**Guided Inquiry**

**Splitting up the work**: After you are assigned your groups it is up to you to determine your roles. There are four main roles. In groups of 3, combine the Lead Researcher and Analyst into one role. In groups of two, combine Task Manager and Lead Presenter into one role as well.

**Team members**: **Role**:

1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Short Answer**: Using your notes or the class PowerPoint, feel free to discuss with your group

What is the basic process of Science?

What is the Forest Carbon Cycle? (be sure to discuss carbon stock and fluxes)

What is the Forest Carbon Database? (ForC)

**Exploring the Data**: Since ForC is open access you can go there right now and download any data you’re interested in (<https://github.com/forc-db/ForC/tree/master/data>). However, it might look a bit messy if you don’t know what you’re looking for. Before you start thinking about what question you’re going to ask, make sure you have a cheat\_sheet available and load the Shiny App: (<https://forc.shinyapps.io/global_data_visualization/>). Each member of the group should spend some time looking at different variables.

Now each member of the group (looking at table 2 of your cheat sheet) should choose three variables you’d like to explore and list them below (each member selects a different 3 variables):

**My variables** are (1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and

(3)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Find your variables on the Shiny App and observe the locations where the data was collected and how many records there are. Fill out the following chart:

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable name** | **Global distribution (describe)** | **Total number of records** | **In your opinion: do you think this variable would be a good one to ask a question about? Why or why not?** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Discuss as a group the variables you studied. Do any stick out as the most interesting or best suited to study? Why?

**Process of Science**

1) **Question**: Using the Question slide on the PowerPoint choose one independent variable and write your question below

What is your **independent variable**?

What is your **dependent variable**?

2) **Research** (all team members participate, led by lead researcher). Take notes (in your notebook or in a word document). Look up more information on your independent and dependent variables, forest carbon cycling, and read up on ForC. You can use provided background information or other resources as provided by your instructor.

4) **Protocols**: Already completed and entered into ForC. The protocols were developed by researchers using a standardized approach to monitor GPP, and collect mean annual temperature

5) **Data Collection**: Done by researchers in the field for individual studies. The ForC database collected data from multiple studies other questions can be asked.

6) **Data Processing**: Go to <https://github.com/forc-db/ForC> and click educational resources, then click ForC\_simplified\_edu.csv and finally right click the download button and click “save link as.” Open the file in Excel (or another data processing program as instructed). If you have experience in Excel then create a scatter plot of your independent and dependent variables. If you have little experience in Excel use the following steps:

* Open the file in Excel
* Click the “filter” button
* Click the down arrow by the variable.name and click (select All) to deselect all variables. Then check off your **dependent** variable
* Find your independent variable and remove any “NA”, “NAN” or missing measurements
* Select all data (Ctrl + A) and copy (Ctrl + C) into a new spread sheet.
* Create a scatterplot with your independent variable on the X axis and your dependent variable on the Y axis. Create a tendline and display the equation and R squared value

7) **Data Analysis**: Answer the following

What is a linear regression line?

Write down your liner regression equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is an R squared value and how do you interpret it?

Write down your R squared value:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Briefly explain what you think the data suggests about the effect your independent variable has on your dependent variable

8) **Conclusion**: Write a concluding paragraph on the impacts of your independent variable on your dependent variable. Be sure to structure include an introduction sentence (on the forest carbon cycle), clearly state your hypothesis, background on ForC, the methods we used as a class, and a reference to your graph and R squared value.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Communicating** your Results: Now that you have finished your analysis it is your duty to explain your findings to the class. Your group will be responsible for a short graded (5 – 10 minute) presentation. You must include the following slides. You will have time in class, but should also work at home. You will be graded as a group and individually based on your roles.

1. **Cover** slide with your question and group members
2. **Background** slide (on your specific info, not ForC or ForestGEO)
3. An **hypothesis** slide that also explains your dependent and independent variables
4. A **methods** slide that (briefly) describes what you did in data processing and analysis
5. A **results** slide that explains your findings
6. A **discussion** slide that puts your study into the context of our global environment
7. A **works cited** slide that contains all references you used