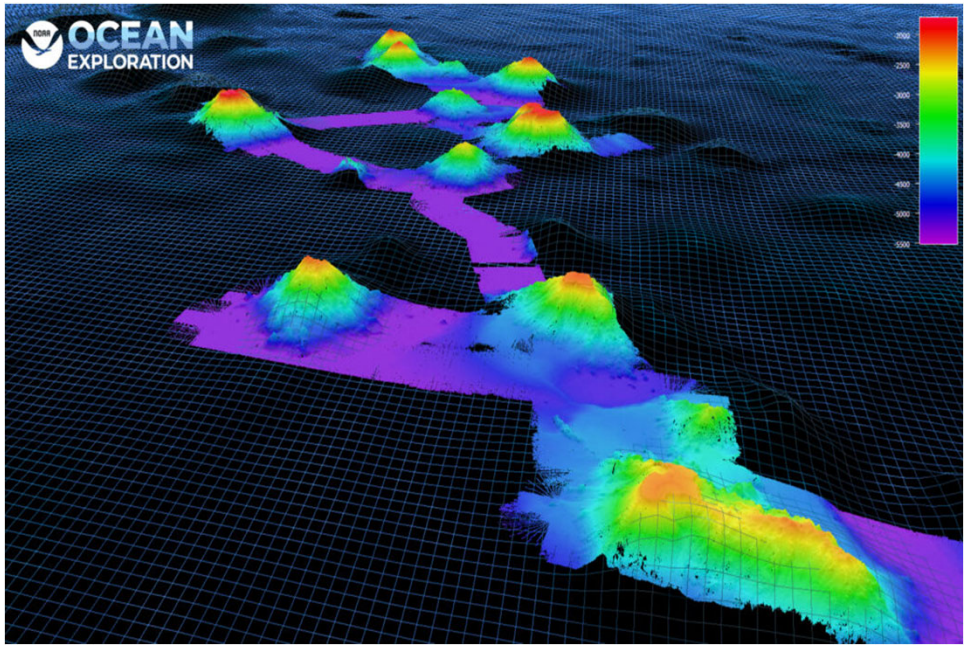
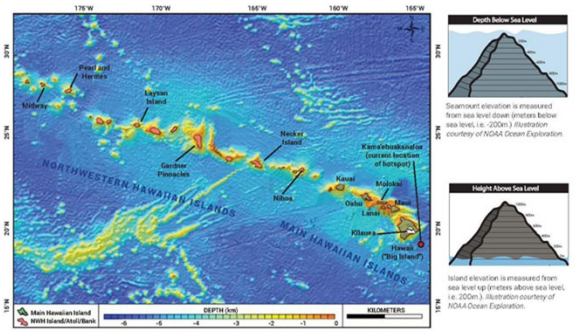
Investigation: Formation of Seamounts and Island Chains



Experience the Phenomenon

Hawaiian Map and Data Table

Hawaiian Volcanic Island/Seamount Map



Seamount elevation is measured from sea level down (meters below sea level, i.e. -200m.) *Illustration courtesy of NOAA Ocean Exploration.*

Island elevation is measured from sea level up (meters above sea level, i.e. 200m.). *Illustration courtesy of NOAA Ocean Exploration.*

Main Hawaiian Islands: Pacific Islands Benthic Habitat Mapping Center. Pacific Islands Benthic Habitat Mapping Center Main Hawaiian Islands Comments, *http://www.soest.hawaii.edu/pibhmc/cms/data-by-location/main-hawaiian-islands/*

Hawaiian Volcanic Island/Seamount Data Table

VOLCANIC ISLAND/ SEAMOUNT	AGE (million years)	ELEVATION	LAST ERUPTED	DISTANCE FROM KILAUEA (km) on HAWAII
Kama'ehuakanaloa *(previously known as Lō'ihi)*	~400 thousand years	-975 meters below sea level (3199 ft)	1996	54
Hawaii	0.280	1248 m (4094 ft)	2022	0
Maui	1.32	3055 m (10,023 ft)	<320,000 years ago	221
Molokai	1.9	1515 m (4970 ft)	~ 1.5 million years ago	280
Oahu	3.7	1220 m (4003 ft)	~ 2.5 million years ago	374
Kauai	5.1	1598 m (5243 ft)	~ 5 million years ago	519
Nihoa	7.2	272 m (892 ft)	~ 7.2 million years ago	780
Necker	10.3	84 m (277 ft)	~ 10 million years ago	1058
Gardner Pinnacles	12.3	-	-	1435
Laysan	19.9	-	-	1818
Pearl & Hermes Reef	20.6	-	-	2281
Midway	27.7	-	-	2432

Alaskan Map and Data Table

Alaskan Seamounts and Seamount Chain Map: NE Pacific and Gulf of Alaska

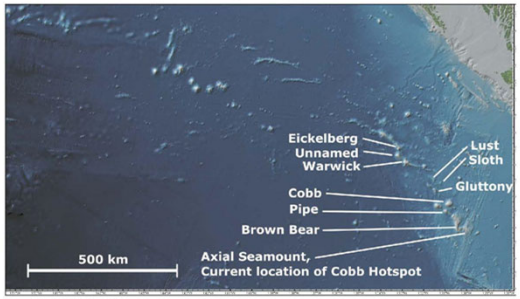
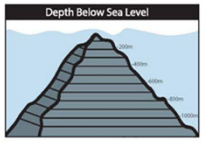


Image adapted from NOAA Ocean Exploration.



Seamount elevation is measured from sea level down (meters below sea level, i.e. -200m.). *Illustration courtesy of NOAA Ocean Exploration.*

Cobb-Eickelberg Seamount Chain Data Table

SEAMOUNT	AGE (million years)	ELEVATION (meters below sea level)	LAST ERUPTED
Axial	< 0.5	-1544 (-5066 ft)	2015
Brown Bear	0.5-1.5	-1500 (-4921 ft)	-
Gluttony	1.55	-1532 (-5026 ft)	-
Cobb	3.27	-115 (-377 ft)	-
Lust	4.4	-2095 (-6873 ft)	-
Sloth	5.2	-2027 (-6650 ft)	
Warwick	6.91	-547 (-1794 ft)	-
Eickelberg	7.05-9.03	-784 (-2572 ft)	-
Unnamed	7.73	-766 (-2513 ft)	

Experience the Phenomenon

Notice - Observations	Wonder - Questions

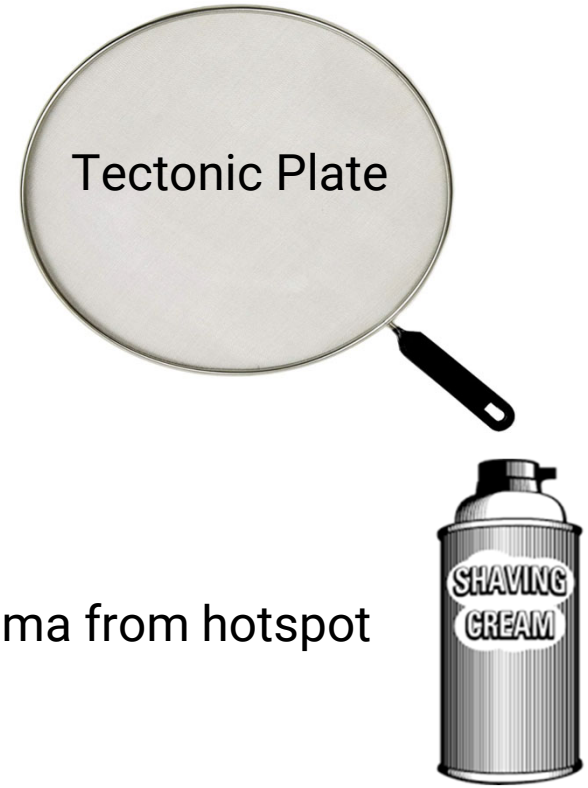
Guiding Questions

- What patterns do you observe in the data presented in the maps and tables?
- How does the data change over time?
- What questions could you ask to help explain the patterns in the data you observed?

DRIVING QUESTION:

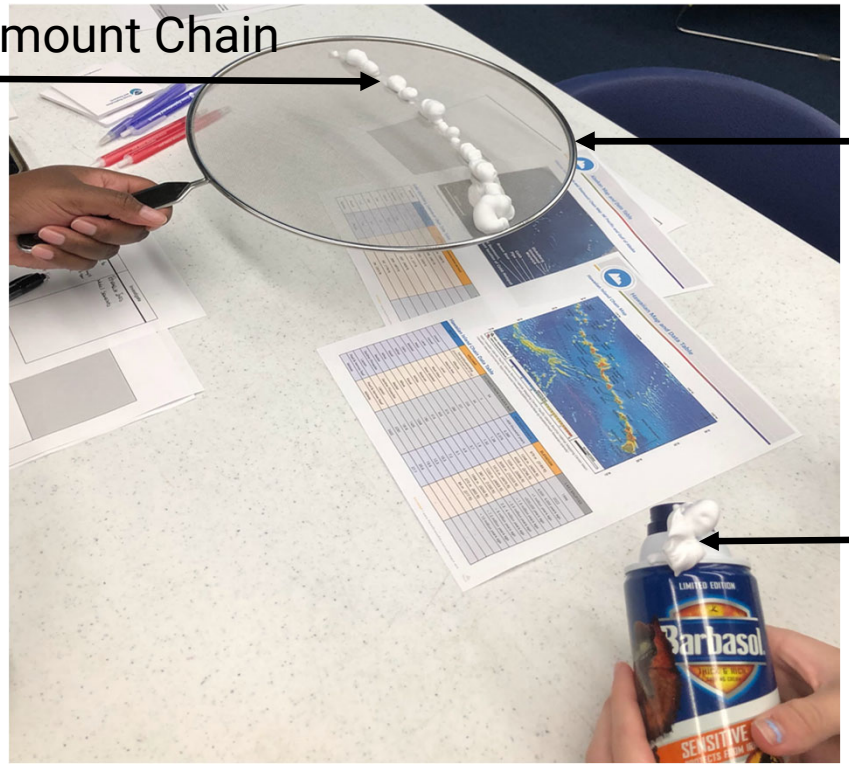
How do seamounts and island chains form in the middle of the ocean?

Investigate: Shaving Cream Seamounts Demonstration



Investigate: Example for Teacher Reference

Seamounts/Seamount Chain



Tectonic Plate

Magma from hotspot

Shaving Cream Seamount Graphic Organizer

2) CAUSE
Describe the cause.

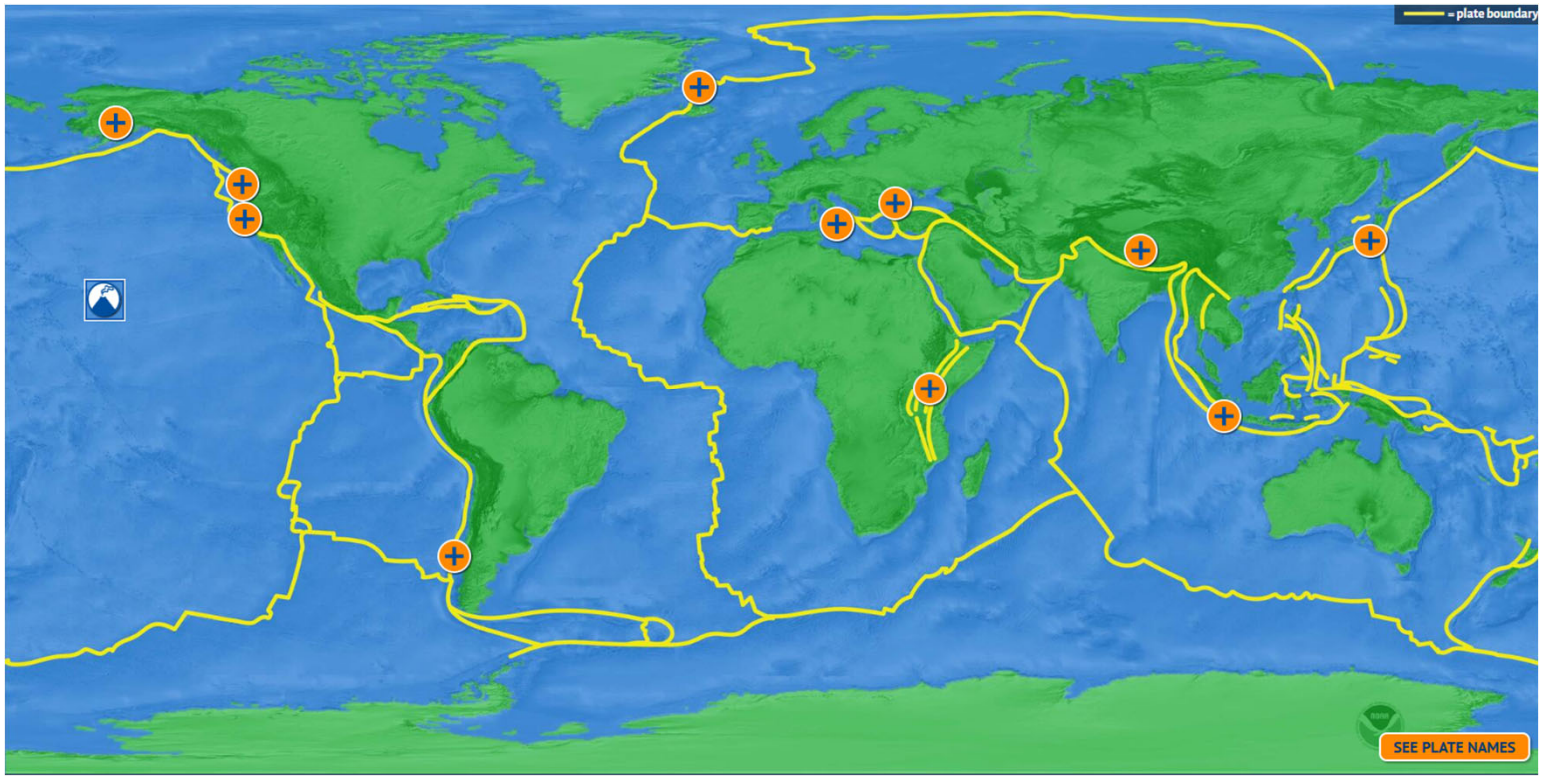
3) MECHANISM
Describe the process that connects the cause & effect.

1) EFFECT
Describe the phenomenon.

Developed by Jeremy Peacock and Amy Peacock, http://bit.ly/CCCGOs

Created for the Deep Ocean Education Project

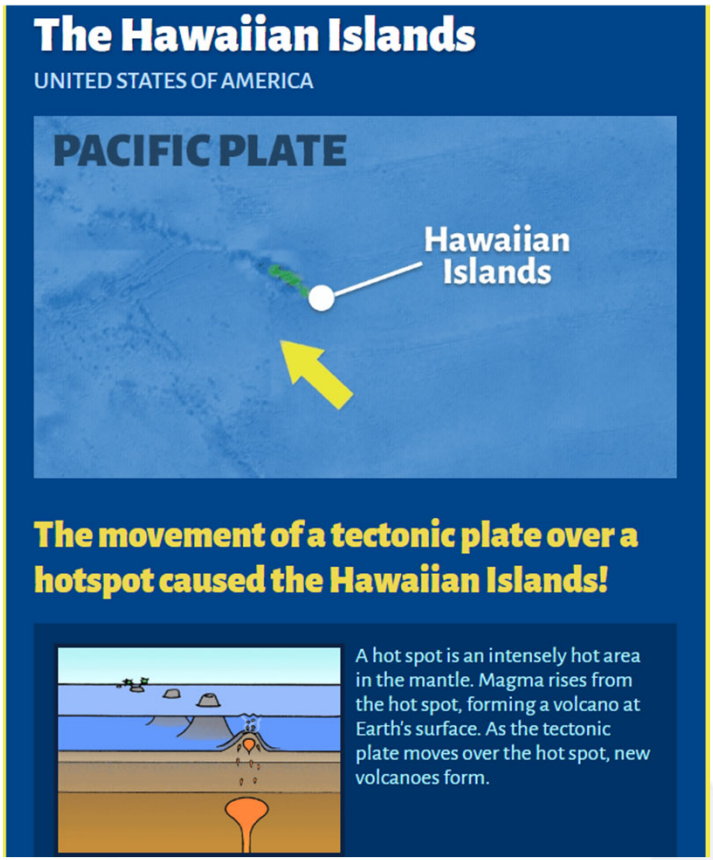
Investigate: Optional



Investigate: Optional

Where did the magma come from that formed the hotspots?

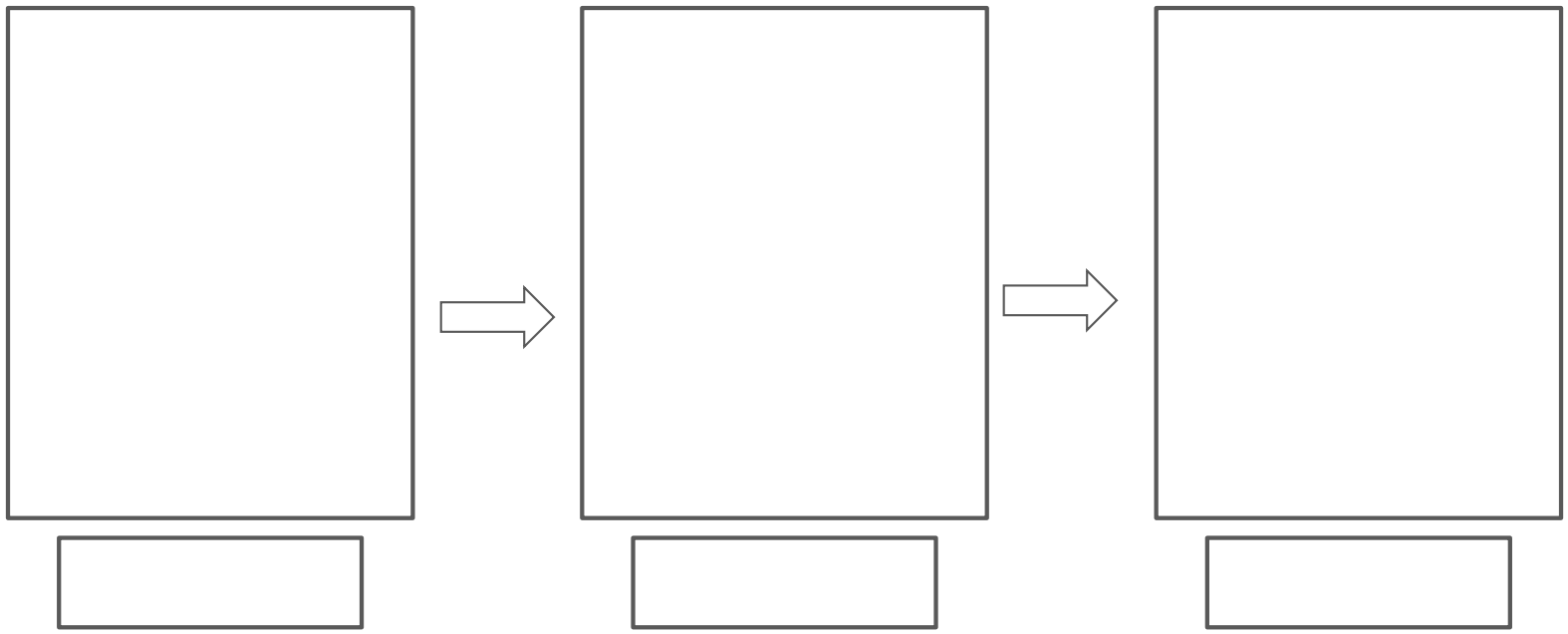
What mechanism is “driving” the seafloor to move over the hotspot?



Put the Pieces Together

Seamount/Island Chain Model

Draw a model explaining how seamount chains form using everything you have learned.
Share and compare with your group and the class.



Seamounts: What are They?

Teacher Keys

Shaving Cream Seamount Graphic Organizer

2) CAUSE
Describe the cause.

A hot spot erupts through the overlying crust (tectonic plate).

3) MECHANISM
Describe the process that connects the cause & effect.

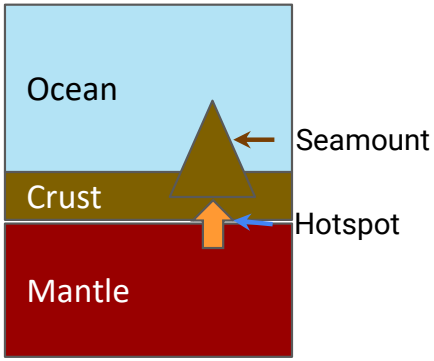
A hot spot erupts through the overlying crust (tectonic plate). An underwater volcano forms an island or seamount as the magma solidifies and the plates move further from the hot spot. Successive eruptions form additional islands and seamounts.

1) EFFECT
Describe the phenomenon.

Lines of islands and seamounts are formed in the middle of the ocean.

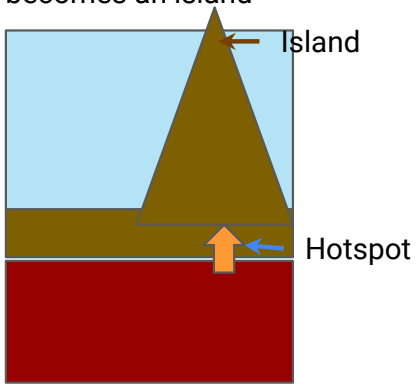
Sample Seamount/Island Chain Model

Hotspot volcano erupts under water, lava hardens forming a seamount



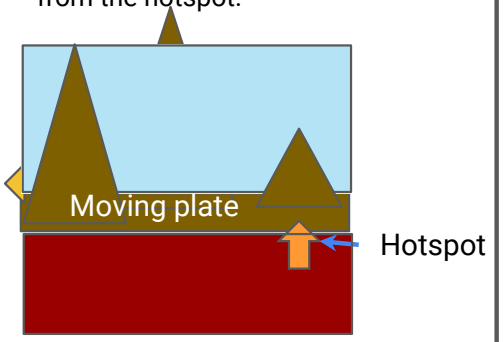
Hotspot

Repeated eruptions grow the seamount until it becomes an island



Island

Over MANY years, the hotspot continues to erupt as the plate moves, forming an island chain. The oldest island is furthest from the hotspot.



Island Chain