

Name:

Date:

Changes in Seasonal NDVI

Introduction. Vegetation Indices give us information about the presence, vigor, and/or density of vegetation. NASA's MODIS instrument measures a vegetation index called the Normalized Difference Vegetation Index (or NDVI) over the entire globe. NDVI ranges from -1 to 1, with higher values corresponding to greater vegetation density. In this investigation you will explore seasonal changes in NDVI in multiple locations.

Guiding question: How does NDVI change over time in two different locations?

Section I: How does NDVI change seasonally in your location?

1. From the Data Tools page on the Student Climate Data website, click on 'Carbon Mapper.'
2. Close the introductory pop-up window.
3. In the Layers panel (*on the right*), click the box next to **Background**. Change the Background layer to 'Google Hybrid.'
4. Click and drag the map and use the zoom tool to find your location on the map (i.e., your town, school, etc.).
 - a. In your science notebook, record your location's **latitude and longitude**. (*Displayed on the bottom of the screen*)
5. Now zoom into the map until you have reached **Zoom Level 12** (*displayed at the bottom of the screen; zoom level 12 is the best level for obtaining only one data point for a particular location*).
6. Now click the box next to the **MODIS NDVI** Layer, and then **NDVI 2013** to view MODIS data.
7. Click on the box next to **Winter NDVI** to display the NDVI data on the map.
8. Click on the identify tool - the **i** icon - and then click on the center of the map. The identify box should pop up.

(*If you get the message: "Sorry, there was nothing that could be identified. Please select some more layers," try clicking in a slightly different spot on the map.*)
9. Create a data table in your science notebook that has two columns: **Season** and **NDVI**. Record the **winter NDVI** value in the table. Make sure to include a **descriptive title** for your Table that includes the **location**.
10. In order to obtain NDVI data for the three remaining seasons, close the identify box, then un-click the box next to **Winter NDVI**. One at a time, click on **Spring**, **Summer**, and **Fall NDVI** for your location, making sure to un-click the previous



layer. For each layer, click on you location on the map to access the identify box and record the NDVI value in your table.

11. In your science notebook, record any other observations and/or questions that you have, including answering the questions:
 - a. In which season is the NDVI value the highest? Why?
 - b. In which season is NDVI the lowest? What features in your landscape or weather patterns might be contributing to a low NDVI value?
 - c. Record one or two questions you have about NDVI after observing the patterns in data.

Section II: How does NDVI change in a contrasting location?

1. Return to the Student Climate Data website tab (make sure not to close out of the Carbon Mapper).
2. Follow the link under the Picture Post heading to the Picture Post website (<http://picturepost.unh.edu>).
3. Use the map to choose a second location that you think will show a different NDVI pattern than your first location. To help you choose, either:
 - a. Pick a spot with a Picture Post- click on the red marker on the map and click ‘View Pictures’ in the pop-up window to see photos from that location, or...
 - b. Zoom into a location on the map. Drag the Google Man (*yellow figure at the top-left of the map*) onto the map and place him on one of the blue lines to see a ground view of that location.
 - c. In your science notebook record **the location** that you chose and describe **why** you chose that location
4. Based on the ground-level photos, predict how NDVI will change over time in this location. Sketch or describe the pattern in your notebook. Why do you expect to see this pattern?
5. Return to the Carbon Mapper. Unclick any data layers that are on. Unclick the identify tool icon.
6. Follow the steps 4-9 in **Section I** to find seasonal NDVI for your second location.
7. In your science notebook, create a second **data table** with **Season** and **NDVI**, and a **descriptive title**. Fill in the table with the data you obtained from the Carbon Mapper.
8. In your science notebook, record any other observations and/or questions that you have, including answering the questions:
 - a. Does the NDVI data show the pattern you expected? Why or why not?



Section III: What features in a location influence NDVI?

1. Using NDVI values (Tables 1 & 2), draw a **graph** of the NDVI for your two locations, with 'Season' on the x-axis (independent variable) and 'NDVI' on the y-axis (dependent variable). Use a different colored pen or different line styles for each location. Be sure to label your axes and provide a legend if necessary.
2. In your notebook, record any further observations and/or questions, including answering the following questions:
 - a. Which location has higher NDVI in the summer? Which has higher NDVI in the winter?
 - b. Do the two locations follow the same seasonal pattern? What features in the landscape might be causing these similarities or differences?