***   In this newly created space we have entered Name and other important information.

To make a *graph* of the world population*:

— Select cells A14 through D34 (4 columns) — Click on the chart wizard icon ** The x-axis values are always in the first column on the left*	📊

> ➢ Select XY scatter and select the type of x-y scatter plot you want (click Next)
> ➢ Excel usually knows that you are using columns for x and y data (click next)
> ➢ You can enter the title and axes labels here. Click on the Legends tab and uncheck the check box. Click on the other tabs to see what they can do. You can come back here later if you want to change your graph a bit. ** [click Next]
> ➢ You can save the chart as a separate page or as an object on your working spreadsheet. The save as object choice keeps numerical values and the graph together which is often nice. Choose this option. [click finish]

If you want to modify your graph after finishing it use **Chart Options of the **Char**t menu. To get the Chart menu you have to first finish the graph and then click somewhere on it to select the whole graph.

Resave your worksheet by using the **File *Save*** command (save as Microsoft Excel Workbook) and then make your graph look good by formatting and labeling axes, include units,……   ***Save*** again.

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Questions:
What was the World Population in 1950, 1990, and 2000?

How much has the world population changed during your life-time?

What is the range of UNEP predicted 2050 populations?

The Table of values might help
Graphs
Spiff up your graph of the three UNEP population data/projection curves to make it look very presentable **and print it out to turn in**.

Use the ***Edit-Move or Copy Sheet-Create copy command*** and then resave the whole worksheet again. This will give you two sheets of what you just created so you can modify one of them following the instructions below and not worry about losing what you've already done.

Enter the average percent increase in population between 1950 and 1955 for the low population projections in Cell F15,
 F15:   **=(B15-B14)/average(B14:B15)/5*100**
Copy this to the right into cells G15 and H15 for Med and High projections. And then fill all three columns down to row 34 [select F15 through H34 and use ***Edit-Fill-Down*.**
In cell E15 put the average year   E15: **=Average(A14:A15)**

Now change your graph so that you have a plot of percent population growth from 1950 to 2050.

A tricky way to do this is to click on the low curve and notice the in the formula bar you have something like:
=SERIES("Low",UNEPWP3!$A$14:$A$34,UNEPWP3!$B$14:$B$34,1)
Changing the As to Es and the Bs to Fs in the formula bar does the trick. Repeat for the medium and high projection curves and re-label your graph appropriately.

Use the ***Edit-Move or Copy Sheet-Create copy command*** and then resave the whole worksheet again. This will give you two sheets of what you just created so you can modify on of them following the instructions below and not worry about losing what you've already done.

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Part 5. Model vs Observations: *how well does the logistic growth model work, and over what range is it valid?*
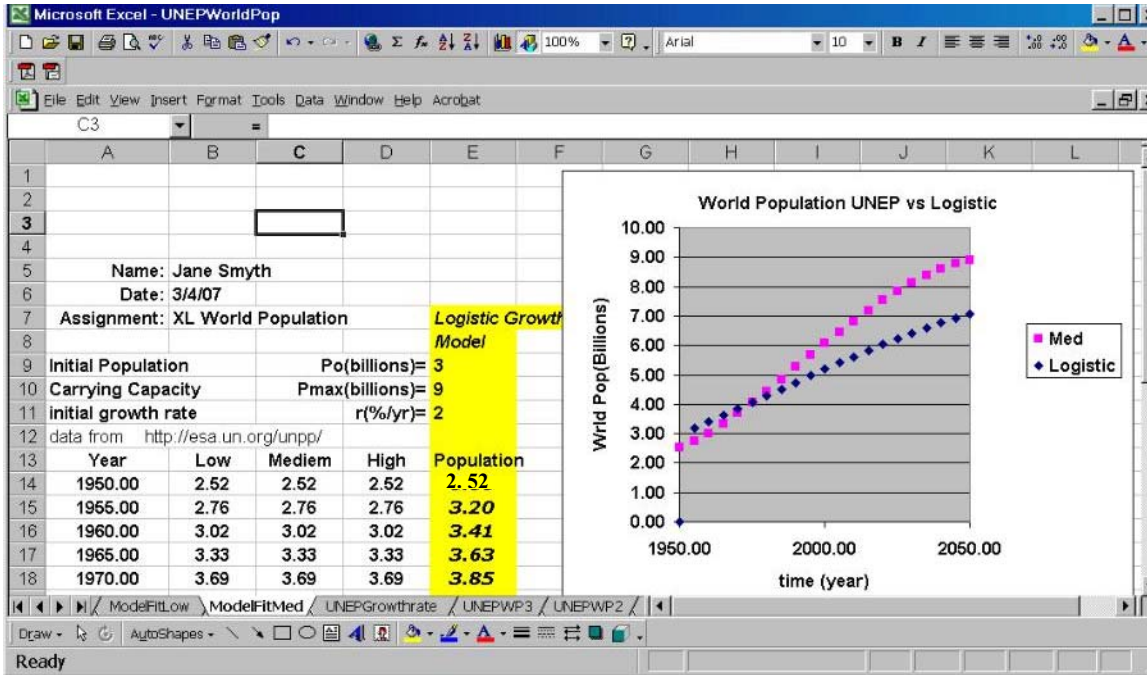
Let's alter our worksheet to get something like that above which compare the logistic model to medium UNEP population projection curve. Move the growth rate calculations to the right by inserting 2 columns between D and E by Clicking on columns E and F and use ***Insert-column***.

$$A(t) = \frac{A_0 e^{rt}}{1 + A_0(e^{rt} - 1)/K}$$

Put the logistic equation   into cell E14.

In cell E14
=E$9*EXP(E$11*0.01*($A14-1950))/(1+(E$9*(EXP(E$11*0.01*($A14-1950))-1)/E$10))
*{this assumes that cells E9, E10, and E11 have values for **Ao, K, and r**}*

Change your graph so that you are plotting two curves, medium UNEP projection vs. logistic model. Adjust the parameters **Ao, K, and r** to give you the best fit between model and data/projections. In the graph above the parameters are way off.

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What values of **Ao, K, and r** are needed for the best fit?
Ao=
K=
r=

Describe how well the logistic model agrees with UNEP data/projections.

Looking closely at the year 2050 Describe how well you think the logistic model will agree with future population between the years 2050 and 2100. Do you think that the logistic model will predict higher or lower populations for these future times?

Graph: Print out your final graph to turn in.

Repeat all questions and graphs from Part 5 for the **low** and **high** projections.

Use the ***Edit-Move or Copy Sheet-Create copy command*** and then resave the whole worksheet again. This will give you two sheets of what you just created so you can modify on of them following the instructions below and not worry about losing what you've already done.