My NASA Data – Data Literacy Cubes

The tools in this guide are resources to support data literacy in your instructional setting with My NASA Data Earth science materials. These flexible resources may be used with graphs, data tables, and mapped images of NASA Earth science data. To access NASA data, visit the My NASA Data visualization tool, Earth System Data Explorer (**https://mynasadata.larc.nasa.gov**).

The Data Literacy Cube set includes:

- Cube templates *(Gaming dice may be substituted for the cubes.)* Each cube type has an icon associated with it. Icons are displayed on the right side of My NASA Data pages to indicate which cubes could be used with the content on the page. It is also possible to search content by cube type.

- Leveled question sheets to help you differentiate your instruction
  Note: This guide provides a labeled version identifying the different question sheets, as well as an unlabeled version for you to use at your discretion. See the bottom left for this designation on each labeled question sheet.

How to use the Data Literacy Cubes and leveled questions:

1. Access Earth science data from the My NASA Data website and the Earth System Data Explorer visualization tool (**https://mynasadata.larc.nasa.gov/EarthSystemLAS/UI.vm**).
2. Differentiate your lesson based on your students' needs and abilities. See versions A-D to select the leveled question sheets and distribute to students.
3. Instruct students to roll cube (or numbered die) to answer appropriate question/s.
4. Visit the *Maps, Graphs, and Data* sections on My NASA Data to access mini lessons and resources from each of the following spheres:
   - Atmosphere **https://mynasadata.larc.nasa.gov/atmosphere**
   - Biosphere **https://mynasadata.larc.nasa.gov/biosphere**
   - Cryosphere **https://mynasadata.larc.nasa.gov/cryosphere**
   - Geosphere **https://mynasadata.larc.nasa.gov/geosphere**
   - Hydrosphere **https://mynasadata.larc.nasa.gov/hydrosphere**
   - Earth as a System **https://mynasadata.larc.nasa.gov/earthsystem**

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NP-2019-10-093-LaRC

Map Cube

1. Examine the map.

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Map Cube

2. Where on Earth is this map?

Map Cube

5. When were the data on this map collected?

Map Cube

3. Summarize the map.

Map Cube

6. Ask a question about the map.

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Map Cube

4. Analyze the map.

Map Cube

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Map Cube Questions

1. Examine the map.

A. The color that shows the most is _____. It means _____.

B. The color that you do not see much is _____. It means _____.

2. Where on Earth is this map?

A. A place I know on the map is _____.

B. Another place I know on the map is _____.

3. Summarize the map.

A. The different colors stand for the variable _____. It is measured in _____.
(unit)

B. The color with the biggest value/number is _____.

C. The color with the smallest value/number is _____.

D. The color in the middle is _____. Its value is _____.

4. Analyze the map.

A. The area/s with the highest values is/are _____. This means _____.

B. The area/s with the lowest values is/are _____. This means _____.

5. When were the data on this map collected?

A. The date/s shown on the map is/are _____.

B. A key word in the title that tells me the time frame of this map is _____.

6. Ask a question about the map.

A. How does…?

B. I wonder if…

C. How is _____ the same as? Different than?

D. How many...? How long...? How often...?

A

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Map Cube Questions

1. Examine the map.

A. The color that shows the most is _____. It means _____.

B. The color that you do not see much is _____. It means _____.

2. Where on Earth is this map?

A. A place I know on the map is _____.

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(unit)

B. The color with the biggest value/number is _____.

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A. The area/s with the highest values is/are _____. This means _____.

B. The area/s with the lowest values is/are _____. This means _____.

5. When were the data on this map collected?

A. The date/s shown on the map is/are _____.

B. A key word in the title that tells me the time frame of this map is _____.

6. Ask a question about the map.

A. How does…?

B. I wonder if…

C. How is _____ the same as? Different than?

D. How many...? How long...? How often...?

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Map Cube Questions

1. Examine the map.

A. The colors that show the most represent _____.

B. The colors that show the least represent _____.

C. I observe a pattern which shows _____.

2. Where on Earth is this map?

A. A place I recognize on the map is _____. The longitude is _____.

B. Another place I know on the map is _____. The latitude is _____.

C. A region I recognize is _____.

3. Summarize the map.

A. The scale of the colors represents the variable _____.

B. The unit for the variable is _____.

C. This variable explains _____.

4. Analyze the map.

A. The area/s with the highest values is/are _____. This represents _____.

B. The area/s with the lowest values is/are _____. This represents _____.

C. The values change from _____ to _____ in the _____ hemisphere.

5. When were the data on this map collected?

A. The time frame for the map is _____.

B. If the time frame/area etc. changes to _____ , then the variable will _____.

6. Ask a question about the map.

A. I wonder if…

B. How many...? How long...? How often...?

B

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Map Cube Questions

1. Examine the map.

A. The colors that show the most represent _____.

B. The colors that show the least represent _____.

C. I observe a pattern which shows _____.

2. Where on Earth is this map?

A. A place I recognize on the map is _____. The longitude is _____.

B. Another place I know on the map is _____. The latitude is _____.

C. A region I recognize is _____.

3. Summarize the map.

A. The scale of the colors represents the variable _____.

B. The unit for the variable is _____.

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A. The area/s with the highest values is/are _____. This represents _____.

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A. The time frame for the map is _____.

B. If the time frame/area etc. changes to _____ , then the variable will _____.

6. Ask a question about the map.

A. I wonder if…

B. How many...? How long...? How often...?

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Map Cube Questions

1. Examine the map.

A. What do the colors that show the most represent?

B. What do the colors that show the least represent?

C. What pattern do you observe?

2. Where on Earth is this map?

A. What is the latitude and longitude range?

B. Identify a place you recognize and its approximate latitude and longitude.

C. What type of map projection is this?

3. Summarize the map.

A. What is the scale on the map?

B. What variable is represented?

C. What is the range and unit for the scale?

4. Analyze the map.

A. What patterns are there for the high values?

B. What patterns are there for the low values?

C. How do the values change by area?

5. When were the data on this map collected?

A. What time frame is represented?

B. Compare this map to a map for a different time frame for the same variable.

C. What are the similarities and differences?

6. Ask a question about the map.

A. Form a hypothesis about the data displayed on the map.

B. What inference can you make about the cause of the data displayed?

C. Compare this map to another map for a different variable for the same area. What are the similarities and differences?

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Map Cube Questions

1. Examine the map.

A. What do the colors that show the most represent?

B. What do the colors that show the least represent?

C. What pattern do you observe?

2. Where on Earth is this map?

A. What is the latitude and longitude range?

B. Identify a place you recognize and its approximate latitude and longitude.

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A. What patterns are there for the high values?

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A. What time frame is represented?

B. Compare this map to a map for a different time frame for the same variable.

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A. Form a hypothesis about the data displayed on the map.

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C. Compare this map to another map for a different variable for the same area. What are the similarities and differences?

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Map Cube Questions

1. Examine the map.

A. The color _____ shows the most. It means _____.

B. The color _____ shows the least. It means _____.

C. A pattern shows the color _____ in the areas that are _____.

2. Where on Earth is this map?

A. The latitude goes from ____to ____. The longitude goes from ____ to ____.

B. This is a _____ map.

3. Summarize the map.

A. The colors stand for the variable _____.

B. The unit used for the variable is _____.

4. Analyze the map.

A. The highest values show up in _____ areas.

B. The lowest values show up in _____ areas.

C. The values change from _____ in _____ to _____ in _____.
(value) (area) (value) (area)

5. When were the data on this map collected?

A. The word in the title that tells me the time frame is _____.

B. The time frame shows the data for a day/week/month/quarter/year, etc.?

6. Ask a question about the map.

A. How will _____ change when _____ changes?

B. I wonder....

C. Ask a question that starts with why, when, or where.

D

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Map Cube Questions

1. Examine the map.

A. The color _____ shows the most. It means _____.

B. The color _____ shows the least. It means _____.

C. A pattern shows the color _____ in the areas that are _____.

2. Where on Earth is this map?

A. The latitude goes from ____to ____. The longitude goes from ____ to ____.

B. This is a _____ map.

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A. The colors stand for the variable _____.

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C. The values change from _____ in _____ to _____ in _____.
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Graph Cube

5. Who would be interested in this graph?

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Graph Cube

1. Examine the graph.

Graph Cube

4. Brainstorm a question that you can answer using these data.

Graph Cube

6. Assess the data values.

Graph Cube

2. Summarize the graph.

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Graph Cube

3. Analyze the graph.

Graph Cube

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Graph Cube Questions

1. Examine the graph.

A. The title tells me _____.

B. The bottom of the graph is the ___ axis. The variable is _____.

C. The left side of the graph is the ___ axis. The variable is _____.

D. The time frame for the data is _____ to _____.

2. Summarize the graph.

A. The x axis shows the *(independent/dependent)* variable.

B. The y axis shows the *(independent/dependent)* variable.

C. The data _____ (increase/decrease/follow a pattern). Explain.

3. Analyze the graph.

A. _____ caused the change.

B. The variable that changed as a result of something else changing is _____.

C. If ____ *(increases/decreases/stays the same)*, then____ *(increases/decreases/stays the same)*.

D. The numbers on the graph show _____.

4. Brainstorm a question that you can answer using these data.

A. How does...?

B. I wonder...

C. How is _____ the same as _____? Different from _____?

D. How many _____?

5. Who would be interested in this graph?

A. I think ___ (i.e. farmers, snow skiers, etc.) would be interested in this graph.

B. These data are important to the _____ community because _____.

6. Assess the data values.

A. The label on the x axis is _____. The label on the y axis is _____.

B. The unit for the x axis is _____. The unit for the y axis is _____.

C. The scale for the x axis is _____. The scale for the y axis is _____.

A

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Graph Cube Questions

1. Examine the graph.

A. The title tells me _____.

B. The bottom of the graph is the ___ axis. The variable is _____.

C. The left side of the graph is the ___ axis. The variable is _____.

D. The time frame for the data is _____ to _____.

2. Summarize the graph.

A. The x axis shows the *(independent/dependent)* variable.

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C. The scale for the x axis is _____. The scale for the y axis is _____.

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Graph Cube Questions

1. Examine the graph.

A. The variable on the x axis is _____. It is the *(independent/dependent)* variable.

B. The variable on the y axis is _____. It is the *(independent/dependent)* variable.

C. The value of the independent variable affects the dependent variable by _____.

2. Summarize the graph.

A. The variable that changes as a result of another variable changing is ____.

B. The variable that causes the change is _____.

C. As the independent variable ___ *(increases/decreases)*, the dependent variable ___ (increases/decreases/stays the same).

D. The time frame represented in the graph is from _____ to _____.

E. The data _____ *(increase/decrease/follow a pattern)*. Explain.

3. Analyze the graph.

A. Write a hypothesis about the two variables to explain the graph. If __, then __.

B. The quantitative evidence that supports my testable statement is _____.

4. Brainstorm a question that you can answer using these data.

A. How does...? How many…?

B. I wonder...

C. How is _____ the same as _____? Different from _____?

5. Who would be interested in this graph?

A. I think _____ (i.e. farmers, snow skiers, etc.) would be interested in this graph.

B. These data are important to the _____ community because _____.

6. Assess the data values.

A. The label on the x axis is _____. The label on the y axis is _____.

B. The unit for the x axis is _____. The unit for the y axis is _____.

C. The scale for the x axis is _____. The scale for the y axis is _____.

B

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Graph Cube Questions

1. Examine the graph.

A. The variable on the x axis is _____. It is the *(independent/dependent)* variable.

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A. I think _____ (i.e. farmers, snow skiers, etc.) would be interested in this graph.

B. These data are important to the _____ community because _____.

6. Assess the data values.

A. The label on the x axis is _____. The label on the y axis is _____.

B. The unit for the x axis is _____. The unit for the y axis is _____.

C. The scale for the x axis is _____. The scale for the y axis is _____.

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Graph Cube Questions

1. Examine the graph.

A. What variable is represented on the x-axis? What is the range of values?

B. What variable is represented on the y-axis? What is the range of values?

C. What are the units of measurement for the x and y axes?

D. If this graph represents a geographic location, identify it on a map or globe.

2. Summarize the graph.

A. Do the data repeat in recognizable ways? Explain.

B. What kinds of patterns or trends do you see in the distribution of the data?

C. How do the patterns you see in the graph relate to other things you know?

3. Analyze the graph.

A. Describe the relationship between the variables: positive, negative, or none.

B. Brainstorm one variable that you predict to be directly proportional.

C. Brainstorm one variable that you predict to be inversely proportional.

4. Brainstorm a question that you can answer using these data.

A. Ask a question beginning with how, what, where, when or why.

B. I wonder...

C. Form a hypothesis using the data on the graph. If ____, then ____.

5. Who would be interested in this graph?

A. Brainstorm who would be interested in the data presented in this graph *(i.e., farmers, snow skiers, etc.).*

B. Why do you think these data are important to this community?

6. Assess the data values.

A. What is the numerical range of the data? Mean? Median? Mode?

B. How is the mean different from the mode?

C. Are there any outliers? If so, what are they?

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Graph Cube Questions

1. Examine the graph.

A. What variable is represented on the x-axis? What is the range of values?

B. What variable is represented on the y-axis? What is the range of values?

C. What are the units of measurement for the x and y axes?

D. If this graph represents a geographic location, identify it on a map or globe.

2. Summarize the graph.

A. Do the data repeat in recognizable ways? Explain.

B. What kinds of patterns or trends do you see in the distribution of the data?

C. How do the patterns you see in the graph relate to other things you know?

3. Analyze the graph.

A. Describe the relationship between the variables: positive, negative, or none.

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4. Brainstorm a question that you can answer using these data.

A. Ask a question beginning with how, what, where, when or why.

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C. Form a hypothesis using the data on the graph. If ____, then ____.

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C. Are there any outliers? If so, what are they?

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Graph Cube Questions

1. Examine the graph.

A. The bottom of the graph is the ___ axis. The variable is _____.

B. The left side of the graph is the ___ axis. The variable is _____.

C. The time frame for the data is _____ to _____.

D. The title says _____. It means _____.

2. Summarize the graph.

A. The x axis shows the *(independent/dependent)* variable.

B. The y axis shows the *(independent/dependent)* variable.

C. The data ___ *(increase/decrease/follow a pattern)*. I know this because ___.

3. Analyze the graph.

A. The independent variable, _____, caused the change.

B. The dependent variable _____ changes when the independent variable changes.

C. If _____ *(increases/decreases/stays the same)*, then_____*(increases/decreases/stays the same)*.

D. The numbers on the graph show _____.

4. Brainstorm a question that you can answer using these data.

A. How does...? I wonder…

B. How is _____ the same as _____? Different from _____?

C. If _____, then _____.

5. Who would be interested in this graph?

A. I think ____ *(i.e. farmers, snow skiers, etc.)* would be interested in this graph.

B. These data are important to the _____ community because _____.

6. Assess the data values.

A. The label on the x axis is _____. The label on the y axis is _____.

B. The unit for the x axis is _____. The unit for the y axis is _____.

C. The scale for the x axis is _____. The scale for the y axis is _____.

D

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Graph Cube Questions

1. Examine the graph.

A. The bottom of the graph is the ___ axis. The variable is _____.

B. The left side of the graph is the ___ axis. The variable is _____.

C. The time frame for the data is _____ to _____.

D. The title says _____. It means _____.

2. Summarize the graph.

A. The x axis shows the *(independent/dependent)* variable.

B. The y axis shows the *(independent/dependent)* variable.

C. The data ___ *(increase/decrease/follow a pattern)*. I know this because ___.

3. Analyze the graph.

A. The independent variable, _____, caused the change.

B. The dependent variable _____ changes when the independent variable changes.

C. If _____ *(increases/decreases/stays the same)*, then_____*(increases/decreases/stays the same)*.

D. The numbers on the graph show _____.

4. Brainstorm a question that you can answer using these data.

A. How does...? I wonder…

B. How is _____ the same as _____? Different from _____?

C. If _____, then _____.

5. Who would be interested in this graph?

A. I think ____ *(i.e. farmers, snow skiers, etc.)* would be interested in this graph.

B. These data are important to the _____ community because _____.

6. Assess the data values.

A. The label on the x axis is _____. The label on the y axis is _____.

B. The unit for the x axis is _____. The unit for the y axis is _____.

C. The scale for the x axis is _____. The scale for the y axis is _____.

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Data Cube

1. Summarize the data.

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Data Cube

3. Analyze the data.

Data Cube

2. Describe the data.

Data Cube

4. Assess the data values.

Data Cube

5. Create questions using the data.

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Data Cube

6. Apply the data.

Data Cube

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Data Cube Questions

1. Summarize the data.

A. The data are displayed in a *(table, chart, etc.)* _____.
B. The title tells me the data are about _____.
C. The data measure...
D. The lowest value is _____.
E. The highest value is _____.

2. Describe the data.

A. The data were collected using _____ *(i.e. thermometer, instrument, etc.)*.
B. The data are collected every _____ *(day, week, month, quarter, year, etc.)*.
C. The unit used to describe the data is _____.

3. Analyze the data.

A. The geographic area of Earth where the data were collected is _____.
B. The time range is from _____ to _____.
C. These data show that _____.

4. Assess the data values.

A. The mean is _____. The median is _____. The mode is _____.
B. The highest value is _____. The lowest value is _____.
C. This variable belongs in the _____ sphere of the Earth System.

5. Create questions using the data.

A. I wonder ...
B. If ___ changed, I think the data would *(increase/decrease/stay the same)* ___.
C. How does....?
D. Why...?

6. Apply the data.

A. These data help us understand _____.
B. These data can explain why _____.
C. Graph the data.

A

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Data Cube Questions

1. Summarize the data.

A. The data are displayed in a *(table, chart, etc.)* _____.
B. The title tells me the data are about _____.
C. The data measure...
D. The lowest value is _____.
E. The highest value is _____.

2. Describe the data.

A. The data were collected using _____ *(i.e. thermometer, instrument, etc.)*.
B. The data are collected every _____ *(day, week, month, quarter, year, etc.)*.
C. The unit used to describe the data is _____.

3. Analyze the data.

A. The geographic area of Earth where the data were collected is _____.
B. The time range is from _____ to _____.
C. These data show that _____.

4. Assess the data values.

A. The mean is _____. The median is _____. The mode is _____.
B. The highest value is _____. The lowest value is _____.
C. This variable belongs in the _____ sphere of the Earth System.

5. Create questions using the data.

A. I wonder ...
B. If ___ changed, I think the data would *(increase/decrease/stay the same)* ___.
C. How does....?
D. Why...?

6. Apply the data.

A. These data help us understand _____.
B. These data can explain why _____.
C. Graph the data.

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Data Cube Questions

1. Summarize the data.

A. The variable is _____. It represents _____.

B. The range of the data is from _____ to _____.

C. The independent variable is _____. The dependent variable is _____.

2. Describe the data.

A. The _____ instrument collected these data.

B. The data are collected every _____ *(day, week, month, quarter, year, etc.)*.

C. The unit used to describe the data is _____.

3. Analyze the data.

A. The geographic area of Earth that is represented is _____.

B. The time range is from _____ to _____.

C. This variable belongs in the _____ sphere of the Earth System.

4. Assess the data values.

A. The average is _____. The median is _____. The mode is _____.

B. The measure of central tendency that best represents the data is the _____ *(mean, median or mode)*. This is because _____.

C. The highest value is _____. The lowest value is _____.

5. Create questions using the data.

A. These data make me wonder _____.

B. I would like to compare _____ with these data because _____.

C. How do these data affect another sphere in the Earth System?

6. Apply the data.

A. These data help us understand _____.

B. These data can explain the phenomenon of _____ because _____.

C. Technology is related to these data because _____.

D. Engineering is connected to these data because _____.

E. Graph the data.

B

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Data Cube Questions

1. Summarize the data.

A. The variable is _____. It represents _____.

B. The range of the data is from _____ to _____.

C. The independent variable is _____. The dependent variable is _____.

2. Describe the data.

A. The _____ instrument collected these data.

B. The data are collected every _____ *(day, week, month, quarter, year, etc.)*.

C. The unit used to describe the data is _____.

3. Analyze the data.

A. The geographic area of Earth that is represented is _____.

B. The time range is from _____ to _____.

C. This variable belongs in the _____ sphere of the Earth System.

4. Assess the data values.

A. The average is _____. The median is _____. The mode is _____.

B. The measure of central tendency that best represents the data is the _____ *(mean, median or mode)*. This is because _____.

C. The highest value is _____. The lowest value is _____.

5. Create questions using the data.

A. These data make me wonder _____.

B. I would like to compare _____ with these data because _____.

C. How do these data affect another sphere in the Earth System?

6. Apply the data.

A. These data help us understand _____.

B. These data can explain the phenomenon of _____ because _____.

C. Technology is related to these data because _____.

D. Engineering is connected to these data because _____.

E. Graph the data.

my NASA data

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Data Cube Questions

1. Summarize the data.

A. What does the variable represent?

B. What is the range of the data?

C. In which sphere of the Earth System does this variable belong?

2. Describe the data.

A. What instrument/s collected these data?

B. How frequently were the data collected?

C. What unit describes the data?

3. Analyze the data.

A. What geographic area on Earth do the data represent?

B. What time range do these data represent?

C. What area and time data would you like to collect to help you analyze these data?

4. Assess the data values.

A. What is the mean? Median? Mode?

B. Are there any outliers? If so, what are they? Why don't they meet your expectations?

C. Graph the data.

5. Create research questions using the data.

A. Identify a question related to these data that you could research.

B. Identify another scientific variable that you could evaluate with these data.

C. How do you think this area compares to other geographic provinces in your region? *(i.e., coastal plain, highlands, etc.)*

6. Apply the data.

A. What science questions do these data help us understand?

B. Describe how you may use these data to explain a scientific phenomenon.

C. How is Technology connected to these data?

my NASA data

NP-2019-10-093-LaRC

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my NASA data

NP-2019-10-093-LaRC

Data Cube Questions

1. Summarize the data.

A. The data are displayed in a *(table, chart, etc.)* _____.
B. The title tells me the data are about _____.
C. The variable measured is _____.
D. The lowest value is _____.
E. The highest value is _____.

2. Describe the data.

A. The data were collected using _____ *(i.e. thermometer, instrument, etc.)*.
B. The data are collected every _____ *(day, week, month, quarter, year, etc.)*.
C. The unit used to describe the data is _____.

3. Analyze the data.

A. The geographic area of Earth where the data were collected is _____.
B. The time range is from _____ to _____.
C. These data show that _____.

4. Assess the data values.

A. The mean is _____. The median is _____. The mode is _____.
B. The highest value is _____. The lowest value is _____.
C. This variable belongs in the _____ sphere of the Earth System.

5. Create questions using the data.

A. I wonder...
B. If _____ changed, then the data would *(increase/decrease/stay the same)* _____.
C. How does...?
D. Why...?

6. Apply the data.

A. These data help us understand _____.
B. These data can explain why _____ happens.
C. Technology was used to get these data by _____.

D

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