Cutting-edge research on interesting and societally relevant topics

Some examples:

- Coastal Geology
- Climate Change
- Environmental
- Geological Hazards
- Hydrology
- Mantle Geochemistry
- Igneous petrology
- Paleo-oceanography
- Paleobiology
- Planetary geology
- Plate tectonics
- Seismology
- Structural Geology
- Volcanology

IODP Drill core

Near-shore geology

Kilauea lava lake

Petrological element mapping

Submarine groundwater discharge
Large and diverse faculty - Geophysics and Tectonics

Garrett Ito
Professor
Geophysics, Geodynamics

Steve Martel
Professor
Engineering geology, structural geology

Janet Becker
Associate Professor
Geophysics, Applied Mathematics

Clint Conrad
Associate Professor
Geophysics, Geodynamics

Robert Dunn
Associate Professor,
Seismology

Greg Moore
Dept. Chair, Professor
Structural Geologist, Seismologist

Bridget Smith-Konter
Assistant Professor,
Crustal Deformation, Planetary Tectonics

Neil Frazer
Professor
Geophysics

Paul Wessel
Professor,
Plate Tectonics, Marine Geophysics
Scientific Software
Large and diverse faculty - Marine and Environmental Geology

Chip Fletcher
Assoc. Dean
Coastal Geology

Henrieta Dulaiova
Assistant Professor,
Environmental Geochemistry

Aly El Kadi
Professor,
Hydrology

Eric Gaidos
Professor
Geobiology, Astrobiology, Planetary

Craig Glenn
Professor
Paleooceanography, hydrology

Hope Jahren
Professor
Paleobiology, Environmental Geology

Brian Popp
Professor,
Stable Isotope Biogeochemistry

Greg Ravizza
Associate Professor,
Marine Geochemistry, Paleoceanography
Large and diverse faculty - Volcanology, Geochemistry, Petrology

Ken Rubin
Dept. Chair, Professor
Submarine Volcanology, Sea-level, Geochemistry

Mike Garcia
Professor
Petrology, Volcanology

Julia Hammer
Associate Professor
Experimental Petrology

Eric Hellebrand
Associate Specialist
Petrology

Bruce Houghton
Macdonald Professor of Volcanology
Volcanology, Hazards & Society

Jasper Konter
Assistant Professor
Geochemistry, Petrology

Christian Miller
Asst. Specialist
Geochemistry

Scott Rowland
Specialist
Volcanology, Hawai‘ian Geology, Remote sensing

John Sinton
Professor Emeritus
Petrology, Hawai‘ian Geology
Opportunities for Field Work in Hawaii

On land

Hanauma Bay

Kilauea

Kilauea

Oahu shoreline survey

Stream flow

Infrared camera
Opportunities for Field Work in Hawaii

Under water and at sea

Loihi

Penguin Bank

Submerged coral reefs

R/V Kilo Moana

Scuba

ROV Lu’ukai

Pisces V
Opportunities for Field Work - Around the world, on land and at sea

South America

Italy

Ocean Drilling

Galapagos Islands

Marine Seismics

Samoa

Iceland

Antarctica
Some GG Research Project Examples
Geological Hazards/Disaster Preparedness

Example from Bruce Houghton

Volcanic Eruptions  image source: USGS, 1980
Landslides  image source: Wyoming DoT, 2011
Earthquakes  image source: USGS, 1971

Understanding Event Duration

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Warning</th>
<th>Event</th>
<th>Duration</th>
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<tbody>
<tr>
<td>flood</td>
<td>weeks to months</td>
<td>days</td>
<td>months</td>
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<tr>
<td>hurricane</td>
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<td>drought</td>
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<td></td>
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<tr>
<td>wildfire</td>
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<td>earthquake</td>
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<td>tsunami</td>
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<td></td>
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<tr>
<td>eruption</td>
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<td></td>
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<tr>
<td>landslide</td>
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</tbody>
</table>

Precursors and decision making  image source: USGS, 2009

Precursors and Uncertainty

Energy

Back to sleep

Time

FEMA  Fundamentals of Geological Disasters
Studies in Structural Geology
Examples from
Steve Martel and Greg Moore

Faults and Fractures Mechanics

Tectonic studies of the Nankai Trough

Forearc Basin

2012

2013

Drilling to the plate Boundary

Fieldwork

LIDAR

Stress Analyses

Differential Geometry

Kumano Transect
San Andreas Fault System Stress Accumulation Rates - How Does Stress Vary With Depth and Time?

Models of present-day earthquake cycle stress accumulation are sensitive to the time since the last major earthquake on each fault segment.

Studies in Seismology
Example from Bridget Smith-Konter
Studies in Geophysics and Tectonics
Examples from Clint Conrad and Rob Dunn

Seafloor bathymetry and seismic structure of the crust in the Lau back-arc basin.

Plate Tectonics & Subduction

Global Mantle and Seismic Anisotropy
Regional sea level rise (1993-2010)

Water level effects on wave-driven inundation for reef fringed islands

Waikiki Sea future level prediction

groundwater discharge at the coastal zone: source of nutrients, trace metals, pollutants into the ocean.

Land-ocean interface

Examples from Chip Fletcher, Janet Becker, Henrieta Dulaiova

Sea Level and Coastal Research

Sea Level and Coastal Research
Examples from Chip Fletcher, Janet Becker, Henrieta Dulaiova
Sea Level Research
Examples from Ken Rubin and Chip Fletcher

Hawaii paleo-sea level reconstruction: constraining ice melt fingerprints and future ice loss predictions

1. Observations of the past
2. Model predictions to explain them
3. Predictions of future change

Figure 1. Fingerprint of the TIM RSL variation (m) for the year 2100 (relative to year 1992) pertaining to the MR (a) and HE (b) scenarios. The green contour shows the ocean-averaged value (eustatic variation). GIA is not considered here.
Studies in Hot spot volcanism
Examples from Mike Garcia and Jasper Konter

Hawaiian Rejuvenation Volcanism

Geochemistry of Western Pacific Hotspots
Studies in Volcanology, Petrology and Geochemistry

Examples from
Ken Rubin and Julia Hammer

Olivine growth at high undercooling revealed by x-ray element mapping

First molten lava sampled in the deep sea
W. Mata 2009

Rarest volcanic rocks on the planet – only known modern example of boninite

Olivine growth at high undercooling revealed by x-ray element mapping
UH Department of Geology & Geophysics, SOEST

www.soest.hawaii.edu/GG

A great place to work and study

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- our GG website
- the SOEST You-tube channel