# Welcome to GG101 DYNAMIC EARTH



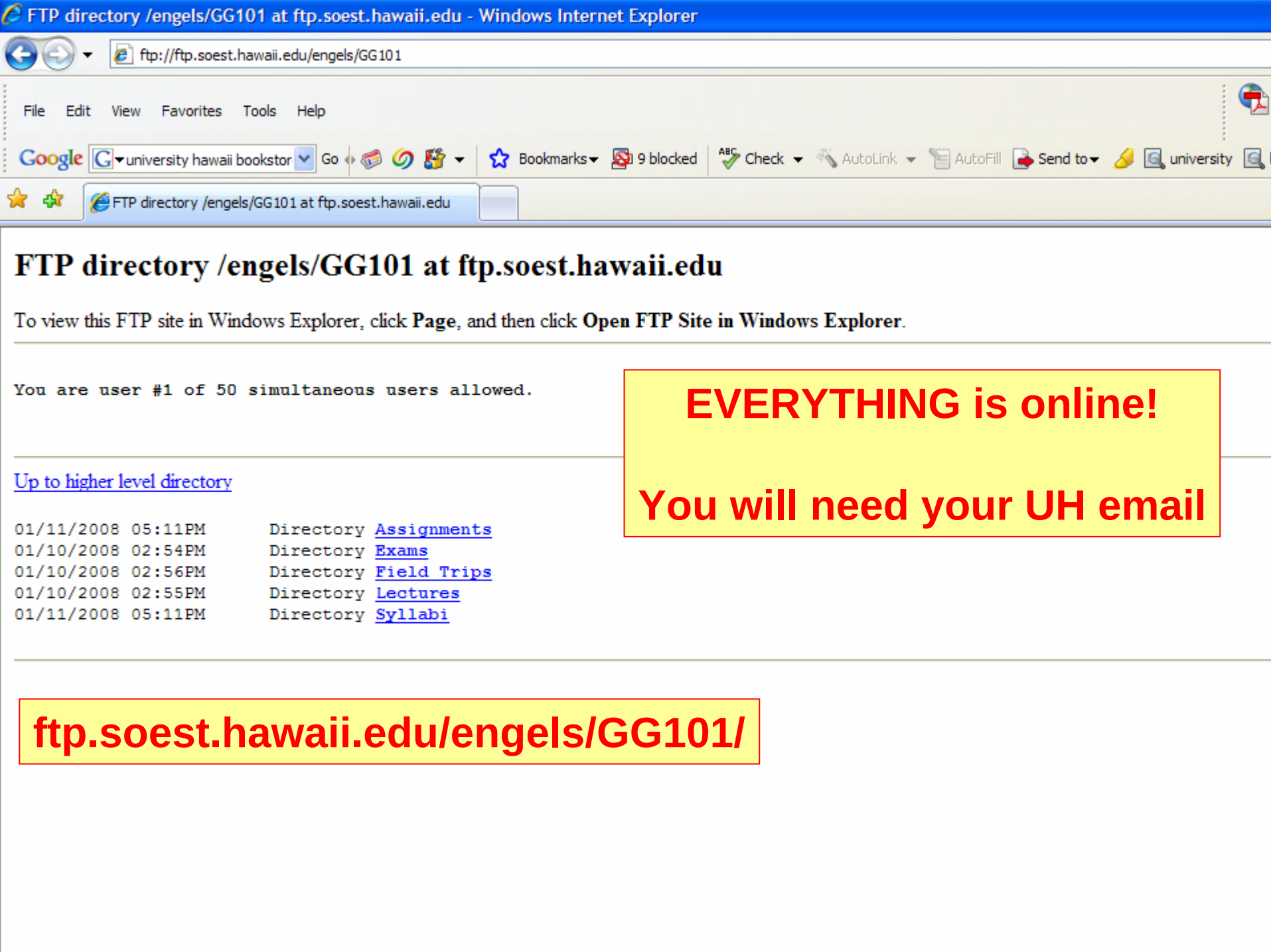
**Textbook options (GG101):** *"Understanding Earth, 5e", Grotzinger, Jordan, Press, Siever*

| | |
|---|---|
| **UH Bookstore new:** | **$106.60** |
| **UH Bookstore used:** | **$81.05** |
| **ebooks.bfwpub.com/earth/php (E-book subscription)** | **$56.00** |

**Save dollars and trees!**

**Lab workbook options (GG101L):** *"Laboratory Manual for Physical Geology, 5e/6e", Jones*

| | |
|---|---|
| **UH Bookstore new:** | **$78.65** |
| **UH Bookstore used:** | **$59.80** |
| **Geology Office (POST 701)** | **$40.00** |


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You will need your UH email
Up to higher level directory
01/11/2008 05:11PM Directory Assignments
01/10/2008 02:54PM Directory Exams
01/10/2008 02:56PM Directory Field Trips
01/10/2008 02:55PM Directory Lectures
01/11/2008 05:11PM Directory Syllabi
ftp.soest.hawaii.edu/engels/GG101/

# SCHEDULE

| Week | Topic |
|---|---|
| 1 | Origin of solar system, Early Earth |
| 2 | Plate tectonics |
| 3 | Minerals |
| 4 | Igneous rocks |
| Feb. 7 | Exam I |
| 5 | Volcanoes |
| 6 | Weathering, Sedimentary rocks |
| 7 | Metamorphic rocks |
| 8 | Geologic time |
| Mar. 6 | Exam II |
| *Mar. 7-9* | *BIG ISLAND FIELD TRIP!* |
| 9 | Relative & radiometric dating |
| 10 | Folds and faults, mountain building |
| 11 | Earthquakes |
| 12 | Surface water |
| Apr. 10 | Exam III |
| 13 | Groundwater |
| *Apr. 16* | *Waihe'e Tunnel Field Trip!* |
| 14 | Glaciers |
| 15 | Global warming |
| 16 | Review |
| May 15 | Final Exam |

| Grading: | # | % final grade |
|---|---|---|
| Exams (I, II, III, Final) | 4 | 60% |
| In-class activities/homework | 11 (10) | 25% |
| Field Trip (one required) | 1 | 10% |
| iClicker participation | daily | 5% |
| *Optional extra credit activities* | *1-3* | *up to 5%* |

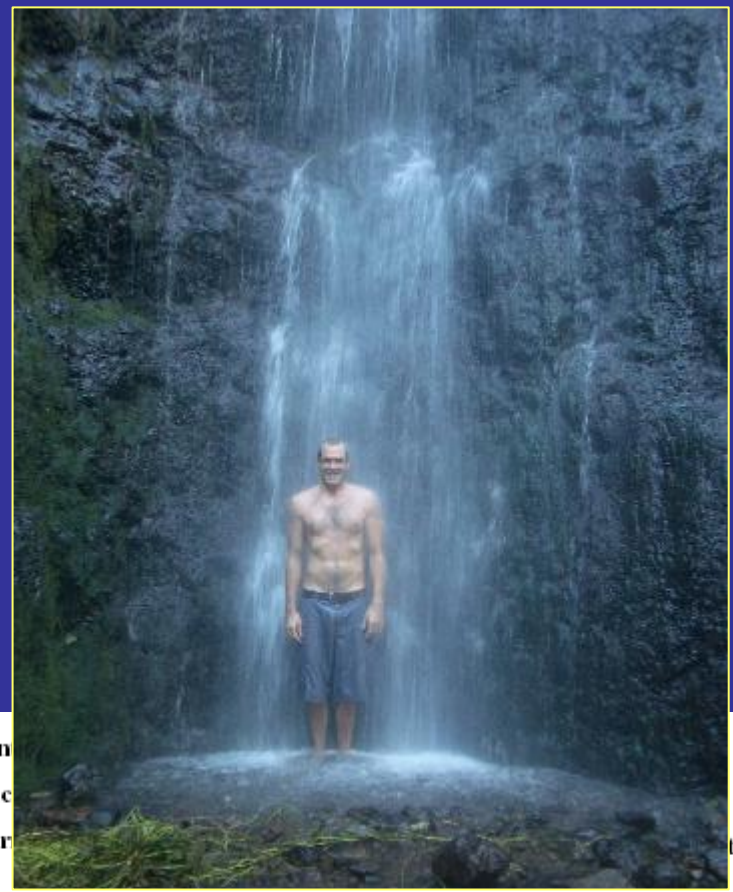
# Field trips: (1) Big Island Field Trip March 7-9



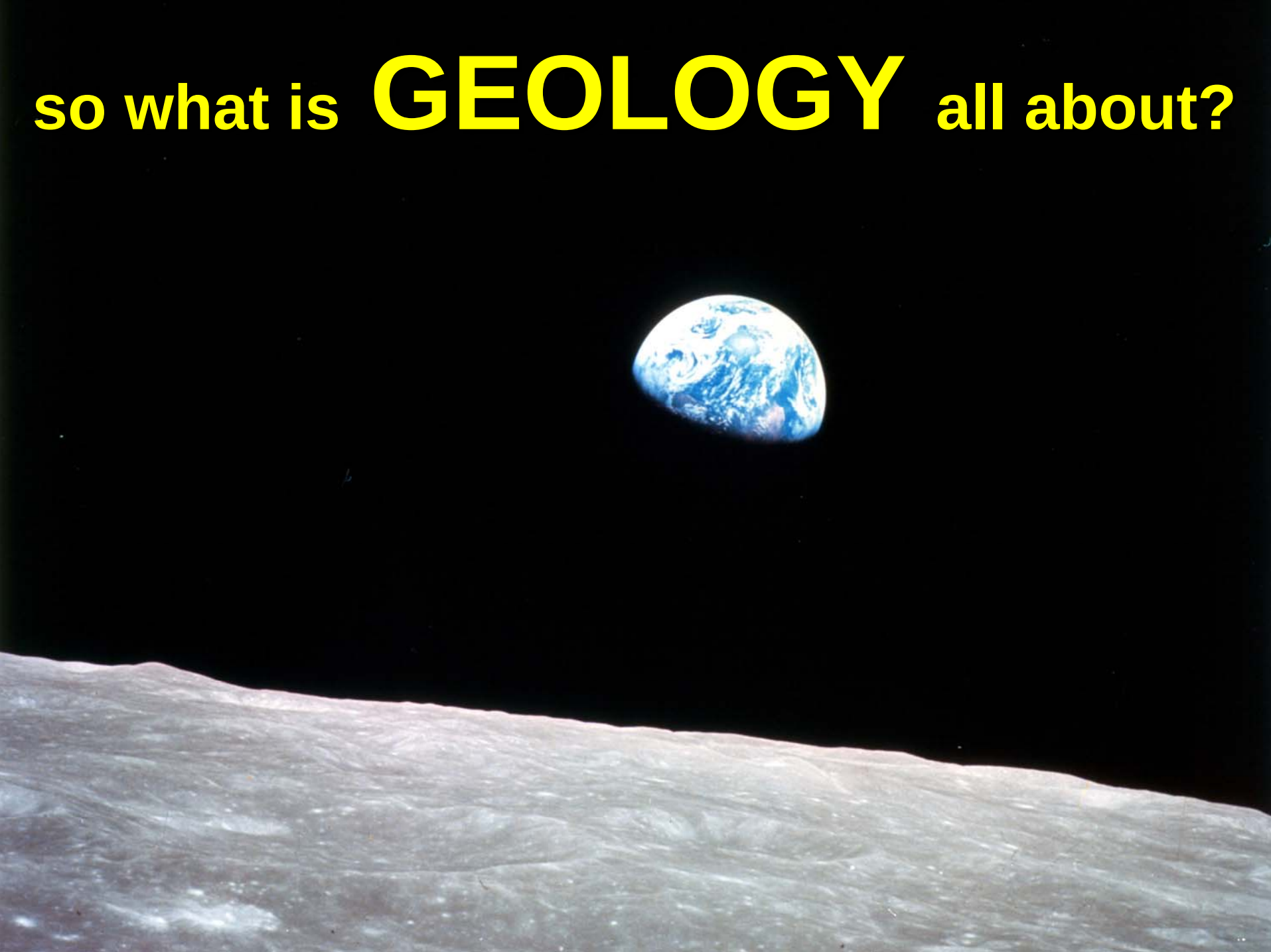
# Field trips: (2) Waihe'e Tunnel Field Trip April 16







# so what is GEOLOGY all about?



# GEOLOGY

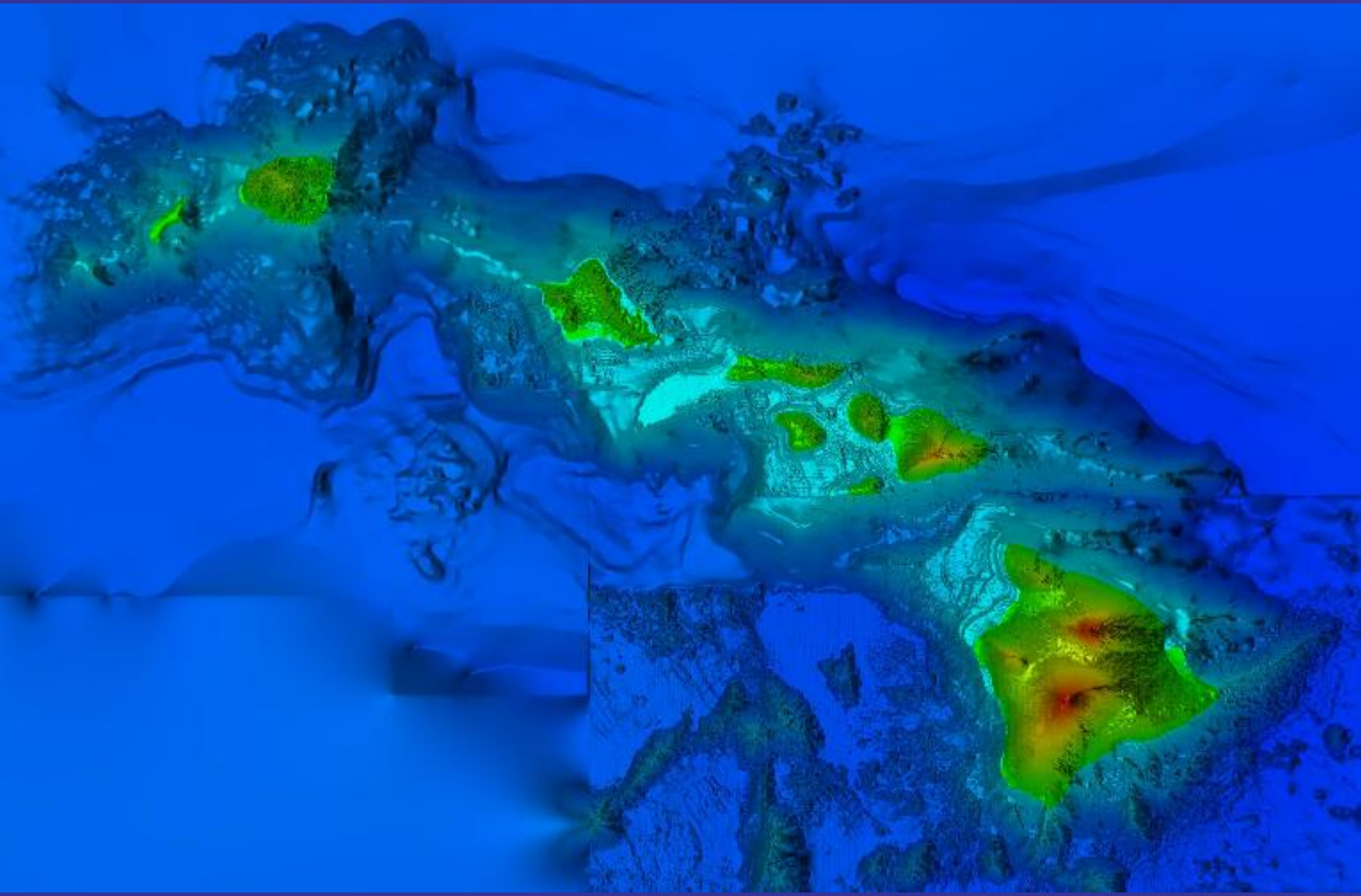


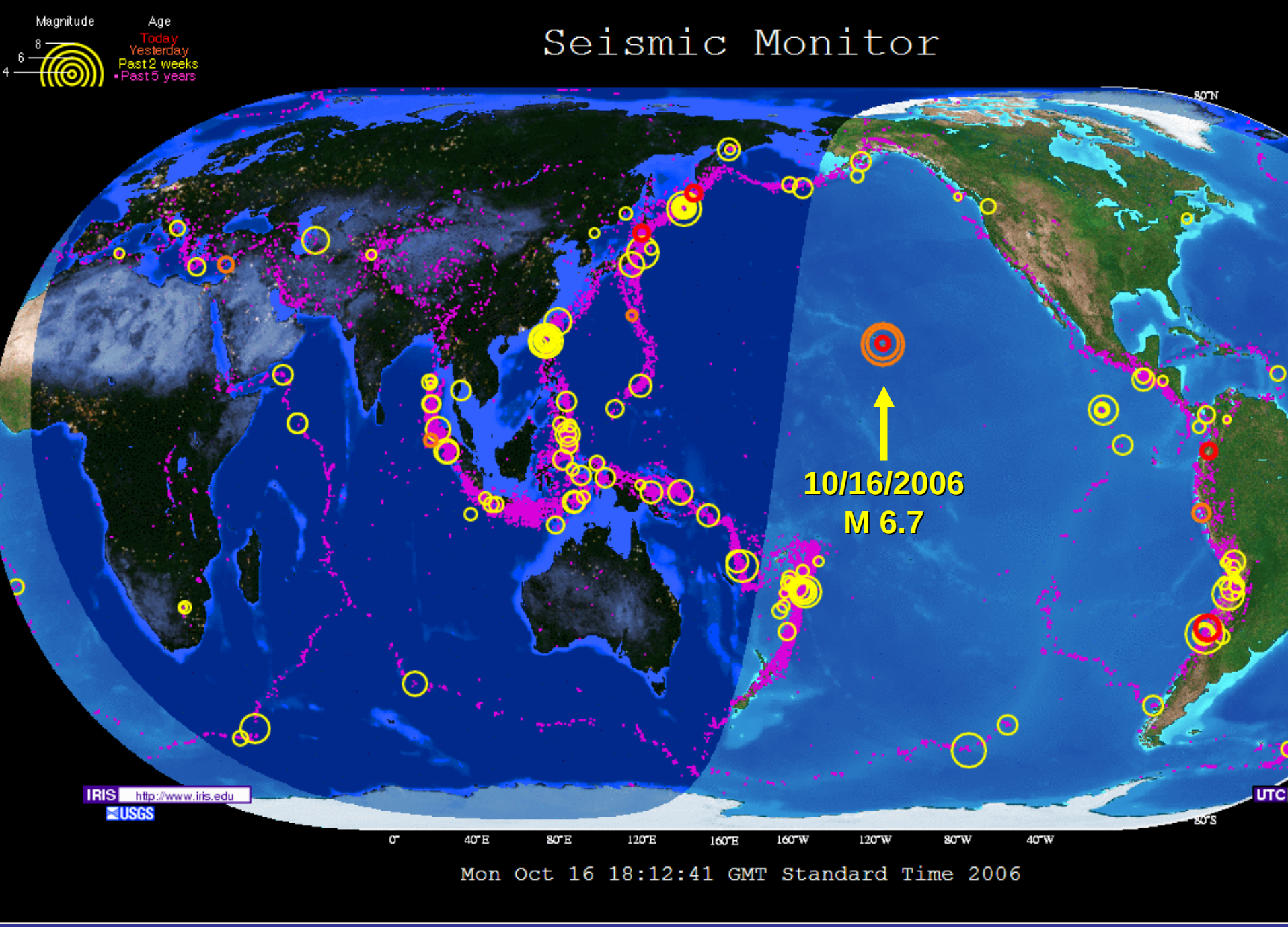
**Geo – “Earth”** **Logos – “discourse”**

**Scientific study of Earth and other planets**

***“Earth Rise” December 24, 1968, from Apollo 8 spacecraft***

# Hawaiian Geology ?




Magnitude
8
6
4
Age
Today
Yesterday
Past 2 weeks
Past 5 years
Seismic Monitor
10/16/2006
M 6.7
IRIS
http://www.iris.edu
USGS
UTC
80°N
80°S
0°
40°E
80°E
120°E
160°E
160°W
120°W
80°W
40°W
Mon Oct 16 18:12:41 GMT Standard Time 2006







# Structural Damage

# Infrastructure Impacts











# Road Damage





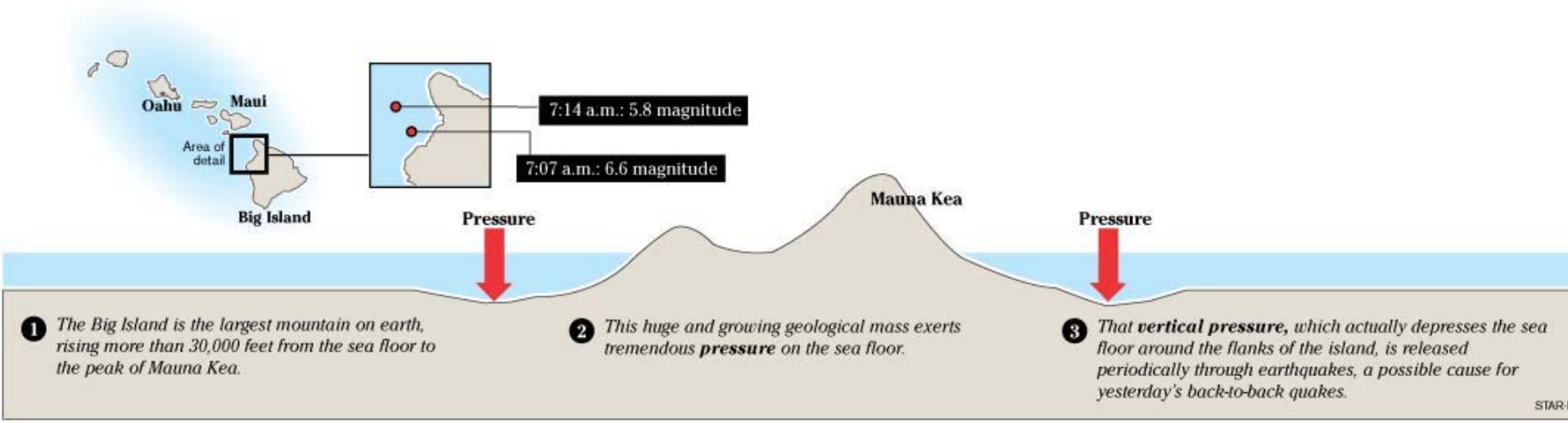


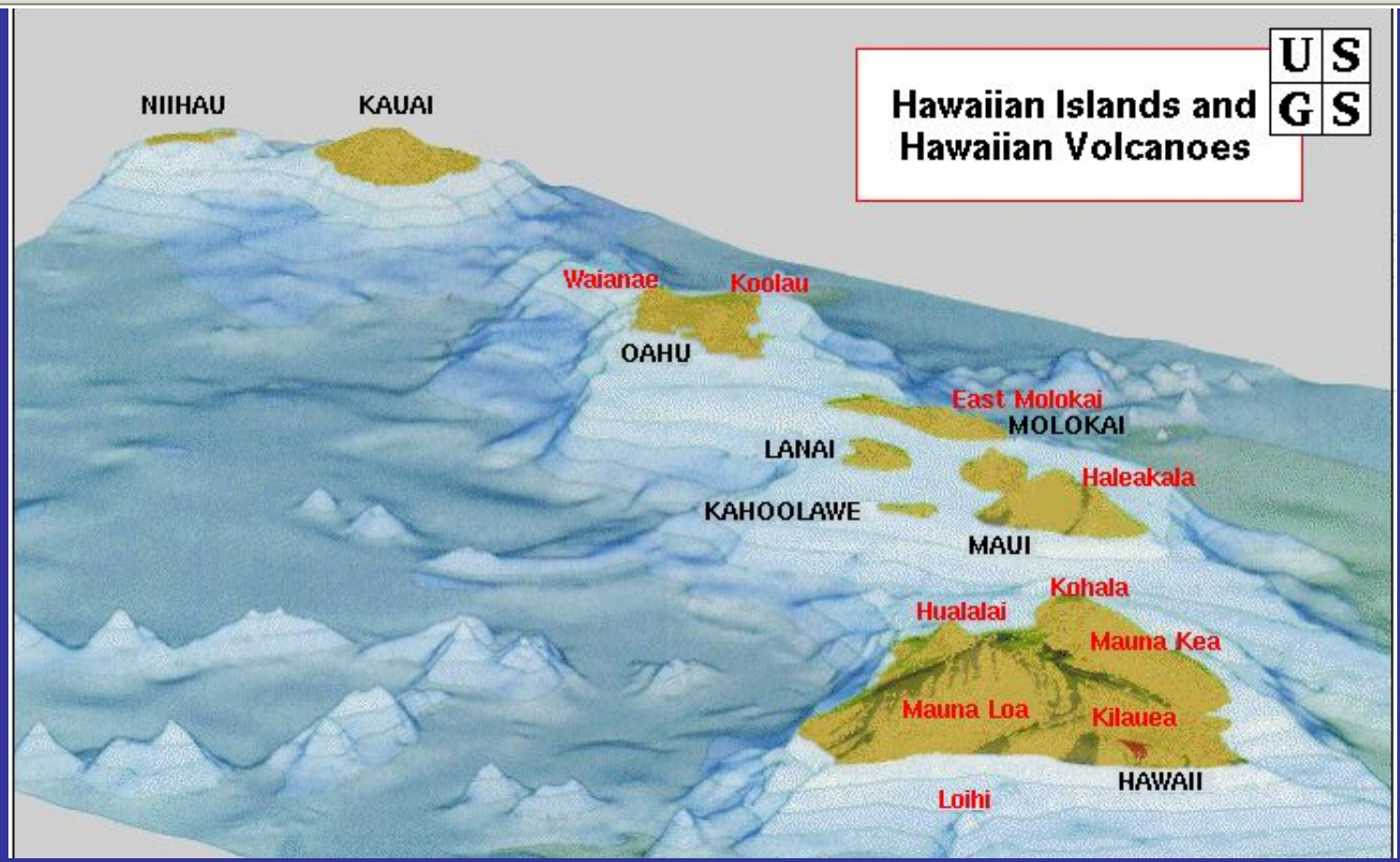
# Food Distribution

# How much does lava weigh?

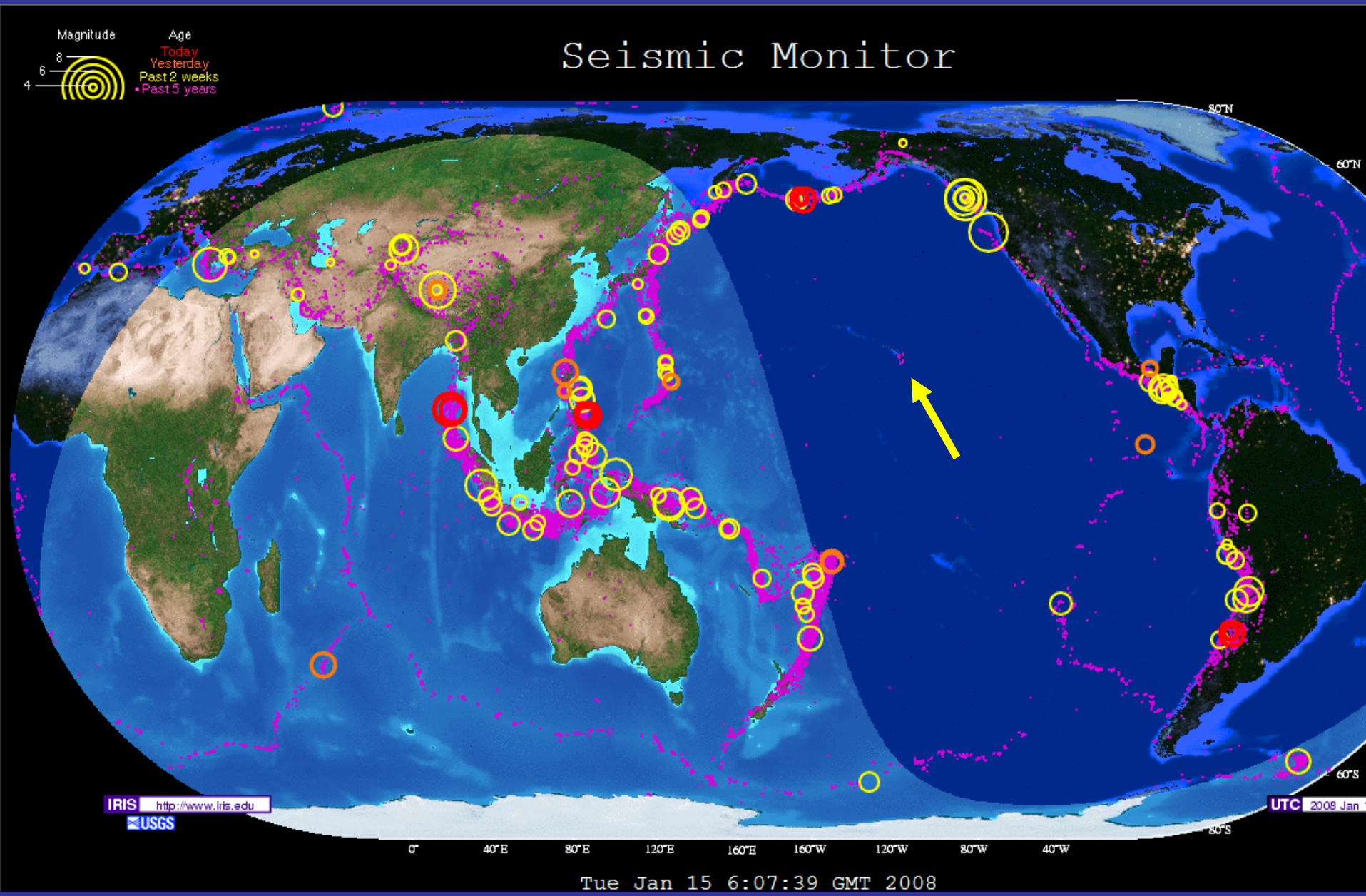





Oahu
Maui
Area of detail
Big Island
7:14 a.m.: 5.8 magnitude
7:07 a.m.: 6.6 magnitude
Pressure
Mauna Kea
Pressure
1 The Big Island is the largest mountain on earth, rising more than 30,000 feet from the sea floor to the peak of Mauna Kea.
2 This huge and growing geological mass exerts tremendous pressure on the sea floor.
3 That vertical pressure, which actually depresses the sea floor around the flanks of the island, is released periodically through earthquakes, a possible cause for yesterday's back-to-back quakes.


Hawaiian Islands and Hawaiian Volcanoes
USGS
NIIHAU
KAUAI
Waianae
Koolau
OAHU
East Molokai
MOLOKAI
LANAI
Haleakala
KAHOOLAWE
MAUI
Kohala
Hualalai
Mauna Kea
Mauna Loa
Kilauea
HAWAII
Loihi

# Where is Hawaii? Where are the earthquakes?

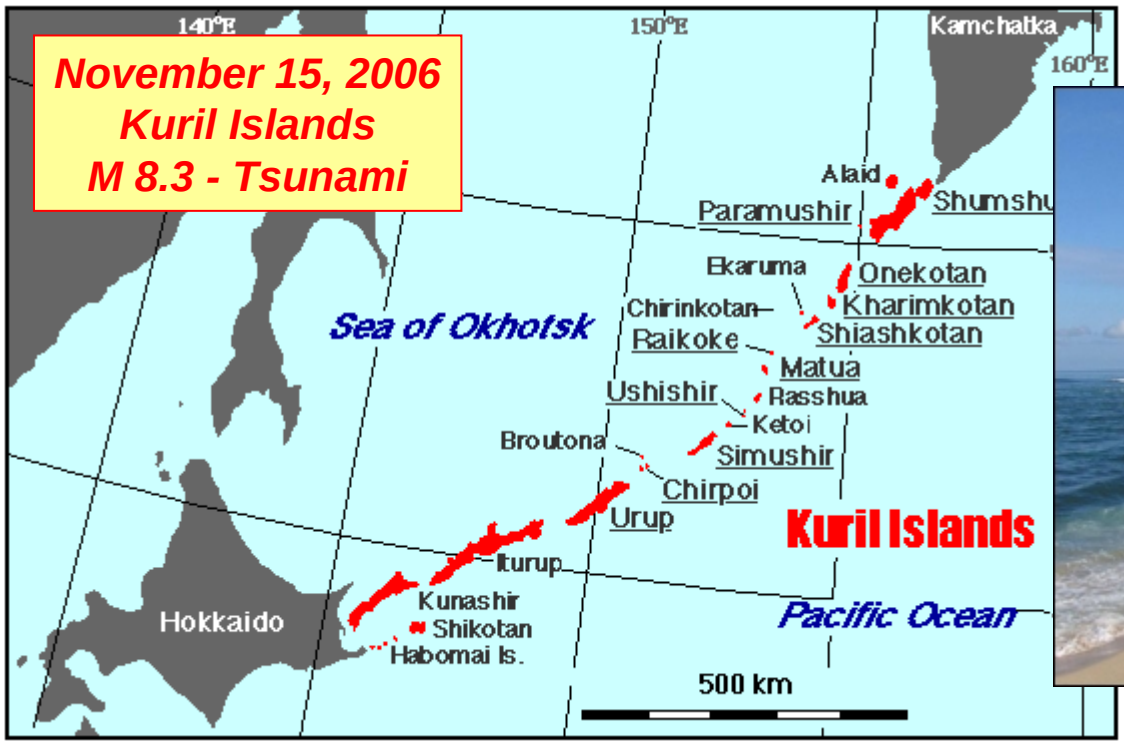


Lani's North Shore Oahu









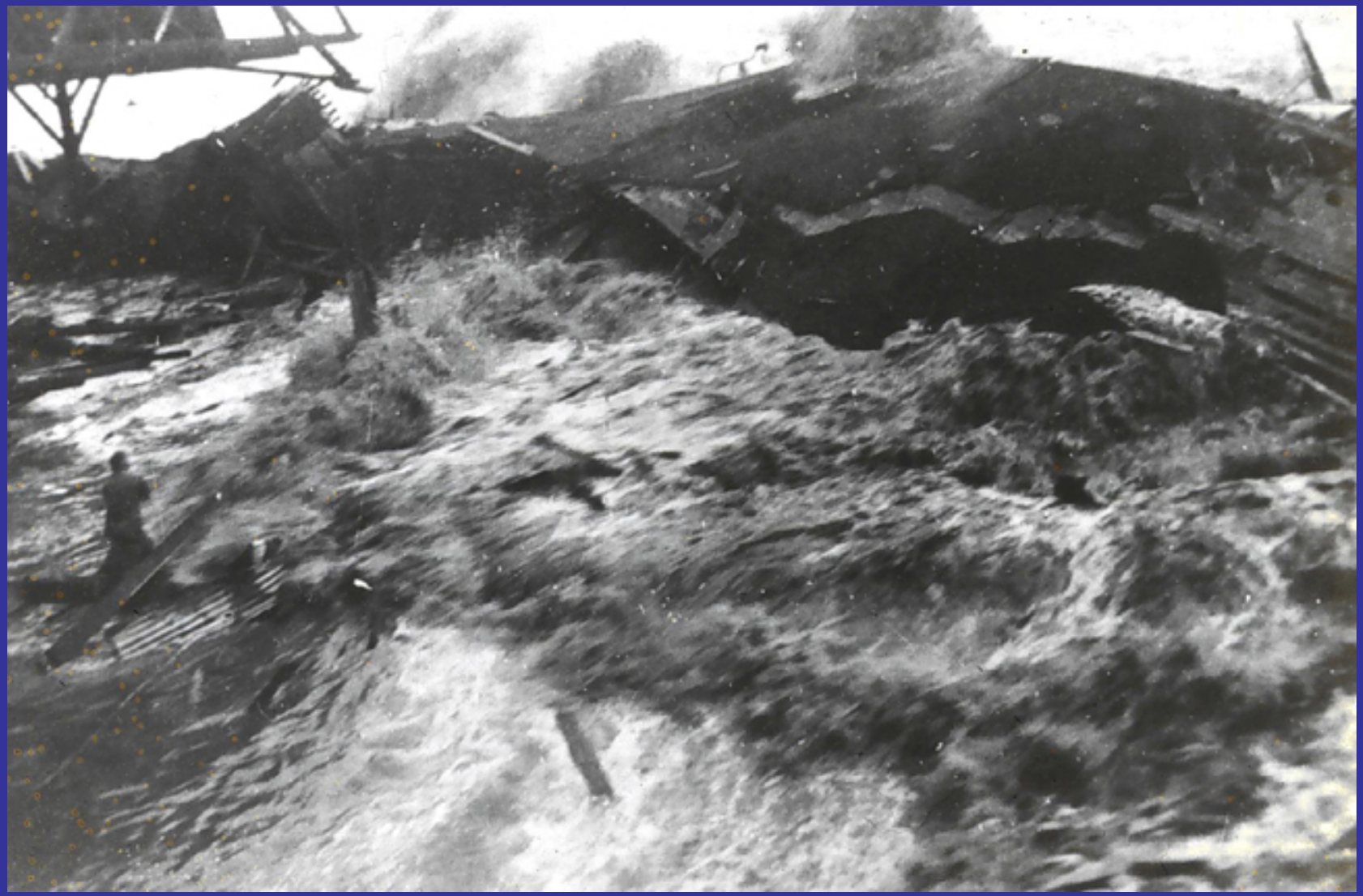





**Hilo Tsunami, 1946 - triggered by Alaskan quake - 170 dead**



**Hilo Tsunami, 1960 - triggered by Chile quake - 61 dead**
**200 dead in Japan**



**Distantly-generated damaging tsunami in:**
**1837, 1841, 1868, 1869, 1877, 1883, 1906, 1918, 1923, 1933, 1946, 1957, 1960**
**Locally-generated damaging tsunami in 1868, 1872, and 1975**

National Weather Service

# Pacific Tsunami Warning Center

Home | News | Organization | Search

DOC > NOAA > NWS > PTWC

Local forecast by "City, State" or Zip

City, St or Zip | Go

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All Regions | Pacific Ocean | Hawai`i | Indian Ocean | Caribbean Sea

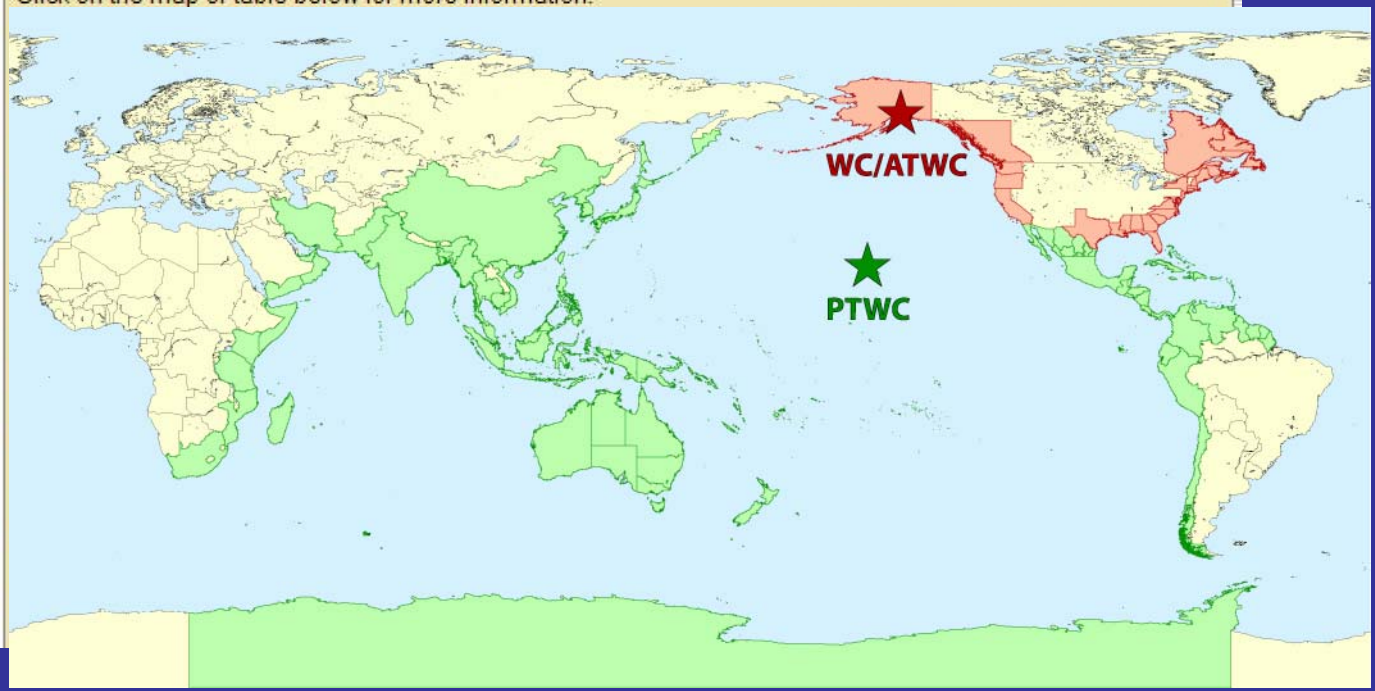
low

**No Current Warning, Watch, or Advisory in Effect**

Click here to read the latest tsunami message.

**Tsunami Messages for All Regions (Past 90 Days)**

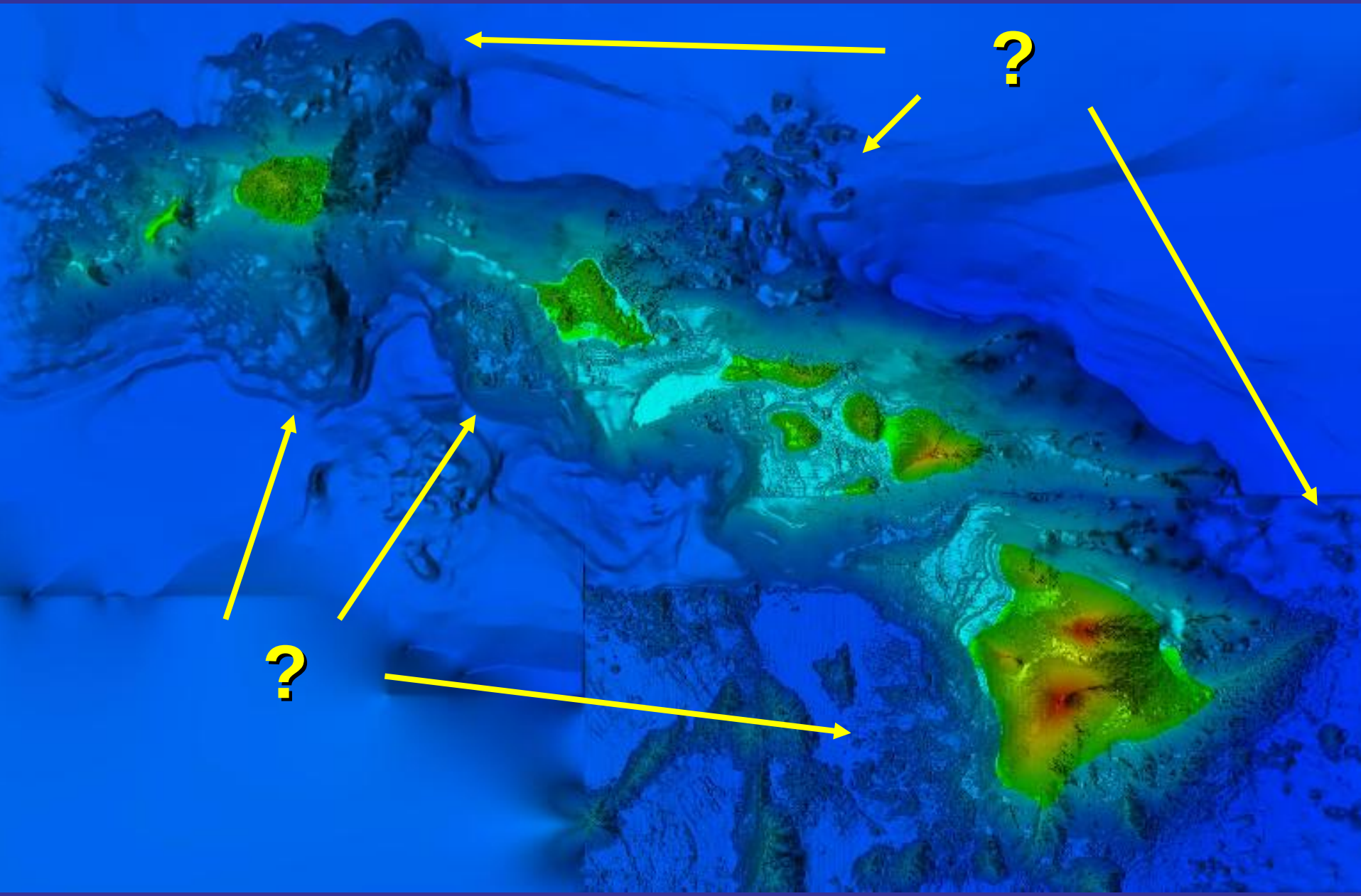
Click on the map or table below for more information.

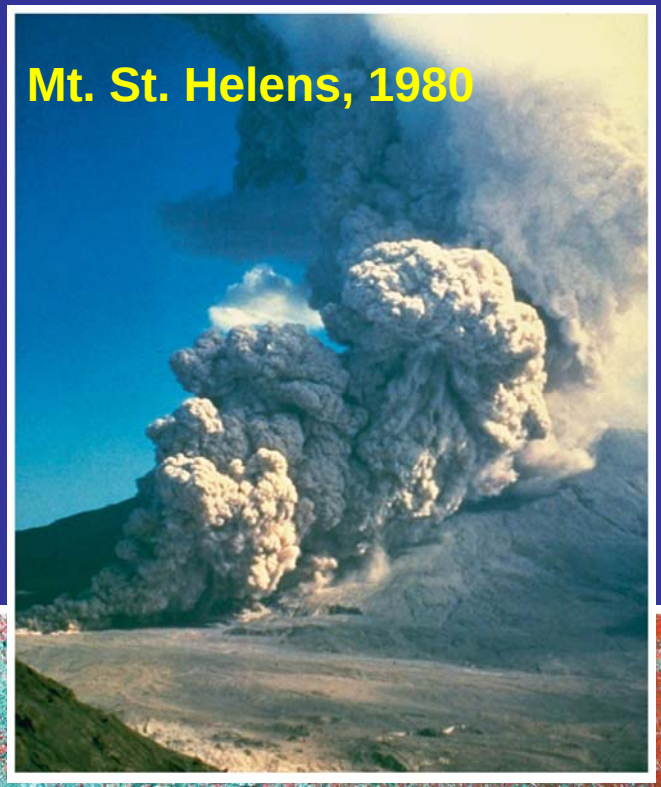



**Pacific Tsunami Warning Center**

**Founded 1949**

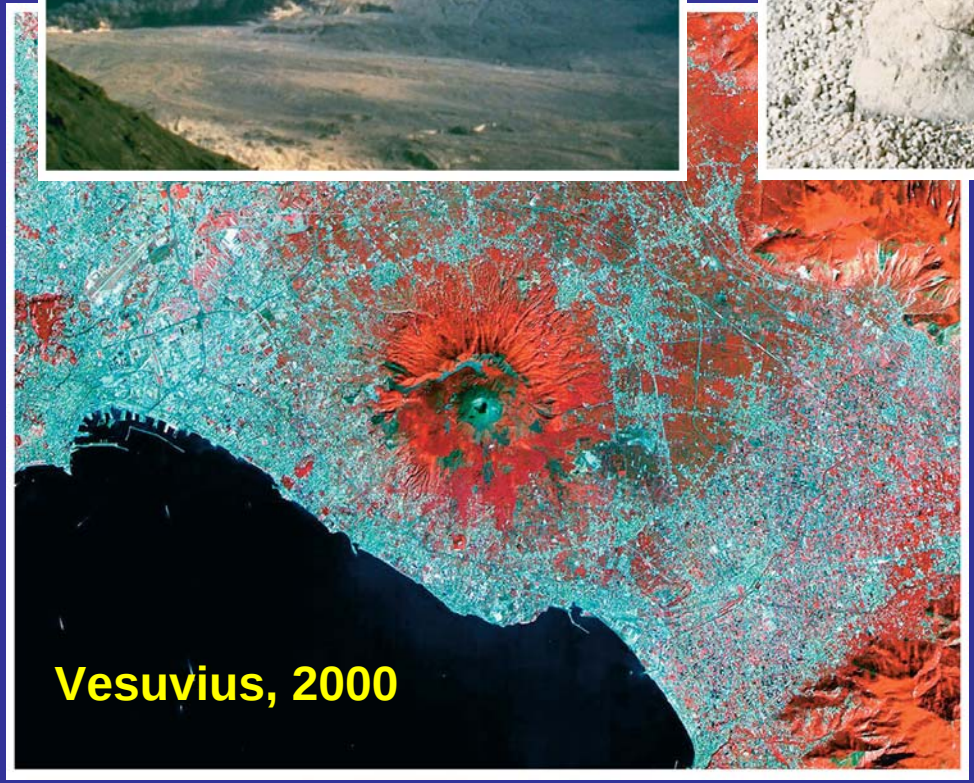
# What are the piles of debris on the seafloor from?












# VOLCANIC HAZARDS



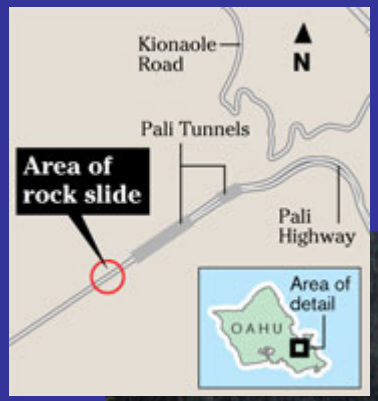



Hawaiian Acres
130
Pāhoa
Ka'ohe Homesteads
Wao Kele o Puna
Kahauale'a Natural Area Reserve
1983-1986
Pu'u 'Ō'ō
Kupaianaha
1986-1992
1992-2002
1997
2002-2004
2004-2007
Hawaii Volcanoes National Park
Royal Gardens Subd.
Kalapana
Pacific Ocean
Chain of Craters Road
3000'
2000'
1000'
200'
Jan 11 - Jan 14 flow field expansion
Flow field on January 11
0 1 2 4 Miles
0 1.5 3 6 Kilometers
200-ft contour interval
N
January 14, 2008

# May 1990 - Lava overflows Kalapana



# November 1, 2006
# Pali Landslide















# MASS WASTING HAZARDS

# So what does a geologist DO anyway?

1. Natural hazards mitigation
2. Resource identification/extraction
3. Environmental clean-up
4. Research/Education

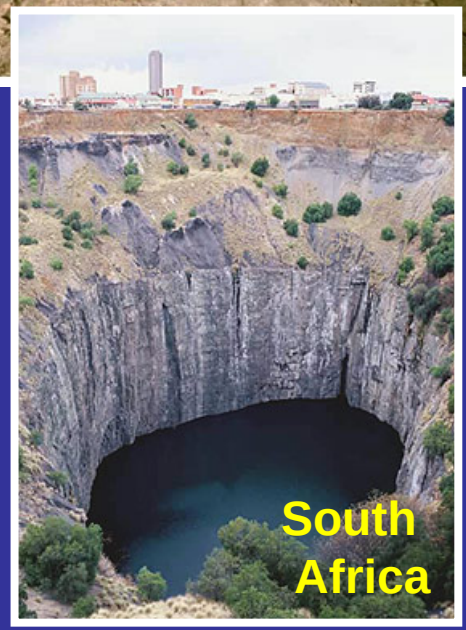
# MINING













# PETROLEUM





# HYDROELECTRIC ENERGY









# GEOTHERMAL ENERGY

# So what does a geologist DO anyway?

1. Natural hazards mitigation
2. Resource identification/extraction
3. Environmental clean-up
4. Research/Education









# OIL SPILLS

# LANDFILLS



# NUCLEAR WASTE



# So what does a geologist DO anyway?

1. Natural hazards mitigation
2. Resource identification/extraction
3. Environmental clean-up
4. Research/Education

# RESEARCH/EDUCATION

INTEGRATED OCEAN DRILLING PROGRAM
JOI ALLIANCE

**INTERNATIONAL – Integrated Ocean Drilling Program**

USGS
science for a changing world

**FEDERAL – U.S. Geological Survey**

**STATE – Department of Land and Natural Resources**




AGU

**PROFESSIONAL – American Geophysical Union**

UNIVERSITY OF HAWAI'I AT MĀNOA
School of Ocean and Earth Science and Technology
Department of GEOLOGY & GEOPHYSICS

**ACADEMIC – University of Hawaii Geology and Geophysics**

# From *romance languages* to geology ?!









**Australia, Costa Rica, France, Galapagos, Guam, Italy, Japan, Mexico, New Zealand, Papua New Guinea, Saipan, U.S., Vietnam…**


Mary


Barkley


Goofy


With Doug at Denali

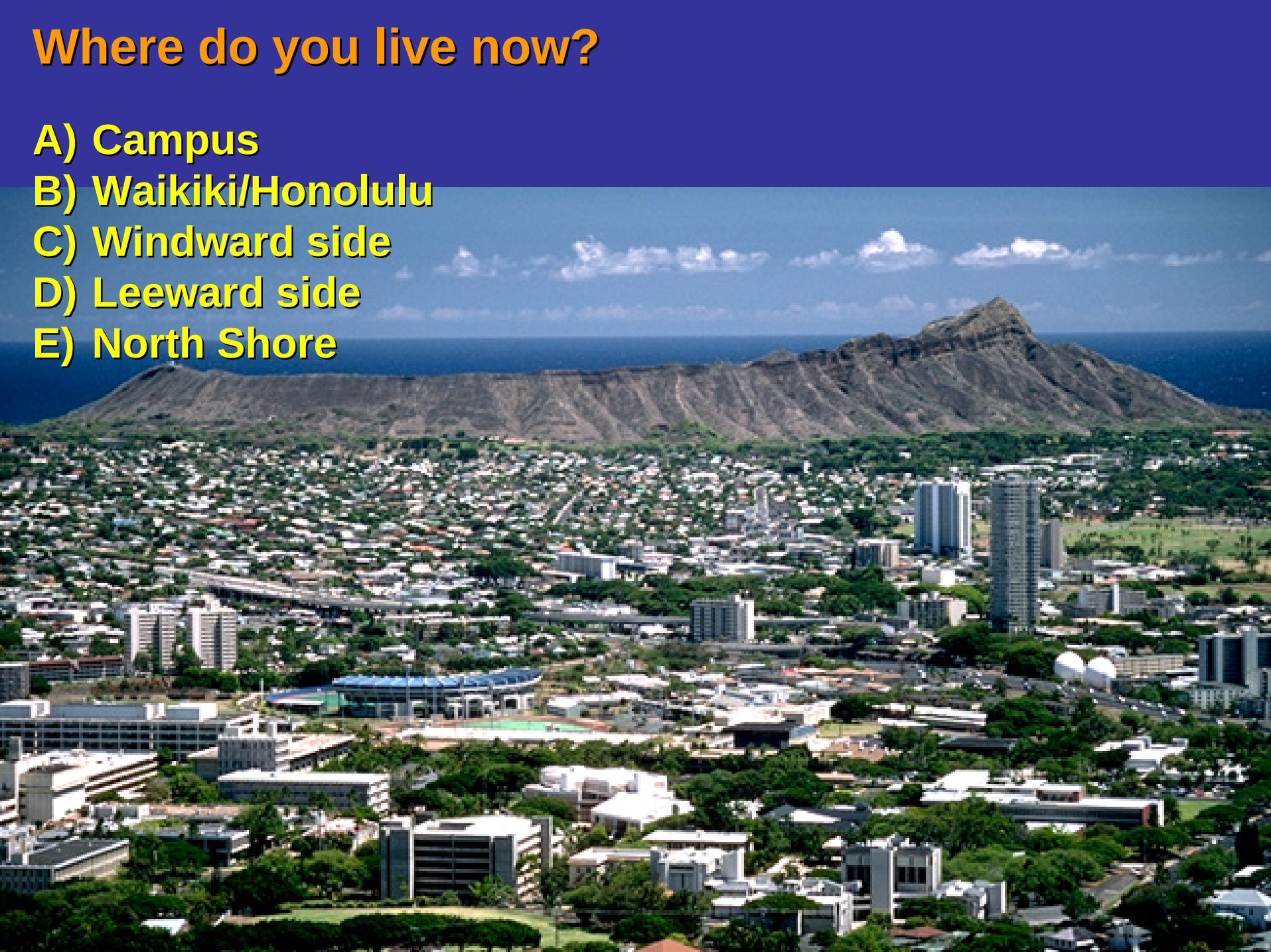



How I spend my time…


Where are you from?
A) Oahu
B) Outer Islands
C) Mainland
D) Asia
E) Other International

# Where do you live now?

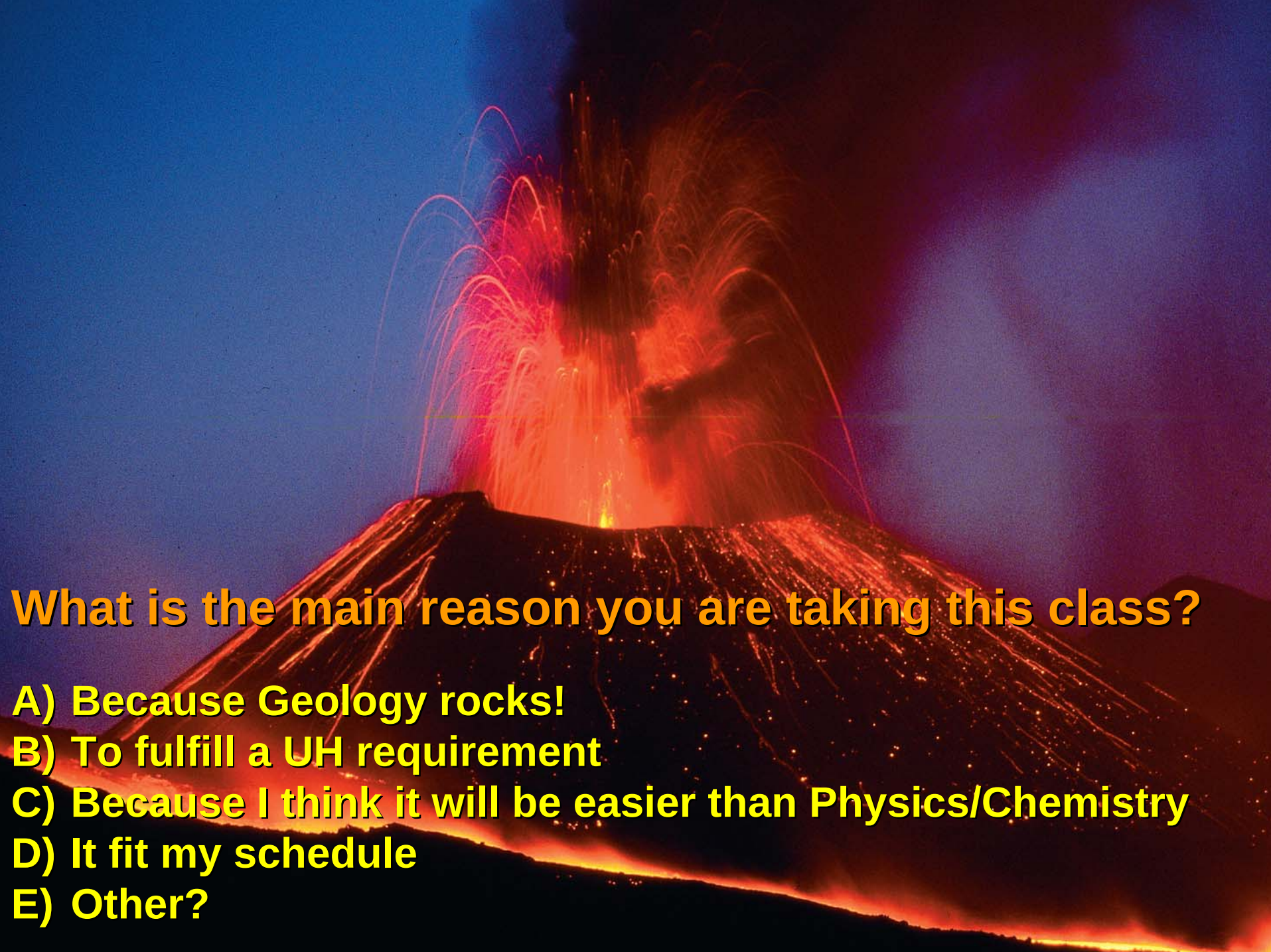
A) Campus
B) Waikiki/Honolulu
C) Windward side
D) Leeward side
E) North Shore



# What year in school are you?

A) Freshperson, B) Sophomore
C) Junior, D) Senior (++)
E) Grad student





**What is the main reason you are taking this class?**

A) Because Geology rocks!
B) To fulfill a UH requirement
C) Because I think it will be easier than Physics/Chemistry
D) It fit my schedule
E) Other?

# How do you spend your time…?












Activity #1