# MY NASA DATA Lesson:

## Snow cover by Latitude

**Purpose:**

Using data sets from MYNASADATA students will create graphs comparing the amount (percentage) of snow cover along selected latitudes by date.
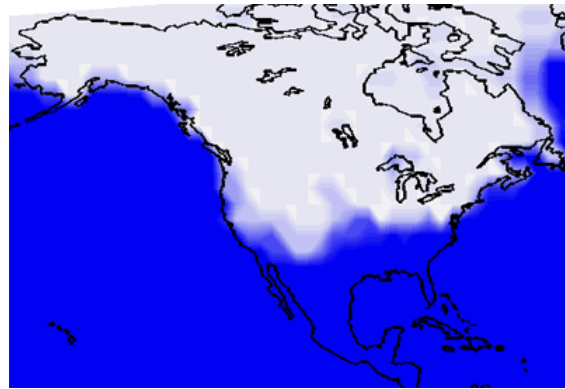


Image courtesy MY NASA DATA Live Access Server. Monthly Snow and Ice Amount, January 2001

**Grade Level:** 6-8

**Estimated Time for Completing Activity:**

One class period

**Learning Outcomes:**

- Create graphs showing the amount of snow coverage at various points of latitude
- Compare graphs

**Prerequisite**

- Basic graphing skills
- Familiarity with using longitude and latitude

**Tools**

- Graph paper
- Graphing utility (e.g. MS Excel)
- Atlas

**Vocabulary:**

- ISCCP
- latitude
- longitude

**Lesson Links:**

- Data and Graph

- Blank map source
- Sample Line Plot

**Background:**

Lines of latitude are sometimes used to define broad climatic regions. For example, the polar regions exist between 66.5 and 90 degrees N or S. Because these lines are imaginary they can intersect many different kinds of geological features, land types and land coverings. By measuring the amount of a particular type of land cover, in this instance ice, scientists are able to determine the growth or shrinking of glaciers or snow cover in general.

This lesson asks that students pick a latitude and compare the amount of snow cover over the range of longitudes that the chosen latitude intersects. Data for this lesson comes from the International Satellite Cloud Climatology Project (ISCCP). ISCCP computes fractional snow and ice coverage from satellites scanning the Earth using visible, infrared and microwave imagery.

**Procedure:**

I. Obtain data and draw line plot using the Live Access Server.
1. Obtain a blank map and draw a horizontal line across the selected latitude. Using an atlas for reference, mark at least four large cities near this line.
2. Access the MY NASA DATA website to access a data set. (Or use the one provided in Step 8 below.)
3. On the MY NASA DATA homepage, click on the Data Access icon.
4. Click on Live Access Server (Advanced Edition)
5. Click on Choose Dataset button.
6. Click on Cryosphere, then Monthly Snow Ice Amount (ISCCP).
7. In the coordinates boxes, type 45 N in the north and south boxes. then 130 W and 60 W in the west and east boxes.
8. Under LINE PLOTS, select Longitude.
9. For the date, select Jan 2001.
10. Click Update Plot to produce the output (line plot).
11. Print a copy of the plot (or save as a pdf on desktop). Be sure to name the file so you can locate it later.
12. Mark the selected cities on the graph.
13. Answer questions (See Questions section).

II. Plot data for additional latitudes
1. Repeat Part I for a different latitude. Note: You may also use the Compare function on the Live Access Server.

III. (Optional) Draw a bar graph using Excel.
1. Repeat part I, except in Step 19, click on Save As, and download data as ASCII file.
2. Use Excel as suggested below, or use a preferred graphing program.

A. Select and copy the data only. Open Excel and Paste into a worksheet. You will have two columns of numbers. Click on B, then use the Insert menu to add a column in front of Column B. Now click on A to select all of Column A. Under the Data Menu, Select Text to Columns.
Text Import Wizard:
-Step1: Select Delimited(usually the default selection), Click Next.
-Step2: Select Space. In addition to Space, check Other, in the box beside Other put a capital W inside. Click Next, then Finish.

B. You should now have 3 columns of data in your spreadsheet, but you only need two.
-Click on B (of Column B), right mouse click, delete. There should now be 2 columns of data.

C. To make the bar graph:
-Highlight column B, click on Chart Wizard or Insert menu then Chart
-Step 1: Select Chart type (Column is the default). Click Next.
-Step 2: Select Series Tab, Category (X) axis labels: click on symbol next to the text box, highlight Column A, click on symbol again to finalize choice. Click Next.
-Step 3: Name the chart and axes, Title: Snow cover over North America at latitude 45 degrees North, x-axis: longitude, y-axis: percent (type symbol or word) snow cover. You can choose whether to have a legend or other features. Click Next.
-Step 4: Choose your preference of whether to have the chart appear within your spreadsheet (default) or on a seperate page (As new sheet). To see an example of what you should get, click on Data and Graph in the Links section.

**Questions:**

1. Does the amount of snow cover vary by longitude? Suggest reasons why or why not.

2. How does snow cover vary across a line of constant latitude.

3. Does longitude control the amount of snow present?

4. What else might contribute to the amount of snow cover?

5. Using the line-plots of snow cover for at least two different latitudes, write a statement describing any changes in snow cover as latitude increases or decreases.

**Extensions:**

1. Using an atlas locate four large cities near the line of latitude, using a topographic reference list the elevations of these cities, each person in the group is to locate climate data for one city and share with the group.

2. Using the information you have now gathered, would you change your answer to question 1? Why or why not?

3. Create data sets and graphs of other locations (latitudes). Compare to elevation and seasonal changes.

4. Consider whether El Nino might have an effect on your results. Explore the same data for 1997-98, when a major El Nino occurred. Does this change your conclusions?

*Lesson plan contributed by Jodie Harnden, Athena, OR*

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