

About this Activity Kit

Objectives: This kit is designed to support elementary Science and Social Studies Standards, as well as career exploration, in the context of the Gilbert and Marshall Islands campaign, specifically the attack on Makin. *This attack took place on November 20-23, 1943 in the Pacific Theater of WWII, with the USS Yorktown CV-10 supplying air support for army landing forces.*

Vocabulary/themes: balanced and unbalanced forces, matter, weather, climate, patterns/predictions of weather and climate, interactions of Earth's materials and systems (hydrosphere and atmosphere), relationship between human activities and climate, technological and geographic influence on military strategies in the Pacific

Standards Reached and/or Related to this Kit:

Grade Level	Social Studies	Science
3rd	<ul style="list-style-type: none">• 3.1.1.AG• 3.2.2.ER• 3.2.3.ER	<ul style="list-style-type: none">• 3-ESS2-1• 3-ESS2-2• 3-PS2-1
4th		<ul style="list-style-type: none">• 4-ESS2-2
5th	<ul style="list-style-type: none">• 5.3.CX	<ul style="list-style-type: none">• 5-PS1-1• 5-ESS2-1

Materials (included*):

- Teacher instructions, background information, and student handouts to be copied*
- Worksheet/Map 1: Alphanumeric Map of the Pacific Ocean*
- Map 2: Map of the wind patterns around the Gilbert and Marshall Islands*
- 6 Fans*
- 3 rolls of fishing line*
- 30, 1/2 straws*
- Tape
- Scissors
- 1 teacher paper airplane (demo)*

This kit includes:

- 3 Activities
- Career Connections



P-39 on Makin Island, from the collection of Patriots Point Naval and Maritime Museum, photograph Dec 1943 -Jan 1944.

Activity Instructions

NOTE: Activities 1, 2, and 3 can be set up as stations that students rotate through (I.E., your class can be divided into 3rds and each third can be divided into smaller groups to complete each activity in two's or three's).

Activity 1

Objective: To explore the Pacific Ocean and highlight how climate/weather might play a role in human activities using a map and worksheet.

Background: The United States used a strategy in the Pacific Theater known as island hopping. The main idea of island hopping was to “leap frog” over Japanese controlled islands where heavy resistance would be met and instead go for easier island targets. This allowed the US to penetrate deeper into the Pacific and effectively cut off supply chains to the Japanese held territories.

Activity Directions:

Distribute one copy of **Map 1** (alphanumeric map of the Pacific Ocean) to each group and have students answer the associated questions on **Student Worksheet Section Map 1**.

More in-depth discussion topics to consider:

- Compare/contrast the climate of atolls/islands/land masses on map with where you live and different SC regions (due to latitude difference, as well as island vs continent, coastal vs inland weather patterns)
- How might the climate influence daily life in these places?

Activity 2

Objective: To demonstrate how wind patterns played a major role in the attack on Makin. This will be accomplished through evaluation of a wind prediction map and answering associated questions.

Background: As part of the island hopping strategy the campaign on the Gilbert and Marshall Islands took place over a span of about 18 months, August 1942 - February 1944. The Battle of Makin occurred from November 20th – Nov 23rd, 1943, however the USS Liscome Bay was sunk on November 24th. The USS



Photograph of a VF-5 Hellcat spinning her propeller making condensation rings as she awaits take-off from the USS Yorktown on November 20th, 1943. From the collection of Patriots Point Naval and Maritime Museum.

Yorktown was part of Task Force 50, Fast Carrier Task Force. She was positioned 69 miles due west of Makin on November 20th. Her job was to launch planes to aid the Army's landing on Makin.

The weather in this region was a large consideration moving into the battle of Makin, as well as others taking place in the Gilbert and Marshall Islands, because of the equatorial front. Global wind patterns are predictable due to the heating of and rotation of the Earth. At the equator, two air masses collide and create an area of low pressure. For the purposes of this activity it is important to understand that because of the predictability, the weather report shown on Map 2 was generated by aerographers approximately 30 days in advance of the battle with high confidence. This allowed enough time for US forces to set up for the battle, and engage while the equatorial front was positioned north of the equator (as shown on Map 2), offering favorable weather conditions for bombers flying from the Ellice Islands, and unfavorable weather conditions for potential Japanese air support which would have come from Jaluit.

Activity Directions:

- Distribute one copy of Map 2 (predicted wind patterns over the Gilbert and Marshall Islands) to each group.
- Have students familiarize themselves with the maps, including the map key and interpretation of the wind direction arrows.
- Now have students complete the questions on [Student Worksheet Section Map 2](#).

Activity 3

Objective: To simulate the wind conditions aircraft faced. Students should take away a basic understanding of how balanced and unbalanced forces affect an object, and how the wind plays a major role in a pilot's ability to fly.

Activity Directions

Part 1: Demo in Front of the Class

- Select 4 students to become "the wind" and give each of these students a hand-held fan
- String a piece of fishing line through the straw on your teacher plane
- Have two students hold the fishing line taut on either end, making sure it is level
- Move the plane to the middle of the fishing line, then have students apply wind in different directions using the hand-held fan. They can try all 4 fans from behind the plane (unbalanced, causing plane to move), 2 fans from the front and 2 from the back of the plane (balanced, plane should remain still), 1 fan from 4 different directions, etc.

Part 2: Group Work

- Distribute the materials for making a plane to each student. Have each student follow the instructions for the paper airplanes included in the kit. You may have students decorate the airplanes if time permits.
- After assembling airplanes, set up “speedways” for racing. (These could be set up by the teacher prior to class.) Attach fishing line on one end to chairs with tape. The other end (unattached) will be held by the students. Make sure your speedways have even starting and finishing points.
- Students will race in pairs, with one student holding the loose end of the fishing line as “the pilot”, and the other student holding the fan as “the wind”.
- Put the Pilot’s plane on the very end of the fishing line. Make sure that the end of the plane is touching their hand.

Rules for the race:

- “The Pilot” cannot move their feet once the race begins. They may move the fishing line from side to side, but NOT UP AND DOWN.
- “The Wind” can use the hand-held fan to propel the plane forward. They may move with the plane, but MAY NOT TOUCH THE PLANE with their body or the fan itself.
- After the first race is complete, have the pilot and the wind switch places, and trade out the plane on the fishing line.
- Run the race again, then have new pairs trade out for their turns.

Wrapping Up

Climates are different across the globe, and these differences can have large effects on military activities in the regions. Planes depend on many forces to maintain flight, and variations in wind can affect these forces to either aid or hinder missions. In the battle of Makin, wind predictions based on the climate patterns were used to give the United States an advantage thus showing how important an understanding of the local climate can be.

Introduce your students to Historical and Modern Careers with the Career Connections handout (intended to be read by teacher and discussed).

Student Worksheet

Questions for Map 2

1. What imaginary line are the Gilbert Islands located on? (Hint: it is the line that separates the northern and southern hemispheres)
2. Circle Kwajalein and the USS Yorktown. Draw a square around Makin.
Is Kwajalein to the north or south of Makin? _____
What direction is the USS Yorktown from of Makin? _____
3. Draw a solid line from the USS Yorktown to Makin. Next draw a dashed line from Kwajalein to Makin. The solid line is the flight path for US planes and the dashed line is the flight path for the enemy bombers.
 - Will the two groups of planes have the same wind conditions on their way to Makin?
 - How will the wind be different? Write or draw your observations below:

Historical and Modern Careers on an Aircraft Carrier

Aerographer's Mate

The Navy officially made Aerographer a rating in 1924. (A rating can be thought of as a job or occupation). An Aerographer, now Aerographer's Mate (AG), is a mix between a weatherman and an oceanographer: helping to observe and predict weather both out at sea and on land.

Both men and women (WAVES: Women Accepted for Volunteer Emergency Service) served as AGs during WWII. Some of the same instruments used in WWII are still used today, including anemometers, barometers, and weather balloons. However, there have been many technological advances since then. One of the major limitations to meteorology (the science of weather) in the 1800s was that the radio had not yet been invented! With the invention of the radio in 1893, the first radio waves transmitted across the Atlantic in 1901, came the ability to send (and receive!) weather reports and forecasts across land and oceans. With an understanding of radio waves also came the invention of radar, which would be used for weather observation after WWII. An Aerologist's Mate today will also rely heavily on satellite technology.

AG's and their work is important for a variety of reasons. Weather impacts mission conditions, timing, and safety. Weather also directly affects how ships sail and planes fly. Temperature, pressure and humidity can all impact the altitude at which a plane can fly. Regional climate and climate patterns (for example wind patterns) also impact activities for better or for worse.



An AG aboard the USS Yorktown using radar, from the collection of Patriots Point Naval and Maritime Museum, photo 1953-1954.



An aerological officer holding an anemometer for two visiting British officers aboard the USS Charger, from the collection of Patriots Point Naval and Maritime Museum, photo 1944.

Critical Thinking: Why would an Aerographer's Mate have to train in both meteorology and oceanography?

Tools of the Trade: Have your students research further an anemometer.

- What does it measure?
- What units are their measurements in?
- Is the measurement a rate?
- What would a graph of these data look like?
- Could they make their own version of one? How?