**IB Biology Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Greenland Ice Reflection Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Scientists use a variety of methods to investigate ice sheet changes. In this exercise you will look at graph and map data to think about how, if at all, the Greenland ice sheet seems to be changing.

**Part 1: Thinking about albedo**

In small groups, spend a few minutes answering the following questions:

1. What is albedo?
2. Brainstorm some reasons why glacial ice can exhibit such a wide albedo range.
3. During which parts of the year would you expect the Greenland ice sheet to exhibit the highest and lowest albedo values? Why?
4. During a given month, would you expect all regions of Greenland to exhibit the same albedo? Explain your answer.
5. You will be interpreting graphs of Greenland’s albedo based on satellite data. Before you look at the graphs, let’s make some predictions about how albedo varies annually. Which of the graphs sketched below best represents the variation in albedo over the course of a typical year in Greenland?
	* 1. A b) B c) C

Albedo

Jan 🡪 Dec

**A**

Albedo

Jan 🡪 Dec

**B**

Albedo

Jan 🡪 Dec

**C**

*Adapted from:* InTeGrate: Climate of Change

**Part 2: Greenland Ice Sheet Albedo at Various Elevations**

1. Each person will be provided with some real albedo data from Greenland with time on the X axis and albedo on the Y axis. You will have a different graph than others in your group because albedo measurements were made at different elevations on the ice sheet. Study your graph and describe what your graph illustrates, including the answers to the following questions: *What elevation range does your data represent? What do the different colors on the graph indicate? What albedo range is illustrated on your graph? In general, which months have the highest and lowest albedo?*

1. Can you discern any trends in albedo values when you compare data from the initial few years with data from the most recent years?

1. Compare your albedo graph with the graphs of the other members of your group. First, as a group, make sure that everyone is clear on the questions that you already answered on your own. Share observations about the different graphs and summarize what you interpret the albedo data suggests could be happening to the Greenland ice sheet. *Based on the overall data, do the higher OR lower elevation areas in Greenland have the greatest albedo? Offer an explanation for WHY. Which elevations show the greatest/least contrast in albedo values over the period represented by the data?*
2. What would you predict the albedo data for 2018 looks like?
3. How confident would you be in predicting what the data for 2018 looks like? Explain your answer.

Very confident

Not at all confident

**Part 3: Why Should we care?**

1. Why should we care that ice is melting in Greenland? So what?

*Brainstorm ideas in your group and record your answers.*

*Then, add to those as we discuss as a class and watch a video.*

**Part 4: What is happening in 2018?**

1. Look at the new graphs in your groups. Describe what the graph is showing- what is on the x and y

axes?

1. What conclusions can you draw from the graph?

**Part 5: The Rest of the Story**

1. What is the North Atlantic Oscillation (NAO?)

 **Positive Phase: Negative Phase:**

  

1. How does the NAO impact the jet stream? How does that impact climate in Greenland and Europe?

**Article: Greenland’s Melting Ice Nears a Tipping Point**

1. Rising sea levels are caused by what two things?
2. Explain what happened to sea ice melting rates in 2013 and what the explanation for this might be.
3. Why does Dr. Bevis say this is concerning?
4. There is a lot of talk internationally about trying to keep the climate from warming more than 2 degrees Celsius. How much has it already warmed?
5. Why does Dr. Das take issue with calling this a ‘tipping point’?