

# The View from Space

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Levels V-VI



Grades 9-12

## Overview:

The University of Alaska's Web-based Geographic Information Network of Alaska (known as GINA) is an extensive geographic and technologic database for Alaska and the Arctic. By viewing current and past satellite images available on GINA, students study weather patterns and sea ice movement on the Bering Sea to determine how weather patterns affect their local communities.

## Objectives:

The student will:

- learn how to convert GMT time to local time;
- use the Internet to access GINA (or use a demo CD-ROM of GINA);
- navigate the GINA site to bring up satellite images of the Bering Strait;
- study the pattern of ice floes in Norton Sound;
- record observed data on a data sheet; and
- draw conclusions about ice movement based on the data.

## GLEs Addressed:

*Science*

- [9] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [10-11] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating.
- [9] SA2.1 The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by formulating conclusions that are logical and supported by evidence.
- [9] SD1.2 The student demonstrates an understanding of geochemical cycles by applying knowledge of the water cycle to explain changes in the Earth's surface.
- [9-11] SD2.1 The student demonstrates an understanding of the forces that shape Earth by recognizing the dynamic interaction of erosion and deposition including human causes.
- [10-11] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by describing causes, effects, preventions, and mitigations of human impact on climate.

## Materials:

- Internet access (or a demo CD-ROM of GINA)
- STUDENT WORKSHEET: "A View from Space"
- STUDENT INFORMATION SHEET: "Using the GINA System"
- STUDENT WORKSHEET: "Using the GINA System"

## Activity Procedure:

In this activity, students will use GINA to study the presence of sea ice along the coast near their village. GINA is the main resource for the University of Alaska's geospatial data, with online satellite images of Alaska, an advanced geographic information system (GIS), and topographic imaging that can be used to study the extent of fires in the state, the presence and extent of sea ice along the coast, channel movement in major river drainages, weather patterns, and much more.

1. Explain to students that they will go online and learn to navigate the GINA Web site (or the demo CD-ROM of GINA) in order to study satellite images showing sea ice along the coast near their village. Ask students why it would be useful to use current satellite images in order to see the location of the sea ice. Their answers should include: knowing where the ice is for safety during travel out onto the ice, and may include an interest in global warming and erosion affecting coastal villages.
2. Walk students through the steps in the box below to enter the GINA website. Point out to students that latitude and longitude are displayed on the map at the left and corner when the mouse is moved around the map.

#### **Steps to access GINA**

1. Type in the URL for the GINA Web site: [www.gina.alaska.edu](http://www.gina.alaska.edu).
2. Click on Swathviewer on the upper right.
3. Click on linework on the upper left.
4. Click on U.S. cities at the bottom of the list to give it a checkmark.
5. Click on the "+" magnifying glass at the upper right of the page.
6. Use the mouse (the arrow will now look like a magnifying glass) until it is positioned over the Seward Peninsula. Click on it three times to zoom the satellite image up to 2 km above the peninsula (2 km will be highlighted on the ruler on the top left. Zooming in to 500 meters or closer may result in a loss of image. If this happens, use the mouse to zoom in by sliding the highlight to the left on the ruler).
6. Click on the Images bar on the upper left.
7. Click on the Misc bar and scroll down to select Terra-MODIS, and 2005.
8. Scroll down to a date and time and click on it to view the satellite image.

Example: View the satellite image taken on 2005-09-22 (date) at 08:10:07 GMT (time) or on 2005-09-23 (date) at 8:53:41 GMT (time). This image is of a storm over the Bering Sea that brought 65 mile-per-hour winds and 22-foot waves crashing over the seawall to flood Front Street and area shops in Nome on September 22 and 23, 2005.

3. Demonstrate how GINA can be used to study Norton Sound over time.
  - a) Scroll down to 2005-01-27 at 21:22:41 GMT and click on this date and time. The cloudless satellite image clearly shows ice in the Bering Strait and Norton Sound.
  - b) Click on View again and scroll down to 2005-01-29 at 21:10:28 GMT. The ice has shifted to the east.
  - c) Scroll down to 2005-01-31 at 20:58:11 GMT to see further eastward movement.
  - d) Now scroll down to 2005-02-07 at 21:04:17GMT. Clouds obscure the sound.
  - e) Look at 2005-02-10 at 21:34:54GMT. The ice has moved back into the sound.
4. Hand out the student worksheet "The View from Space" and ask students to complete it.
5. Distribute the Student Information Sheet and the Student Worksheet, which both are titled "Using the GINA System." Instruct students to use the directions found on the Student Information Sheet to access the GINA Web site in order to complete the worksheet.

## Answers to Student Worksheets:

### **The View from Space:**

1. e
2. a) June 8, 2004 at 2:15:29 AM Alaska Time  
b) October 11, 2005 at 10:30:10 PM Alaska Time

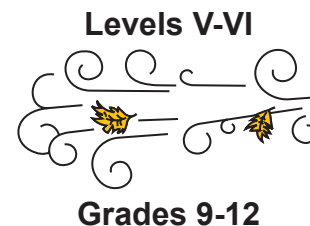
### **Using the GINA System:**

1. Answers will vary
2. 2005-06-06 at 21:10:21
3. Answers will vary, but should convey that the cloud cover indicates windy conditions that may speed melting of the ice.

Name: \_\_\_\_\_

# The View From Space

## Student Worksheet



1. Satellites orbit Earth gathering information in the form of radio waves, then beam this information back down to Earth. Circle the types of information made available due to satellites.
  - a. cell phone calls
  - b. cable television
  - c. weather maps
  - d. spy satellite images
  - e. all of the above
2. The GINA website lists satellite images according to the date and time they were taken. For example, a satellite image of the Seward Peninsula is saved under a file labeled 2005-06-07 21:04:17 GMT. But what does this mean?

Determining the date is easy. 2005-06-07 translates to June 7, 2005.

Determining the time takes a little math. GINA gives the time based on a 24-hour clock, and includes minutes and seconds. In addition, this 24-hour clock is based on Greenwich Mean Time (GMT), which is the time in Greenwich, England.

The 24-hour clock divides the day into 24 hours, running from midnight to midnight. This is also known as military time. The first 12 hours on a 12-hour clock are the same as a 12-hour clock, so that 11:00 am is 11:00 on the 24-hour clock. But 1:00 pm on a 12-hour clock is 13:00 on the 24-hour clock. Likewise, 5:00 pm is 17:00 on a 24-hour clock.

To determine what 21:04:17 GMT would be on a 12-hour clock, count the hours from 12:00 noon to 21:00 for a total of 9 hours, or a time of 9:00 PM. Minutes and seconds do not change. 21:04:17 GMT converts to 9:04:17pm on a 12-hour clock.

Alaska Time. Alaska Time is 8 hours earlier than GMT, so subtract 8 hours GMT to get Alaska time: (Note: GMT does not change during daylight savings time, so between November and March subtract 9 hours.)

9:04:17pm GMT (on a 12-hour clock) – 8 hours = 1:04:17pm Alaska Time.

Convert the following dates and times to Alaska Time:

- a. 2004-6-08 10:15:29 GMT

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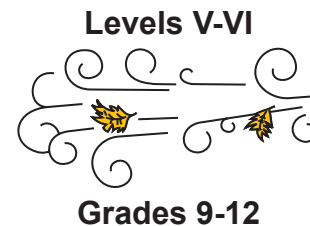
- b. 2005-10-12 06:30:10 GMT

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Name: \_\_\_\_\_

# Using the GINA System

## Student Information Sheet



### Using the GINA System

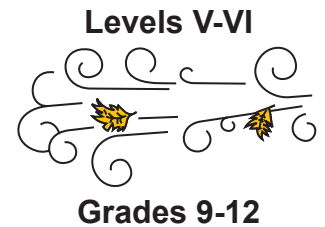
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Name: \_\_\_\_\_

# Using the GINA System

## Student Worksheet



**Directions:** Follow the instructions on the Student Information Sheet “Using the GINA System” to access the GINA Web site and complete this worksheet.

1. Notice that GINA’s Swathviewer gives the Latitude and Longitude of any point. Click on the approximate location of your village and write down the Latitude and Longitude.

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2. Use GINA to determine when Norton Sound became free of sea ice this last spring, and fill out the data table below. Click on several dates and times and begin to narrow the search. Some satellite images will appear red, which is an indication that the satellite that took the picture was not overhead. Other images will contain cloud cover that obscures Norton Sound. Narrow down the search until the earliest cloud-free image shows Norton Sound clear of ice.

Data Table:

Date and Time of Image	Ice Free? (Yes/No)	Cloud Cover? (Yes/No)

Record the first date and time that Norton Sound appeared ice-free:

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3. Look at satellite images for several days before Norton Sound was ice-free. Do these satellite images indicate changes in weather or wind that would have helped melt the last of the sea ice from Norton Sound?

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