



Seasonal Changes in Albedo

1. How does albedo change with the seasons?

2. What is unique about ice and snow?

3. What does the changing albedo in the polar regions tell you about seasonal changes in ice and snow?

Annual Sea Ice Minimum

1. What happens to sea ice in the summer?

2. What trend did you observe in the video?

Changes in Sea Ice over Time

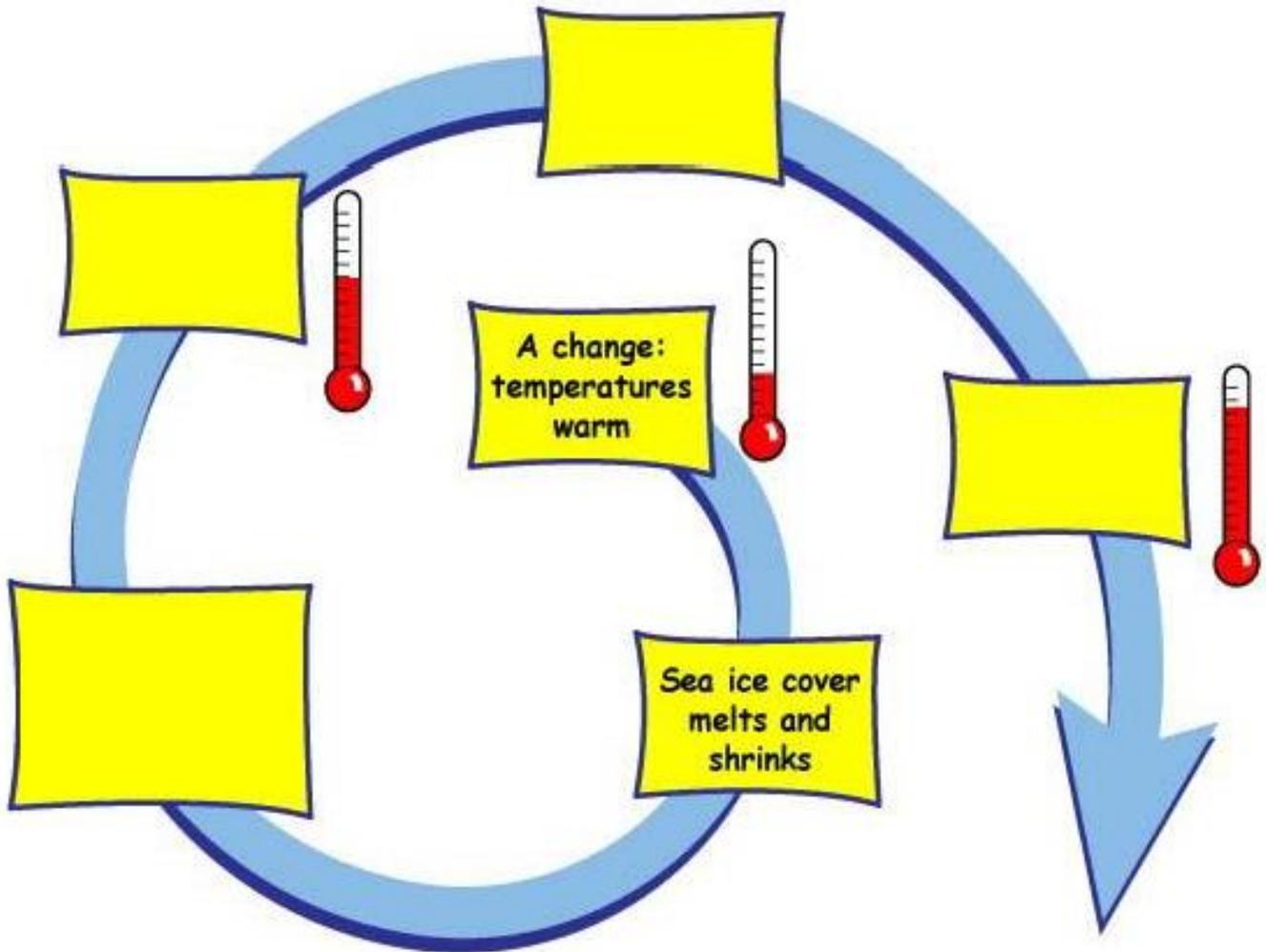
1. What reasons can you think of to explain why the older sea ice is disappearing?

Feedbacks

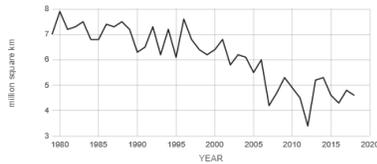
1. What is a negative feedback loop? Explain the example given in the video.

2. What is a positive feedback loop? Explain the example given in the video.

3. Complete the graphic organizer of a positive feedback loop for the effects of changing albedo on sea ice.



Positive Feedback Loop



Source: climate.nasa.gov

This graph shows the sea ice minimum over time.

1. What was the level of sea ice in 2000?

2. What was the level of sea ice in 2005?

3. What was the level of sea ice in 2010?

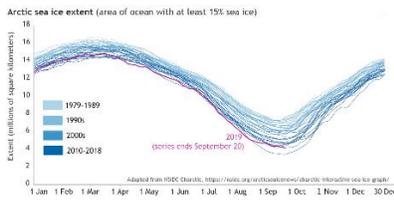
4. What was the level of sea ice in 2015?

5. What was the highest level and what year was it?

6. What was the lowest level and what year was it?

7. What is the trend over time?

8. How will albedo change with this trend in the sea ice?



The graph shows the sea ice over the course of the year for many years.

1. What is the pattern of sea ice each year?

2. What time of year has the highest level of sea ice?

3. Which month has the lowest sea ice each year?

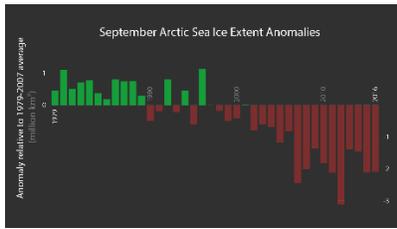
4. How has the minimum changed over time?

5. What is the difference between the different time ranges shown on the graph?

6. How is the time range 2010 – 2018 different from the other time ranges?

7. What is the trend over time?

8. How will albedo change with this trend in the sea ice?



1. What years were used to find the average sea ice extent?

2. How does the year 2000 compare with the average?

3. How does the year 2005 compare with the average?

4. How does the year 2010 compare with the average?

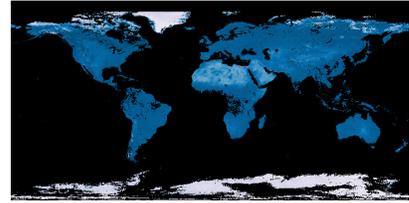
5. How does the year 2015 compare with the average?

6. Which year had the lowest value?

7. What is the trend over time?

8. How will albedo change with this trend in the sea ice?

These images show albedo over land only. That means that the albedo in the polar regions in these images is from snow or land ice. Focus on the albedo in the Arctic when answering the questions.



1. What month does each image show?

2. What is significant about that month?

3. How does the albedo for 2000 compare with 2005?

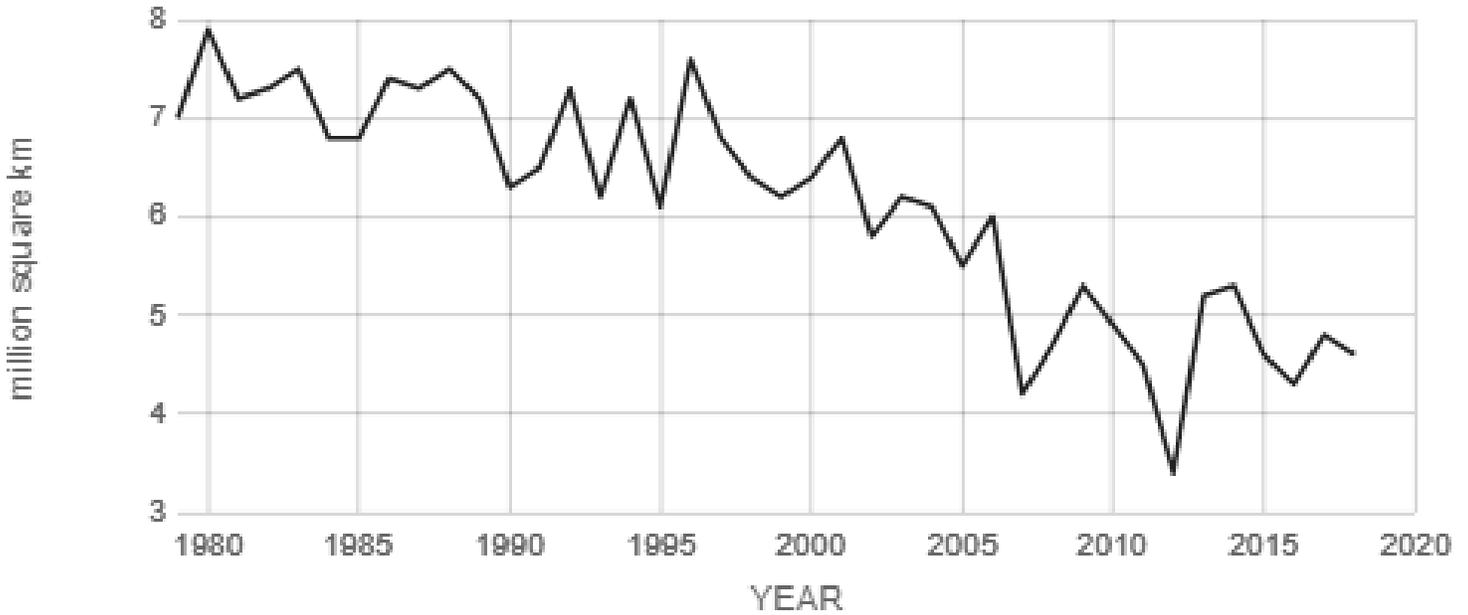
4. How does the albedo for 2000 compare with 2010?

5. How does the albedo for 2000 compare with 2015?

6. Which year had the lowest albedo?

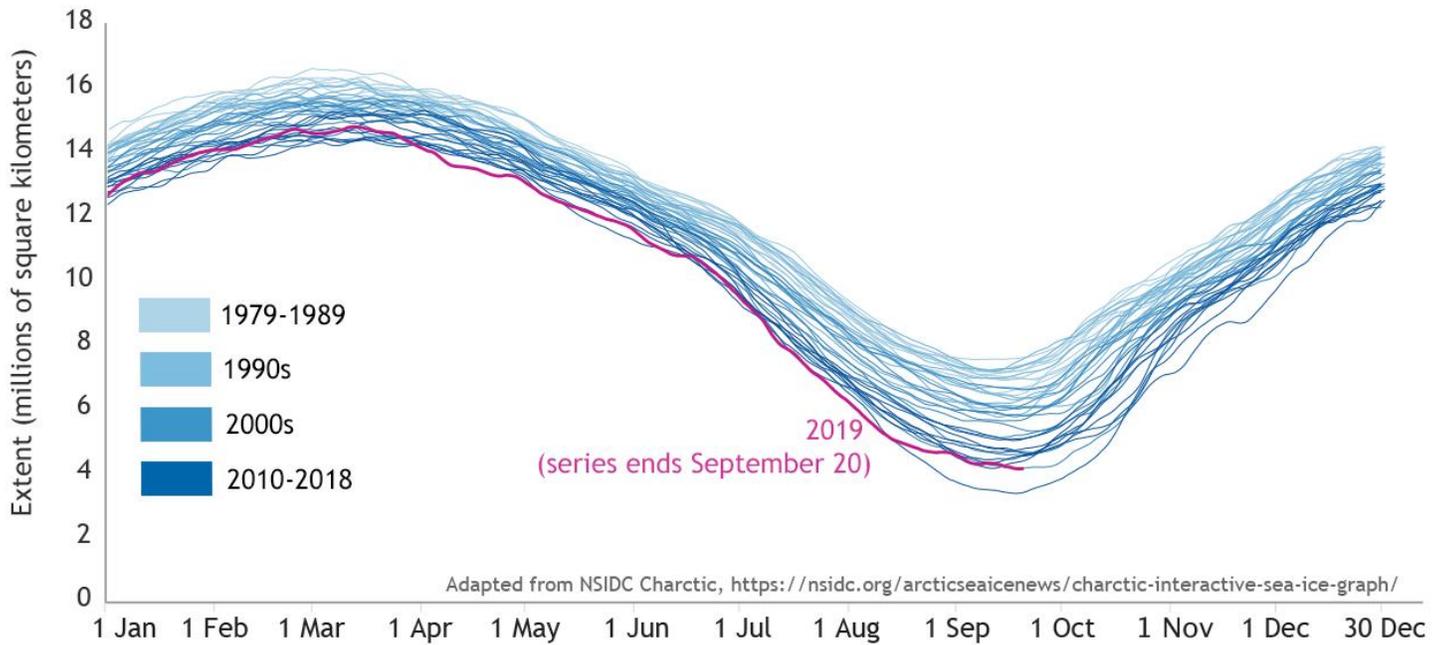
7. What is the trend?

8. What relationship might there be between the albedo on land and sea ice?



Source: climate.nasa.gov

Arctic sea ice extent (area of ocean with at least 15% sea ice)



Adapted from NSIDC Charctic, <https://nsidc.org/arcticseaicenews/charctic-interactive-sea-ice-graph/>

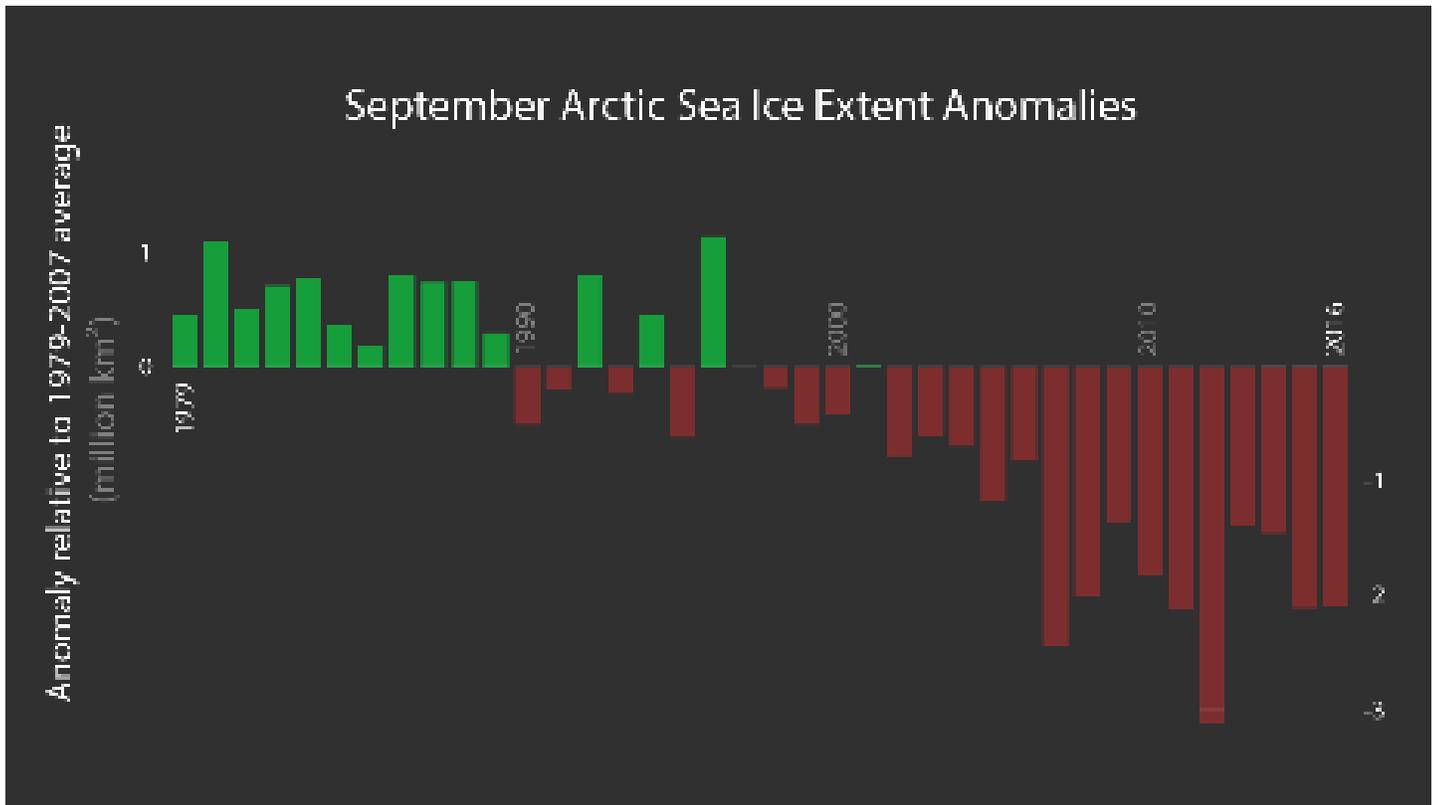
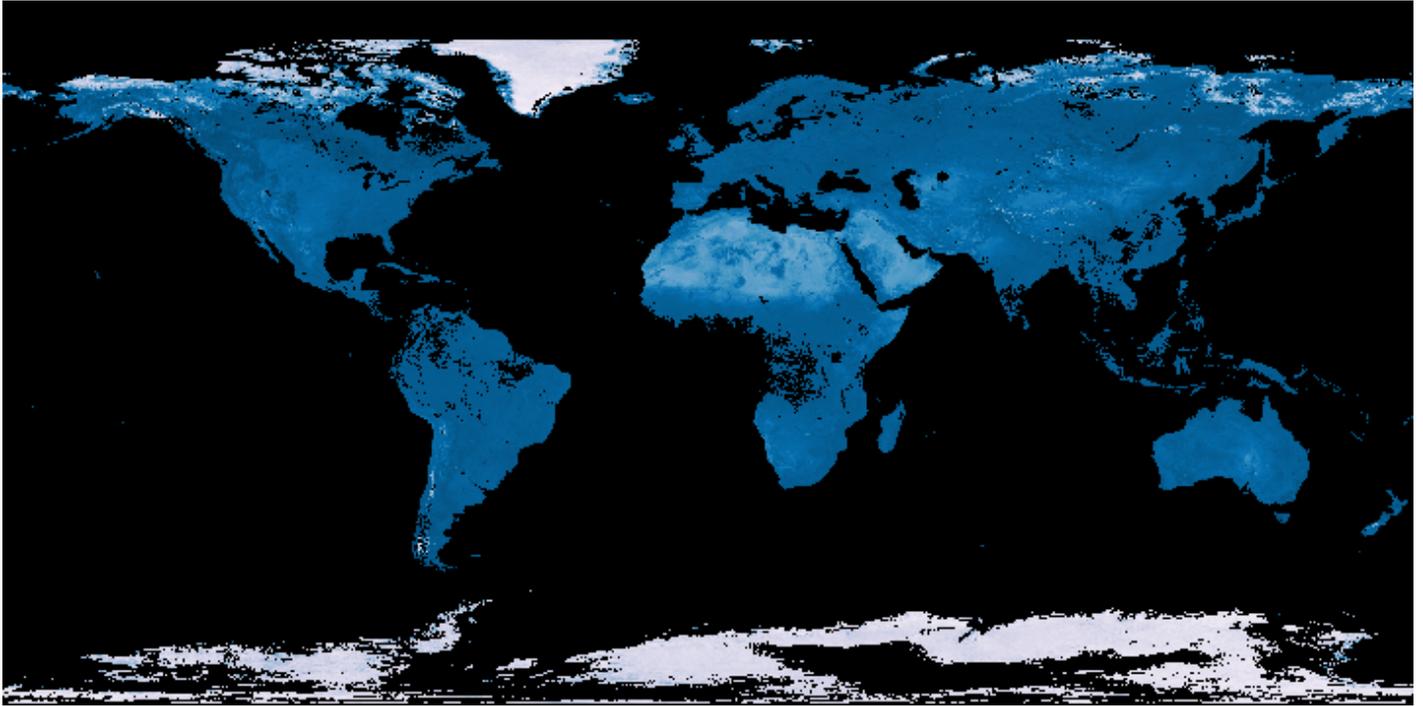
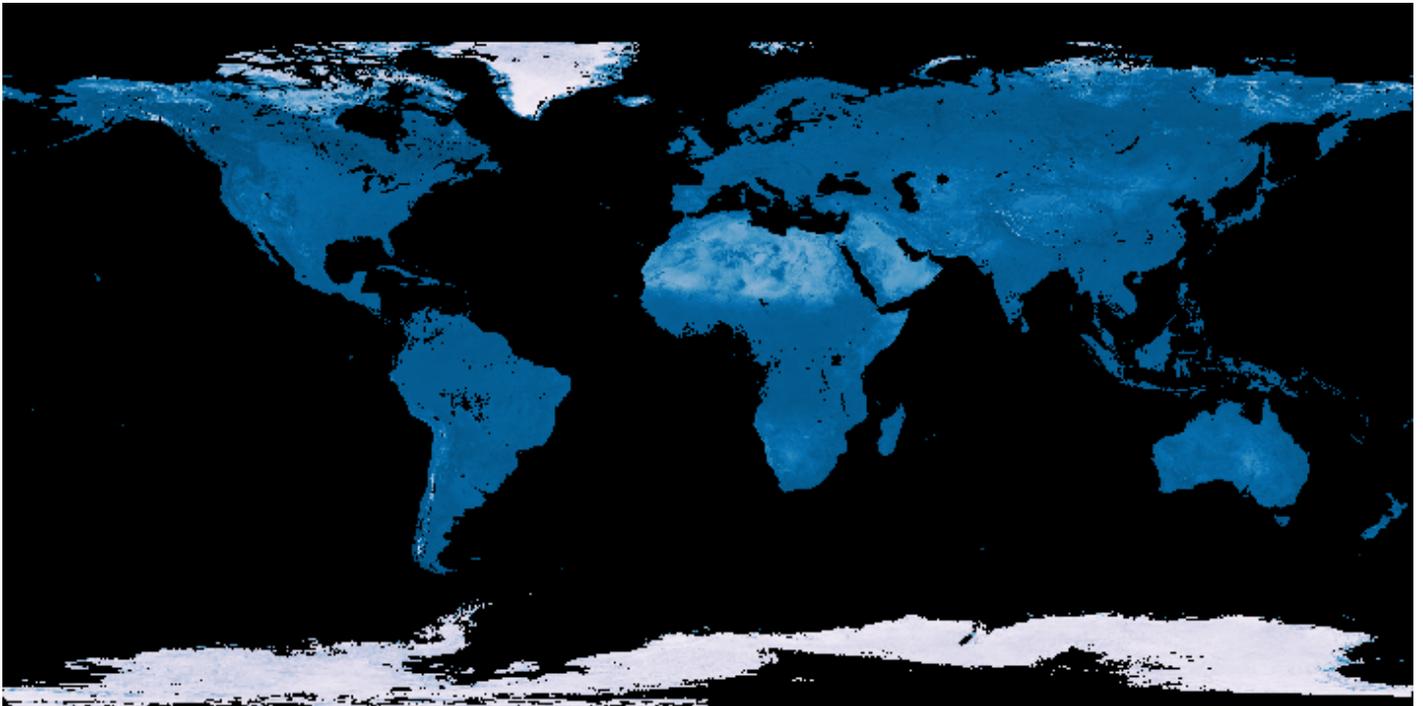


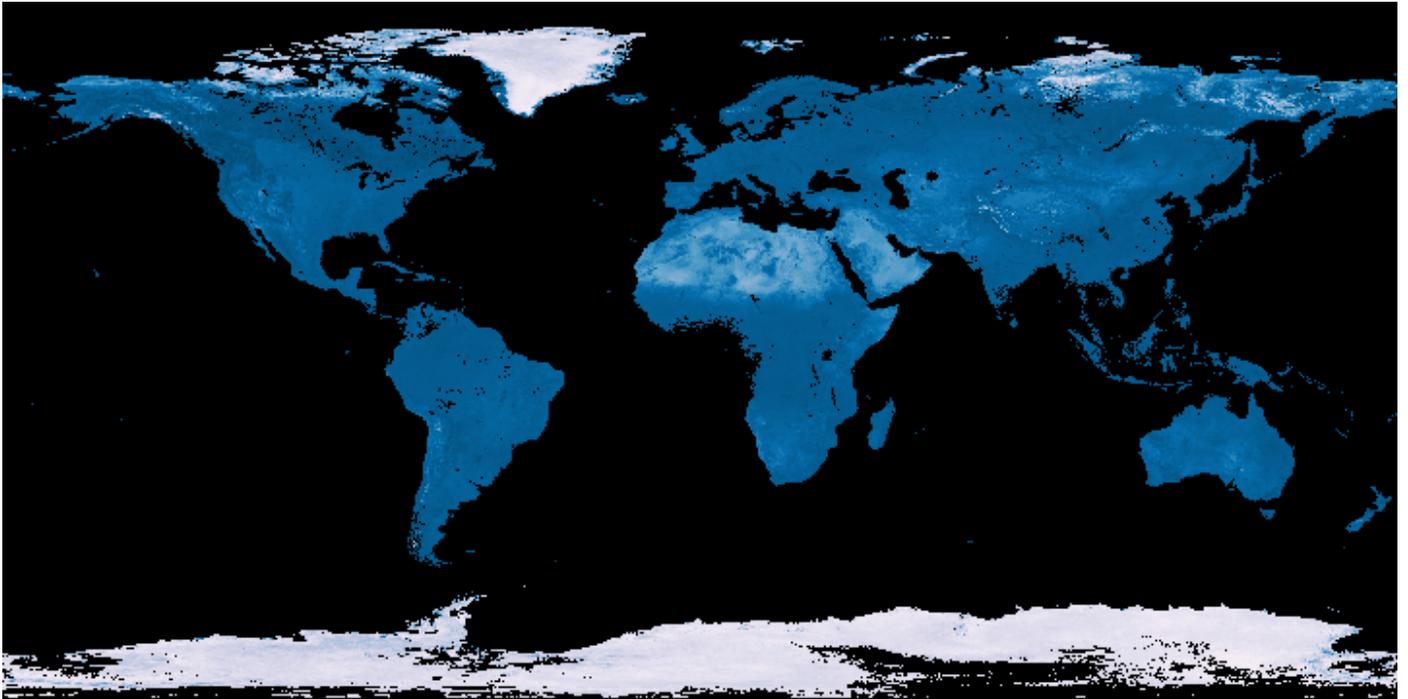
Image Credit: NASA Goddard Space Flight Center



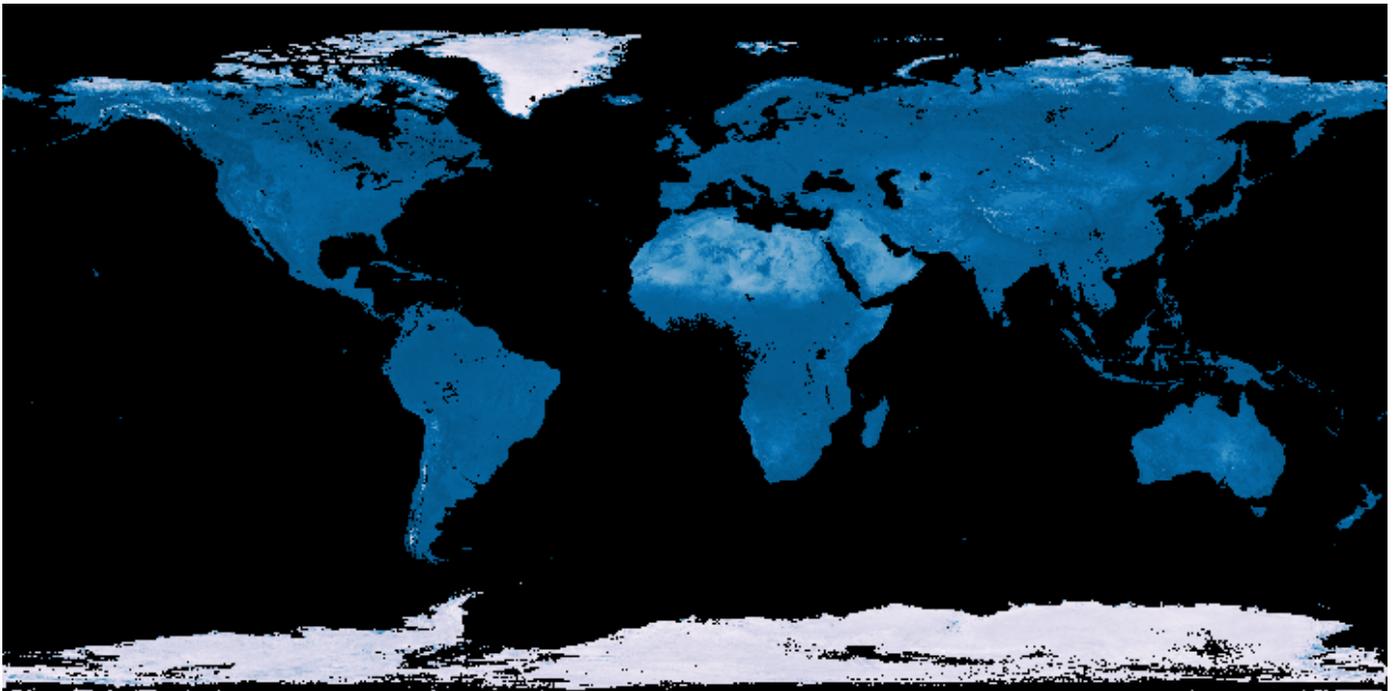
Albedo September 2000 – Image Credit: NASA NEO



Albedo September 2005 – Image Credit: NASA NEO



Albedo September 2010 – Image Credit: NASA NEO



Albedo September 2015 – Image Credit: NASA NEO



Student Name:

Date:

Period:

Claim: Make a claim to answer the question: **What is likely to happen to Arctic sea ice in the next few years?**

Evidence: Sufficient, Appropriate, and Observation Driven	Reasoning: (Why is this evidence important?)