PACIFIC ISLANDS DIGITAL ELEVATION MODELS

Coastal Models Supporting our Nation's Needs through Science and Technology

HOWE
HOWE
Cassidys Pt.
Cassidys Bay
Spit Head
Cold Bath Shoal
FIG
Cable Ferry
FIR
272°
360°
5 Cables

All of the coastal digital elevation models (DEMs) in this presentation were created by scientists with NOAA's National Geophysical Data Center (NGDC) and the Cooperative Institute for Research in Environmental Sciences (CIRES)— University of Colorado at Boulder. The elevation modeling work, done in collaboration with the National Tsunami Hazard Mitigation Program (NTHMP), is providing near-continous coverage of U.S. coasts in support of NOAA's role in protecting life and property and conserving and protecting natural resources.

Data identified as coming from the NOAA National Geophysical Data Center are provided for public use from many academic, federal, state and other sources. For a complete list of sources see the Technical Reports developed for each DEM, available online.

PACIFIC ISLANDS

United States Pacific Islands and territories are dispersed mostly across the southern Pacific Ocean. This geographic area – also known as Oceania, includes over 30,000 islands that are broken up into the regional groups of Melanesia, Micronesia, and Polynesia. These island groups consist of small atolls and cays, coral islands, expansive barrier reefs, and high volcanic islands. The islands include well known landmarks such as the Hawaiian Islands, American Samoa, Fiji, and Guam. More than just tropical travel destinations, these islands are home to thousands of residents whose local indigenous populations are mixed with western culture.

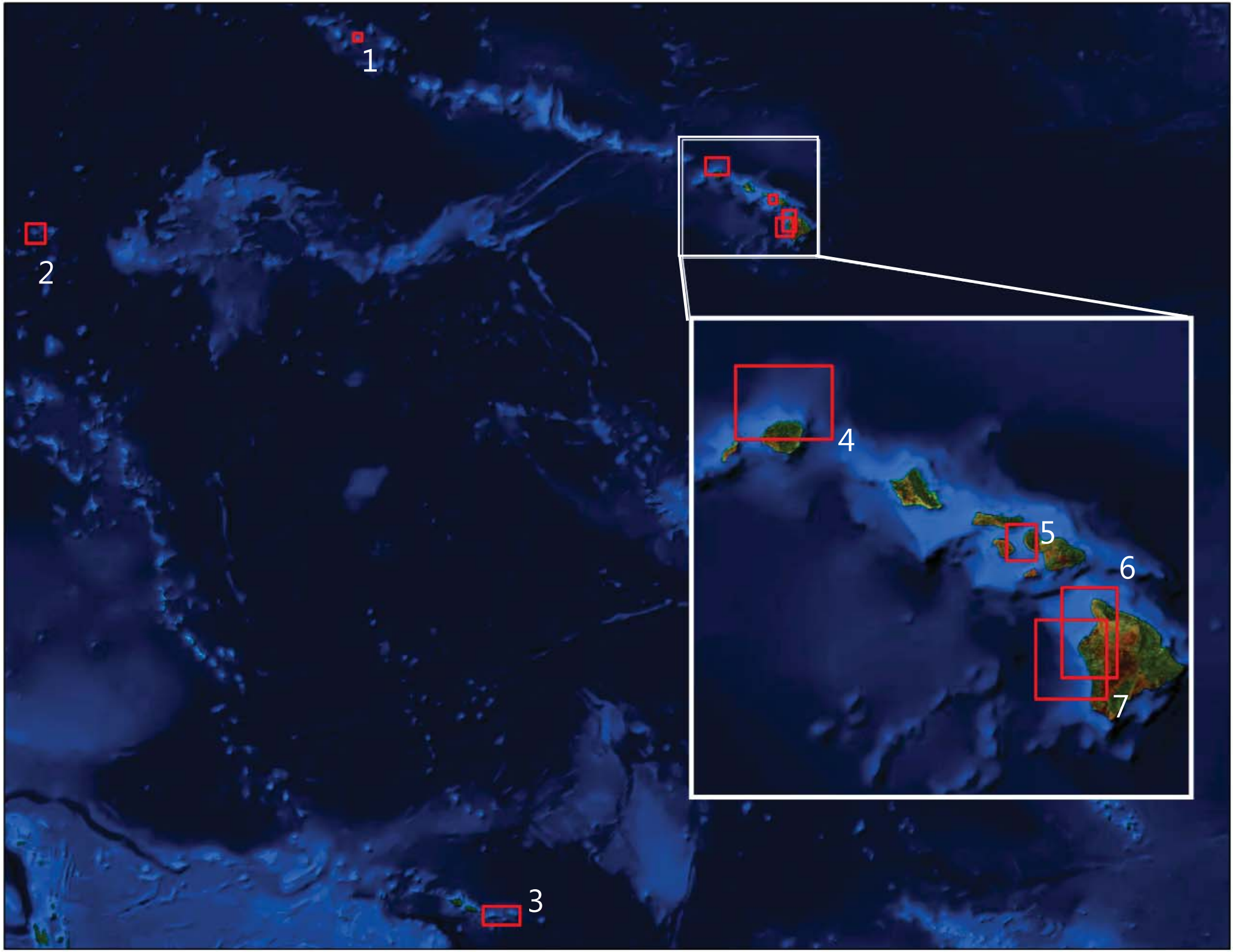
Communities and people who inhabit the tropical Pacific islands— especially in developments near the coast— are extremely vulnerable to severe storms, coastal inundation events, typhoons, earthquakes, and, as shown by the 2009 event that killed 149 people, 34 in American Samoa alone, tsunamis. Seismic activity at plate boundaries along the Pacific Ring of Fire, along with other tectonic stresses, deep-sea trenches, submerged volcanoes, and undersea features, increase the likelihood of risks associated with deadly large-wave events. Every year, coastal inundation events cause millions of dollars in damages and often loss of life.

The National Geophysical Data Center's digital elevation models (DEMs) provide detailed, accurate depictions of the coastal bathymetry and topography of the Pacific U.S. Islands and territories. The models are used by scientists, coastal managers, and policy makers to effectively maintain marine ecosystems and coastal resources, coordinate planning and mitigation efforts, and better understand the impacts of natural hazards on coastal communities.

1. Midway Atoll
2. Wake Island
3. Pago Pago
4. Hanalei
5. Lahaina
6. Kawaihae
7. Keauhou



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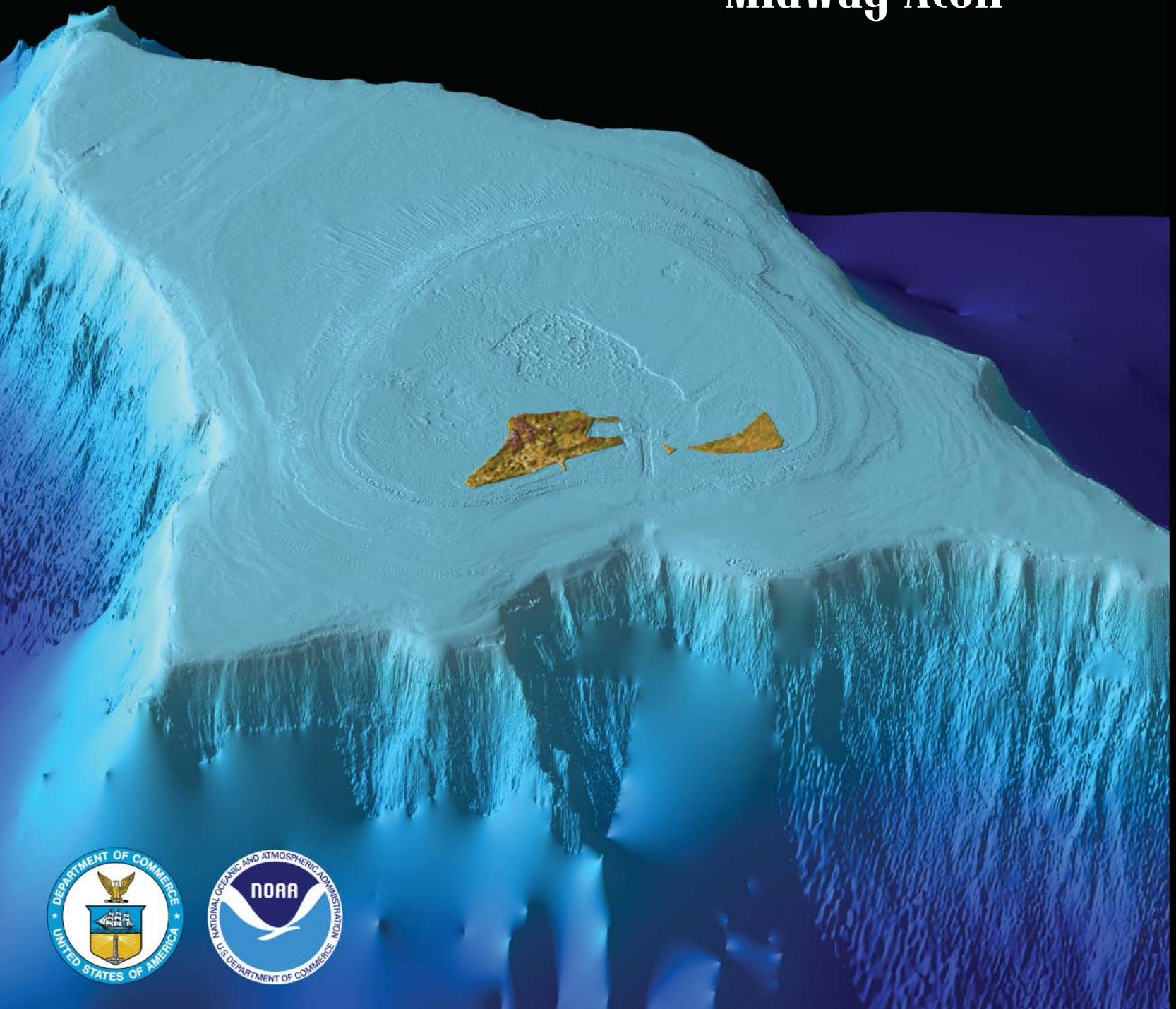
DIGITAL ELEVATION MODEL

Midway Atoll



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National Oceanic and Atmospheric Administration
U.S. Department of Commerce

MIDWAY ATOLL

Why Model Midway Atoll?

Midway Atoll is a circular atoll that consists of two islands, Sand Island and Eastern Island, collectively called Midway Island. The atoll is located in the Hawaiian archipelago approximately 1,150 miles west-northwest of Hawaii. In 1940, an air and submarine base were built on the island. Shortly after, in 1942, the island gained notoriety after the Battle of Midway proved to be the turning point of World War II. In 2006, Midway Island was designated as a protected national monument with the other northwestern Hawaiian Islands, and is managed by the U.S. Fish and Wildlife Service and NOAA. Midway Atoll was formed from a shield volcano that developed around 28 million years ago from the same hotspot that is located under Hawaii today. Pacific plate motion has moved the volcano northwest from the hotspot, where it has slowly subsided. A coral reef has grown around the rim of the atoll, which is home to an array of important wildlife and marine species. The Midway Atoll DEM is an important tool for hazard managers due to the dangers associated with Midway's low-lying position in an active volcanic zone.

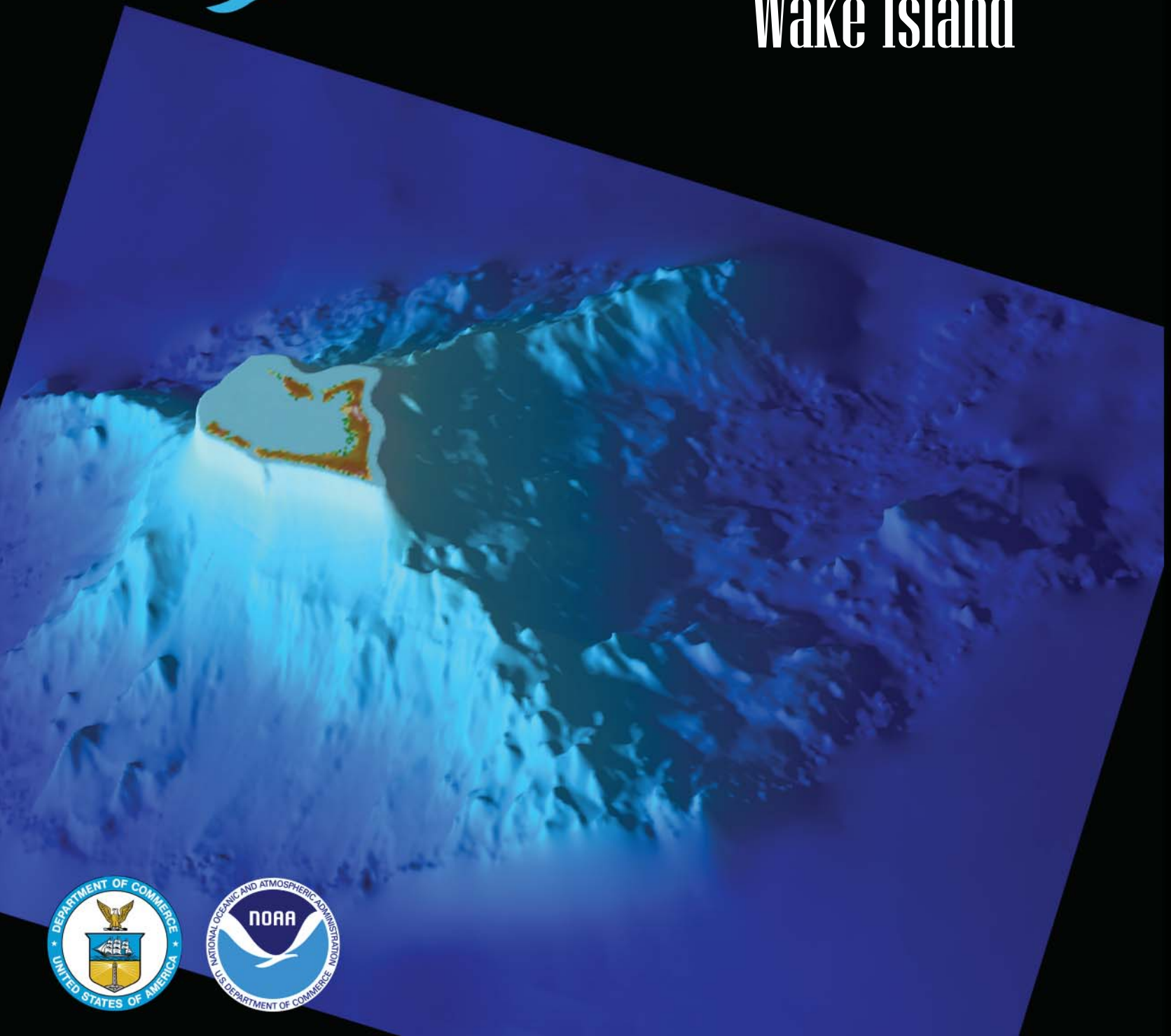
Who Provided the Data?

- NOAA National Geophysical Data Center (NGDC)
- NOAA Office of Coast Survey (OCS)
- NOAA Center of Coastal Monitoring and Assessment (CCMA)
- NOAA Coastal Services Center (CSC)
- U.S. Geological Survey (USGS)
- Naval Postgraduate School

Photo Credits: Forest and Kim Starr; Elliot Lim

DIGITAL ELEVATION MODEL

Wake Island



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WAKE ISLAND

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Why Model Wake Island?

Wake Island is a tiny coral atoll with less than twenty kilometers of coastline. It is located in the North Pacific Ocean, approximately two-thirds of the way from Hawaii to the Northern Mariana Islands. The atoll consists of three low coral islands— Peale, Wake, and Wilkes— surrounding a central lagoon. The area is an unincorporated, unorganized territory of the United States. Activities on the island are minimal and are overseen by the United States Air Force. All public access to the island is restricted. Wake Island is vulnerable to typhoons and tsunamis. In August 2006, a category 5 Super Typhoon (Loke) passed over Wake Island with winds over 185 mph, causing a seven meter storm surge and inflicting major damage to the island. Tsunami inundation from far-field events is also a threat to the island due to the surrounding subduction zones that line the Pacific Basin. This DEM will help to understand and mediate the effects of future tsunamis and severe storm events.

Who Provided the Data?

- NOAA National Ocean Service (NOS)
- NOAA National Geophysical Data Center (NGDC)
- NOAA Office of Coast Survey (OCS)
- U.S. Geological Survey (USGS)

Photo Credit: www.msc.navy.mil

DIGITAL ELEVATION MODEL

Pago Pago

DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

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National Oceanic and Atmospheric Administration
U.S. Department of Commerce

PAGO PAGO

Why Model Pago Pago?

American Samoa is an unincorporated territory of the United States located in the South Pacific Ocean. The Pago Pago digital elevation models include coverage of the American Samoa islands of Tutuila, Ofu, Olosega, and Ta'u. Tutuila is the largest of the islands and features the eroded summit of a large basaltic volcano that formed 1.54 to 1 million years ago. Pago Pago, the capital of American Samoa, is home to roughly 11,500 of the territory's total population of more than 57,000 people. Pago Pago Harbor is one of the world's largest natural harbors and was formed by submergence of the volcano's caldera. The area is frequently hit by typhoons and is at great risk of experiencing future severe storm events. In September 2009, an 8.0 magnitude earthquake struck 120 miles off the coast of American Samoa, generating a tsunami. Three waves hit the islands, killing 34 people in Pago Pago, Tutuila, and American Samoa, and 149 people in neighboring Samoa. The American Samoa DEM is an important tool in predicting and preparing for future tsunamis and other natural disasters.

Who Provided the Data?

- NOAA National Geophysical Data Center (NGDC)
- NOAA Coastal Services Center (CSC)
- Scripps Institution of Oceanography (SIO)
- Gaia Geo-Analytical
- U.S. Geological Survey (USGS)
- Naval Oceanographic Office (NAVOCEANO)

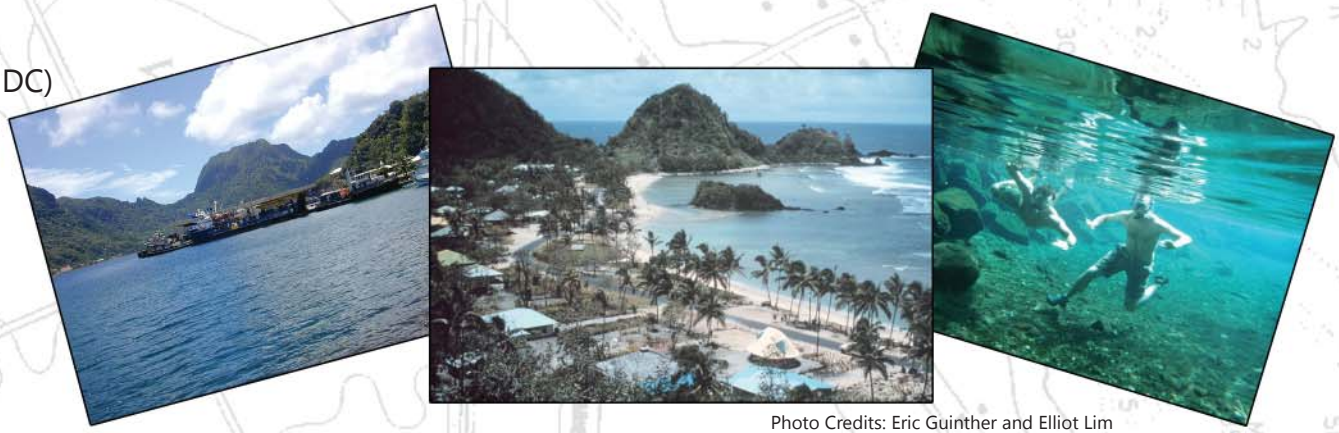
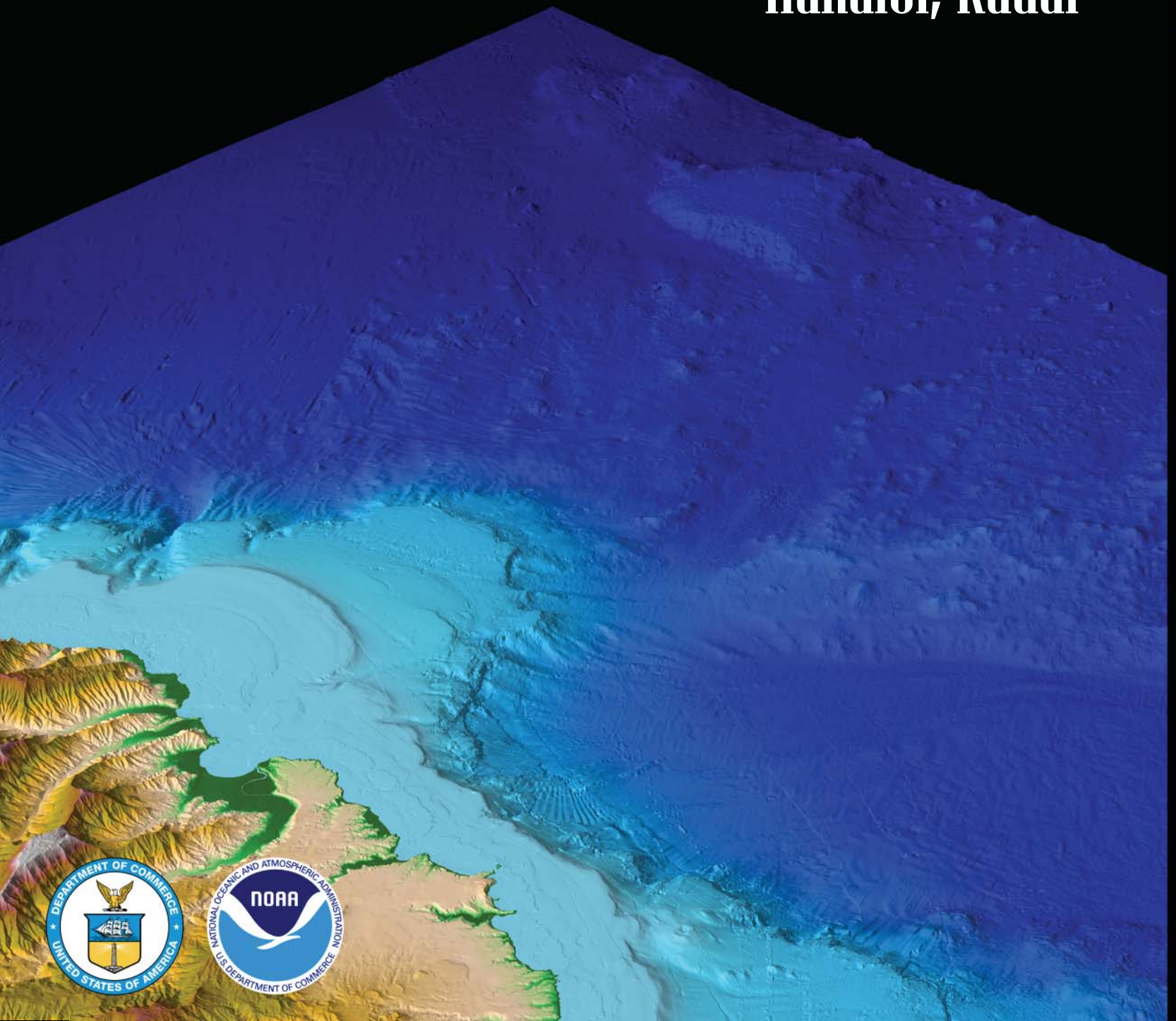


Photo Credits: Eric Guinther and Elliot Lim

DIGITAL ELEVATION MODEL

Hanalei, Kauai



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HANALEI, KAUAI

Why Model Hanalei, Kauai ?

Hanalei is located along Hanalei Bay near the mouth of the Hanalei River. The small town is home to 500 residents and is nestled next to the coast. Hanalei is known for its beautiful beaches and its breathtaking views of the mountains. The Hanalei regional DEM covers the northern coast of the island of Kauai, the northernmost island of the main Hawaiian Island Chain. The area is at risk from tsunamis caused by both distant and local sources. While some tsunamis that affect Hawaii originate in distant areas where tectonic plates collide (subduction zones), such as in Alaska's Aleutian Island chain, Japan, or the west coast of South America, shallow regional undersea earthquakes or landslides can also generate local tsunamis. The shorter warning time for locally generated tsunamis, perhaps as little as a few minutes, poses a great danger to residents. The Hanalei DEM can help local managers prepare for both distant and local tsunamis, and for hazardous events that are associated with inundation, sea level rise, tropical cyclones, and geologic change.

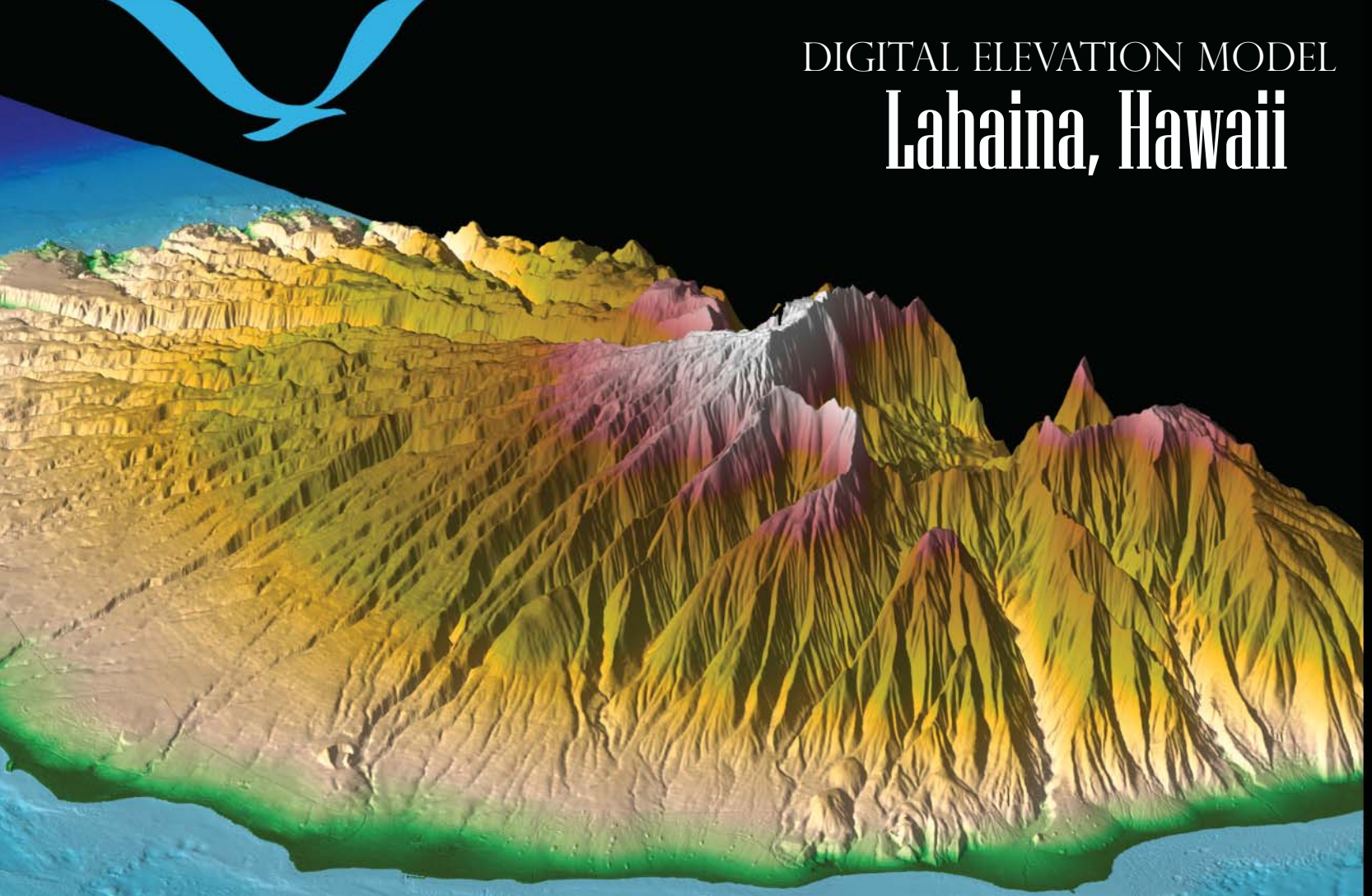
Who Provided the Data?

- NOAA National Geophysical Data Center (NGDC)
- NOAA National Ocean Service (NOS)
- NOAA Office of Coast Survey (OCS)
- NOAA Center for Coastal Monitoring and Assessment (CCMA)
- NOAA Coastal Services Center (CSC)
- NOAA Pacific Services Center (PSC)
- County of Kauai Information Technology Division
- Federal Emergency Man¬agement Agency (FEMA)
- U.S. Army Engineer Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX)
- U.S. Geological Survey (USGS)

Photo Credit: www.gohawaii.com

DIGITAL ELEVATION MODEL

Lahaina, Hawaii



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LAHAINA, HAWAII

Why Model Lahaina, Hawaii?

Lahaina is located on the western coast of the island of Maui, Hawaii, near the marine channels between Maui, Lanai, and Molokai. Neighboring communities include Kapalua on Maui, Lopa on Lanai, and Kaluaaha on Molokai. Lahaina has a resident population of roughly 9,000 people, which can grow by almost 40,000 people during the highest tourism seasons. The islands of Hawaii have been created by still active shield-building volcanoes, whose low-viscosity lava flows often reach the coast. Development in the coastal zone of the popular tourist destination has modified the local morphology, especially in boat harbors. In the deep water, the marine channels between the islands exhibit significant morphologic relief, reflecting alternation between living and drowned coral reefs built atop submarine volcanic material. The islands' volcanic history and central location in the Pacific "Ring of Fire" make the area an important location for tsunami research. Large wave events and ocean storms often threaten coastal communities such as Lahaina, and so DEMs and tsunami models are useful tools in providing information to hazard managers and planners.

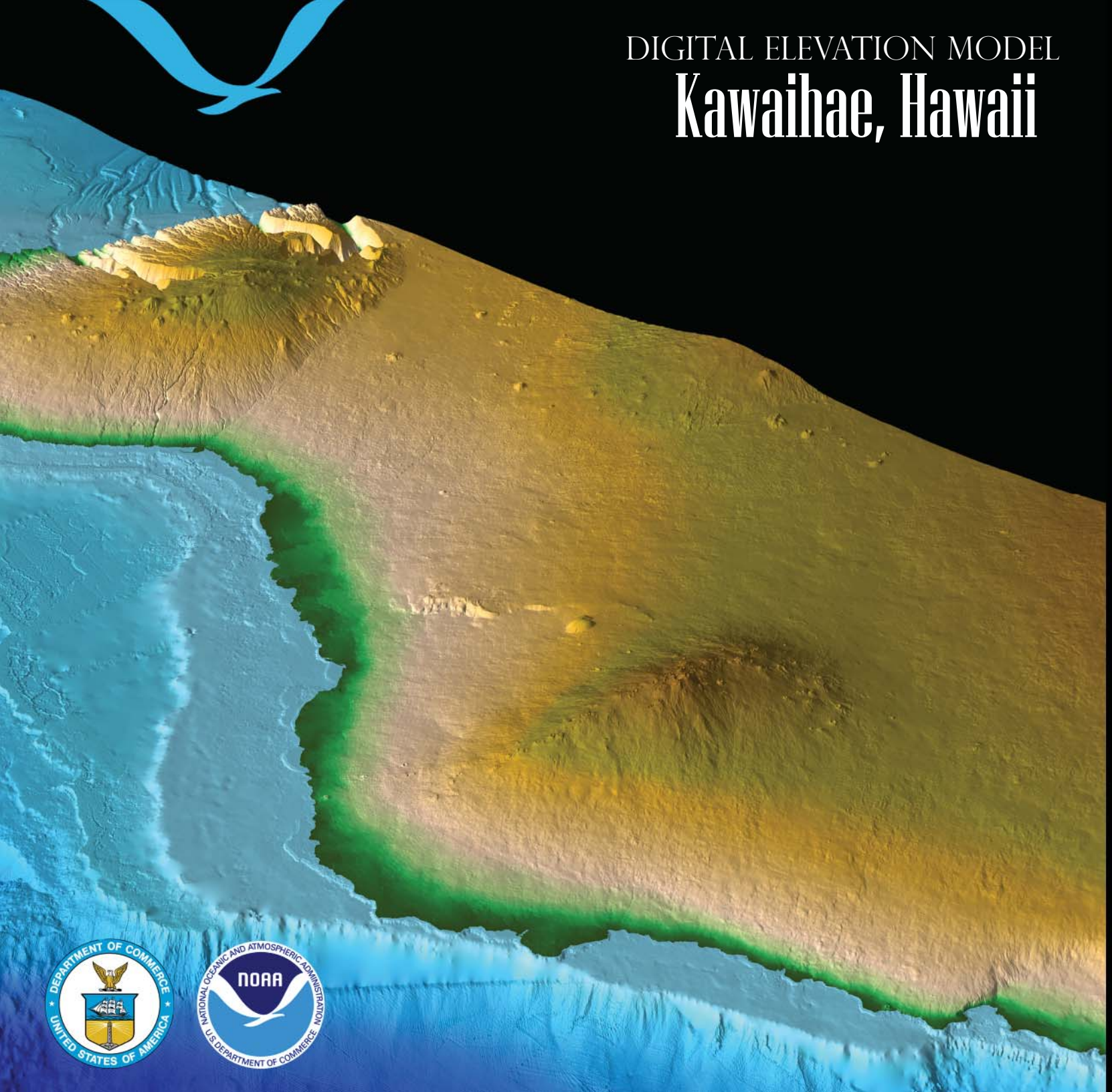
Who Provided the Data?

- NOAA National Ocean Service (NOS)
- NOAA Coastal Services Center (CSC)
- NOAA National Geophysical Data Center (NGDC)
- U.S. Geological Survey (USGS)
- National Geospatial-Intelligence Agency (NGA)
- Joint Airborne LiDAR Bathymetry Technical Center of Expertise (JALBTCX)

Photo Credit: www.hawaii.gov

DIGITAL ELEVATION MODEL

Kawaihae, Hawaii



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KAWAIHAE, HAWAII

Why Model Kawaihae, Hawaii?

The Kawaihae DEM covers the northwestern coastal region of the island of Hawaii, an island with a long history of tsunamis, including several non-deadly tsunamis in Kawaihae. The town of Kawaihae is an unincorporated community and is a shipping terminal, a popular surfing destination, a military landing site, and one of the largest harbors on the island of Hawaii. This well known island chain was created by shield-building volcanoes and the Island of Hawaii is composed of five volcanoes: Kohala, Hualalai, Mauna Kea, Mauna Loa, and Kilauea. The island has 428 kilometers of coastline and is known locally and abroad as the Big Island. The western side of the Big Island lies in the lee of Mauna Loa (4,205 meters), the largest volcano on Earth, rising almost 9 kilometers from the sea floor. The island's volcanic history and location within the Pacific "Ring of Fire" make it vulnerable to local and distant tsunami events as well as ocean storms, making DEMs, disaster planning, and warning efforts very important.

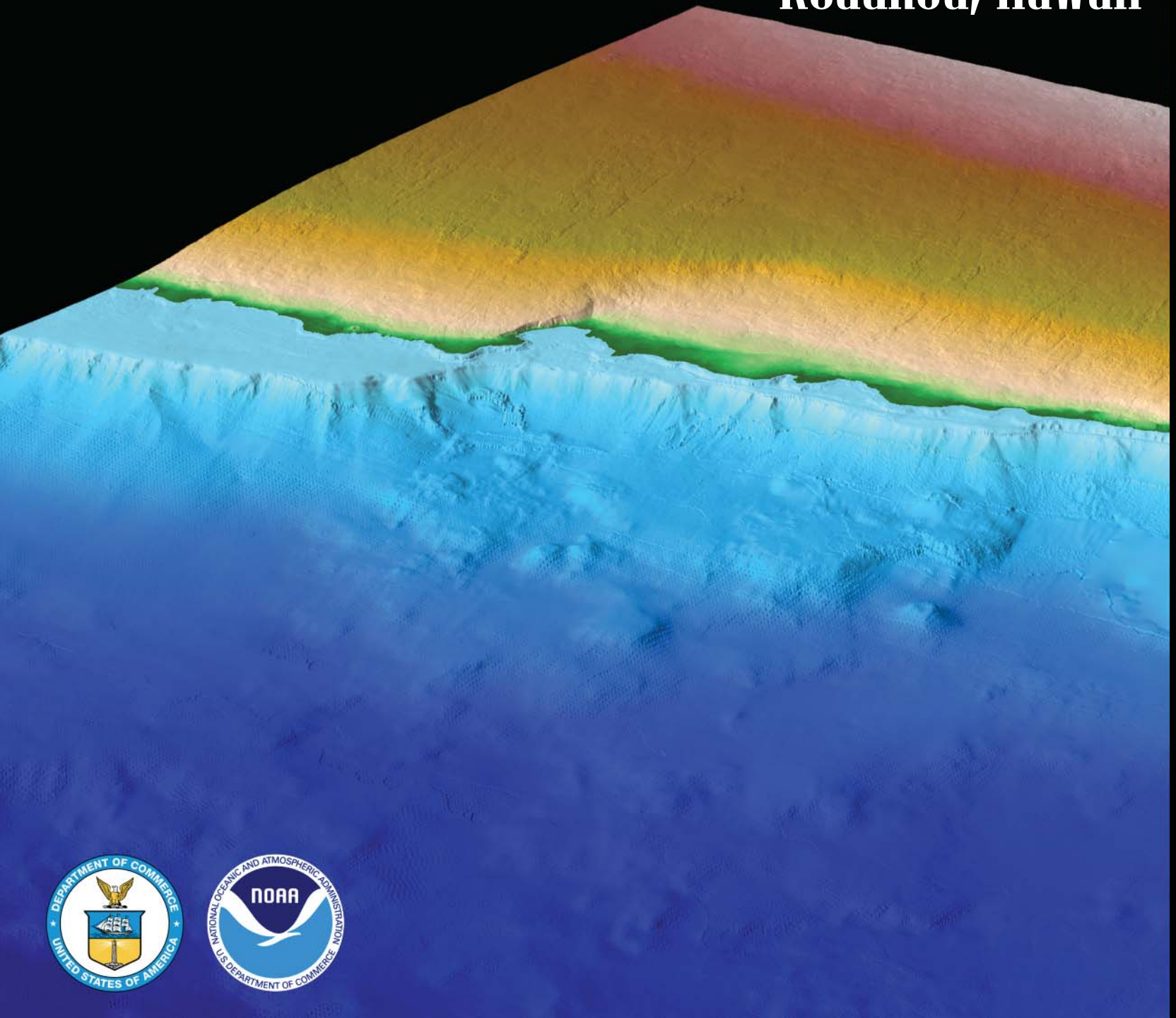
Who Provided the Data?

- NOAA National Geophysical Data Center (NGDC)
- NOAA National Ocean Service (NOS)
- U.S. Geological Survey (USGS)
- U.S. Army Corps of Engineers (USACE)

Photo Credit: www.poh.usace.army.mil

DIGITAL ELEVATION MODEL

Keauhou, Hawaii



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KEAUHOU, HAWAII

Why Model Keauhou?

Keauhou is located on the west coast of the Big Island of Hawaii, six miles south of Kailua-Kona. This coastal community is made up of roughly 2,500 residents, who depend largely on tourism to fuel their local economy. Near-by attractions, such as Kealakekua Bay and Keauhou Bay offer some of the best beaches and snorkeling spots— where visitors can see green sea turtles, tropical fish, and manta rays despite the otherwise rocky shores. Historically, this area has been occupied for 500 years and once was an important resi-dence for Kings and royal families. The remains of ancient fishponds, burial grounds, housing structures, and stone temples remind locals and visitors alike of the rich history of these lands. While some tsunamis that threaten Hawaii originate from distant areas where tectonic plates collide, regional shallow undersea earthquakes or landslides can also generate local tsunamis. The Keauhou DEM will serve as an important resource for tsunami warning centers, emergency planners, and local hazard managers in the face of future possible disasters and inundation events.

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- NOAA National Geophysical Data Center (NGDC)
- NOAA National Ocean Service (NOS)
- NOAA Office of Coast Survey (OCS)
- NOAA Center for Coastal Monitoring and Assessment (CCMA)
- NOAA Coastal Services Center (CSC)
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Photo Credit: www.gohawaii.com

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This flipbook is part of a "Regional DEM Series" that is based on the work of a team of NOAA and CIRES scientists, led by Dr. Barry Eakins and Lisa Taylor. To learn more about coastal DEMs and DEM development in support of coastal management and research, visit http://www.ngdc.noaa.gov/mgg/coastal/

2011, NOAA NGDC

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http://www.photolib.noaa.gov/

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