Natural Disasters in Japan

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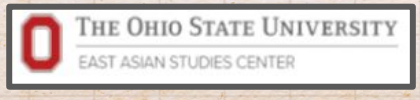

Table of Contents

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Natural Disasters in Japan

Japan is an island country located on different tectonic plates.
Regular movement of tectonic plates results in earthquakes, volcanoes, and tsunamis.

Earthquake

"Sudden shaking of the ground caused by a disturbance deeper within the crust of the Earth. Most earthquakes occur when masses of rock straining against one another along fault lines suddenly fracture and slip."
~Britannica

Earthquakes in Japan

Japan has regular earthquakes because it is located on the boundary of four tectonic plates: Pacific, Phillipine, Eurasian, and North American. As these plates move they cause seismic activity that results in earthquakes. Some earthquakes can be small while others are massive (Hussain, 2019).

Shindo Scale

Japan Meteorological Agency scale for measuring the degree of shaking during an earthquake. The scale includes information about the human perception and reaction to the quake as well as information about occurrences that may occur inside and outside of buildings, such as dishes rattling in a cabinet (Japan Meteorological Agency).

Major Modern Earthquake Timeline

September 1923 Great Kanto Earthquake

March 1927 Tango Earthquake

March 1933 Sanriku Earthquake

June 1948 Fukui Earthquake

January 1995 Hyogo Earthquake

March 2011 Tohoku Earthquake

Timeline: Japan's most devastating earthquakes (ibtimes.com)

Online Simulations

Earthquake Simulator

Virtual Earthquake

Seismic Waves

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Videos

Could this protect Japan's Buildings from Earthquakes?

Japan's Earthquake and Tsunami

Earthquake News Footage

Websites

These websites can be used to learn more about earthquakes and where they occur.

- Today's Earthquakes in Japan
- What is an Earthquake? NASA
- Japan Quake Map
- Restless Planet
- Geographical Association
- Japan Meteorological Agency

Tsunami

Japanese “harbor wave”

“A catastrophic ocean wave, usually caused by a submarine earthquake, an underwater or coastal landslide, or a volcanic eruption.”

~Britannica

Tsunamis in Japan

The word *tsunami* originated in Japan and means *harbor wave* (NPR). Tsunamis are common in Japan with almost a third of the largest tsunamis in the world happening in Japan (NPR). Tsunami waves travel approximately 20 to 30 miles per hour when they arrive on land and can range in height from under 10 feet to over 100 feet. Tsunamis in Japan can be caused by earthquakes and volcanoes.

March 11, 2011

On March 11, 2011 a seaquake off the Sanriku coast triggered a tsunami that reached up to 55.88 meters in height. Over 470 square kilometers of land was flooded. The tsunami was deadly and destroyed numerous homes and businesses. This tsunami was especially tragic because some of the waves hit the Fukushima nuclear power plant, causing the leak of radioactive materials (World Data).

Online Simulation

Tsunami Interactive

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Videos

Tsunami Simulation

Japan's Earthquake and Tsunami

Tsunami Animation

NOAA Tsunami Animation

Websites

These websites can be used to learn more about tsunamis and where they occur.

- Catching a Tsunami
- What is a Tsunami? NASA
- Tsunamis in Japan
- Natural Hazards Viewer
- Tsunami Historical Series
- Tsunamis in History

Volcano

"Vent in the crust of the Earth
from which molten rock,
hot rock fragments, ash, gas,
and steam issue."

~Britannica

Volcanoes in Japan

Japan is located in the Ring of Fire. Japan has 111 active volcanoes and averages 15 eruptions a year. Many of Japan's volcanoes are formed from magma in the mantle which is generated by the subduction of an oceanic tectonic plate (Japan Meteorological Agency and Geological Survey of Japan).

Online Simulations

Volcanoes Deadly Warning

Thermal Convection

Volcanic Features

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Websites

These websites can be used to learn more about volcanoes and where they occur.

- Out of the Inferno
- Volcanoes in Japan
- Plate Tectonics and the Ring of Fire
- Japan Meteorological Agency
- Volcanism

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Videos

Volcanoes 101

5 Most Active Volcanoes in Japan

Eruption of Sakurajima

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Resources

The following slides contain suggested readings, lesson plans, standards, and teaching suggestions.

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Suggested Readings

Nonfiction

- Tsunami! by Kimiko Kajikawa
- Everything Volcanoes and Earthquakes by National Geographic

Fiction

- Beyond Me by Annie Donwerth-Chikamatsu
- The Phone Booth in Mr. Hirota's Garden by Heather Smith and Rachel Wada
- I Survived the Japanese Tsunami 2011 by Lauren Tarshis

Human Aspects

While natural disasters can be explored as purely scientific phenomena, it is also powerful to include information regarding the human experience before, during, and after these disasters.

This line of study could include:

- Systems used to warn people of natural disasters
- Ways to monitor natural disasters
- Building structures to withstand natural disasters
- Rebuilding after a disaster

Human Aspects

Natural disasters also result in the loss of life and property. This sensitive topic should be handled in an age-appropriate manner. Conversations about natural disasters could provide an opportunity to develop social emotional learning skills such as empathy.

Lesson Plans

Exploring Earthquakes and Volcanoes on Earth - Elementary School

Japan and the Ring of Fire - Middle School

Japan: Seismic Activity and Its Effects - Middle School

PBS Volcano Lesson Plan - Middle and High School

PBS Earthquake Lesson Plan - Middle and High School

NOAA Tsunami Resources - High School

Japan Earthquake and Tsunami - High School

NGSS Standards

Learning about tectonic movement can address NGSS standards at the elementary, middle, and high school levels.

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

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Japan Meteorological Agency. (2021). *Weather/Earthquakes*. Retrieved from Japan Meteorological Agency (jma.go.jp)

Simmons-Duffin, S. (2011). *History of Tsunami, the Word and the Wave, Runs Long in Japan*. Retrieved from History Of Tsunami, The Word And The Wave, Runs Long In Japan : NPR

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Thanks!

Do you have any questions?

Jennifer Smith
jennfer18@hotmail.com

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