

MY NASA DATA Lesson:

Aruba Cloud Cover Measured by Satellite

Purpose:

The purpose of this investigation is to have students analyze cloud cover and to compose written conclusions to a given related scenario.

Grade Level: 6 – 9

Estimated Time for Completing Activity:

60 minutes

Learning Outcomes:

- The students will submit a letter of response and a report detailing their calculations and conclusions.

Prerequisite

- Familiarity with accessing websites on the Internet
- Familiarity with producing graphs in Excel
- Ability to recognize the symbol for and meaning of the term percentage

Tools

- Internet
- Microsoft Excel
- Microsoft Word

Vocabulary:

- [ISCCP](#)
- [latitude](#)

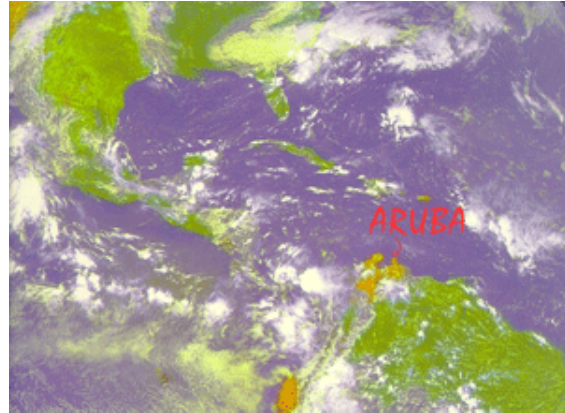


Image courtesy GOES-8

- [longitude](#)
- [percentage](#)

Lesson Links:

- [Microdataset and graph](#)
- [Live Access Server \(Advanced Edition\)](#)

Background:

Cloud cover fraction (percentage) represents the fractional area covered by clouds as observed from above by satellites. It is estimated by counting the number of satellite fields-of-view (called pixels, about 5 km across for ISCCP) that are determined to be cloudy and dividing by the total number of pixels in a region about 280 km across.

Procedure:

Distribute the following letter to students

Dear Students:

I have recently been promoted to Senior Editor of the National News Newspaper. The National News lawyers are very concerned that I watch that the junior editors and journalists do not slander or print untruths. That was the reason for my predecessor's untimely departure.

Last week I was asked to run an advertisement 'Aruba, never a cloud in the sky, guaranteed eighty percent cloud coverage or less all year.' This sounds too good to be true, so can you please do an analysis of cloud cover over Aruba and get back to me? Please include any data, analysis, errors in data collection, and references. We here at the National News want to get to the bottom of this statement before we print anything.

Writing the Right News,

Cursive Script
Senior Editor,
National News

Have students go to the Live Access Server link found above in the lesson links section.

Select 'Choose Dataset' if you are not automatically prompted to do so then, click Atmosphere, Clouds, Cloud coverage, then Monthly Cloud Coverage (ISCCP)

From the menu to the left select 'Time Series' under 'Line Plots'

From the menu at the top of the page, click the radio button next to 'Update Plot'

Change the date range to Jan 1998 to Jan 2001

Under the navigation map, enter 12 N Latitude and 70 W Longitude which is where Aruba is located.

Once you are able to see the new plot of your data, then go to the menu bar at the top of the page and click on 'Save As', select ASCII, verify your date range and click 'OK' to save your data to your computer.

From this output file, highlight all the data (including the descriptive information at the top of the screen) in the window and scroll down to the bottom of the data. Right click and select copy.

Open Microsoft Excel and paste the data in the first column of the spreadsheet.

Highlight the dates and values under the word coordinates and scroll to the bottom of the data.

From the toolbar, select Data, then Text to Columns. In the Convert Text to Columns Wizard box, click Fixed Width, Next, Finish. This will put the date in column A and the values in column E.

To produce a bar graph of Date versus Percent of Cloud Coverage, highlight the dates and values in columns A and E under the word coordinates.

From the toolbar, select Insert, Chart, Bar, Clustered bar (the default bar chart type), and click Next.

If not selected, under Series in, click the Columns radio button and Next.

In the Chart title box, enter 'Cloud Coverage over Aruba'.

In the Category X(axis), enter 'Date'.

In the Category y(axis), enter 'Percent of Cloud Coverage'.

Click Finish.

After the students study the graph they have produced, have them complete a letter and report reply to Ms. Cursive Script.

Questions:

1. For the period of time shown on the graph
 - a. What was the highest percentage of cloud cover and during which month and year did this occur?

- b. What was the lowest percentage of cloud cover and during which month and year did this occur?
2. Were any months completely cloud-free? Explain your answer by referring to the data or graph.
3. Referring to the graph or data,
- a. For how many months was the cloud coverage 60 percent or greater?
- b. What is the percentage of total months was there 60 percent or greater cloud cover? Show your calculations.

Extensions:

1. Referring to the graph, do you notice any patterns in cloud coverage? For example, during which months did cloud coverage increase or decrease? Are there additional patterns? Explain with examples from the graph.
2. Did the percentage of cloud cover change from 1998 to 2001? Justify by calculating the average percentage cloud cover for each year. Show an example of your calculations.
3. Consider the location of Aruba. How close to the equator is Aruba? How might this affect the percentage of cloud cover?

Lesson plan contributed by Laurissa Werhun, Toronto, Canada

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