Activity 10: When are the Kiuguyat\textsuperscript{NS}/Kiujiyaq\textsuperscript{NP} Visible in Your Area?

Time: 1-2 class periods (1 class period = 45 min)

Materials:
- Creating the Northern Lights poster
- Data Collection worksheet
- Data Analysis worksheet
- Large paper or whiteboard/chalkboard
- Markers/chalk

Standards Addressed:
- Alaska Cultural Standards: B.1, B.2, D.1, D.3
- Iñupiat Learning Framework: [E]C.s.4.1, [E]H.uqu.4.1
- Iñupiaq Cultural Values: Respect for Elders
- Alaska Science Content Standards: A.1, A.3, D.3, F.2, F.3
- Alaska English/Language Arts Content Standards: RSIT K-5 Grade 4: 7

Background Information:
Earth’s rotation and tilt on its axis as it orbits the sun impact when and where the northern lights can be seen. The aurora oval hovers around the geomagnetic north pole year-round, but in order for the lights to be visible (even directly beneath the oval) the sky must be dark and clear. Earth is always rotating, and this rotation causes periods of daylight and darkness that we know as day and night. The side of Earth facing the sun experiences day, while the side facing away from the sun experiences night. During periods of daylight, the northern lights cannot be seen because the bright light of the sun obscures them. During the night, skies are dark enough to reveal the aurora. During winter, the far northern regions of Earth are tilted away from the sun. Days grow shorter, and nights longer, until in some areas the sun sinks below the horizon and does not appear again for weeks at a time. Times of darkness are good times to look for the northern lights. Other factors, such as cloud cover, geography and urban lighting also can affect whether people can see the northern lights when they are overhead. In this activity, students will interview community members to collect data on when the northern lights are visible from their area, then graph and look for patterns in the data that are the result of Earth’s rotation and tilt as it orbits the sun.

Assessments:
- Student responses on Data Collection worksheets will provide a means of assessing student ability to:
  - engage effectively in learning activities that are based on traditional ways of knowing and learning;
  - collect data to investigate a scientific question.
- Student responses on Data Analysis worksheets will provide a means of assessing student ability to:
  - make effective use of the knowledge, skills and ways of knowing from their own cultural traditions to learn about the larger world in which they live;
  - acquire insights from other cultures without diminishing the integrity of their own;
  - understand processes of science used to investigate problems, including conducting a repeatable scientific investigation;
  - understand how Earth’s rotation, tilt and orbit affect cause observable patterns and affect when the aurora is visible.
Activity Instructions:

1. Briefly review the process that causes the northern lights. Refer to the Creating the Northern Lights poster.

2. Ask students which months are the best months to view the northern lights. Make a bar graph on the board or a large paper to show which month is preferred.

3. Discuss whether the experience from the class on its own is enough to determine the best month. Introduce the term “sample size” and explain how a larger sample size grants greater insight.

4. Ask students to read pages 12-14 of the KiuguyatNS/KiugiyaqNP The Northern Lights Elementary Guide.

5. Distribute the Data Collection worksheet and ask students to communicate with elders, parents or others in their community to ask which months the northern lights are visible, what colors most often appear, and where the best local places to view the northern lights. If you wish to complete this activity in one class period, ask students to interview adults in the school for this activity. Local administrators, principals, janitors, librarians, aides, maintenance workers, teachers and even high school students can be great resources to interview for this lesson. Please note: There are two versions of the worksheet. The North Slope Iñupiaq version is indicated by the superscript NS in the worksheet's title bar. The Northern Seward Peninsula Iñupiaq version is indicated by the superscript NP in the worksheet's title bar. Use the version that is most appropriate for your community.

6. After students have gathered their data, ask them to compile and analyze it as a class. Create a class bar graph showing which months were reported as best for seeing the northern lights. Create a class tally showing how many people reported night versus daytime as best for seeing the lights. Print or draw a map of your community and ask students to mark the locations that people reported as best for viewing the northern lights.

7. Discuss as a class: How does Earth's rotation affect when the northern lights are visible? How does Earth's tilt and orbit affect when the northern lights are visible? How does the information about Earth's rotation, tilt and orbit connect to the information we learned from our community about when the northern lights are visible? What else affects when we can see the northern lights (i.e. clouds, lighted streets or homes etc.)?

8. Distribute the Data Analysis worksheet. Please note: There are two versions of the worksheet. The North Slope Iñupiaq version is indicated by the superscript NS in the worksheet's title bar. The Northern Seward Peninsula Iñupiaq version is indicated by the superscript NP in the worksheet's title bar. Use the version that is most appropriate for your community.

9. Ask students to answer the questions on their worksheet.

Connections and Extensions:

- Incorporate technology by marking favored locations to observe the northern lights in Google Maps or Google Earth.
- Visit https://www.brainpop.com/science/earthsystem/solsticeandequinox/ to share a short animated video about seasons with your students.
- Watch the night sky near Fairbanks, Alaska by visiting http://allsky.gi.alaska.edu. This website shares live footage of the northern lights using an all-sky camera located at Poker Flat Research Range outside of Fairbanks. The camera feeds footage to the website only when skies are dark.
Activity 10: When are the Kiuגיעyat visible in your area?

When are the Kiu struggyat visible in your area? Interview two adults in your community about when they most often see the northern lights. You can speak to parents, elders, other adult family members, or community members. Record their responses below.

1. During which months are the northern lights visible in your community?

   Person 1 name:  

   (Circle all that apply)

   Jan    Feb    Mar    Apr    May    Jun    Jul    Aug    Sep    Oct    Nov    Dec

   Person 2 name:  

   (Circle all that apply)

   Jan    Feb    Mar    Apr    May    Jun    Jul    Aug    Sep    Oct    Nov    Dec

2. What colors have you observed in the northern lights?

   Person 1:  

   Person 2:  

3. Where is a good place nearby to view the northern lights?

   Person 1:  

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

   Person 2:  

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________
Activity 10: When are the Kiugiyaq visible in your area?

When are the Kiugiyaq visible in your area? Interview two adults in your community about when they most often see the northern lights. You can speak to parents, elders, other adult family members, or community members. Record their responses below.

1. During which months are the northern lights visible in your community?
   - Person 1 name: ___________________________________________ (Circle all that apply)
     Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec
   - Person 2 name: ___________________________________________ (Circle all that apply)
     Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

2. What colors have you observed in the northern lights?
   - Person 1: ________________________________________________
   - Person 2: ________________________________________________

3. Where is a good place nearby to view the northern lights?
   - Person 1: ________________________________________________
     ________________________________________________
     ________________________________________________
     ________________________________________________
   - Person 2: ________________________________________________
     ________________________________________________
     ________________________________________________
     ________________________________________________
Activity 10: When are the Kiuñuyat visible in your area?

When are the Kiuñuyat visible in your area? Use the data that you and your classmates collected to complete the questions below.

1. Create a bar graph to show the data your class collected about when the northern lights are visible in your area.

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<th>People reporting the aurora is visible in your community</th>
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Activity 10: When are the Kiعغوت visible in your area?

Data AnalysisNS (2 of 2)

Name: ____________________________

2. What colors of northern lights did people in your community see?

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3. Using your class data, list three good places to view the northern lights from your community:

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4. How does Earth’s rotation affect when the northern lights are visible?

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5. How does Earth’s orbit and the tilt of its axis affect when the northern lights are visible?

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