GEOLOGISTS ROCK!

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North Carolina Geological Survey

What is Geology?

Geology is an earth science concerned with the solid Earth, the rocks and minerals of which it is composed, and the processes by which they are created and are changed over time

What is Earth Science?

Earth science is a branch of science related to planet Earth. It deals with the physical, chemical, and biological elements of Earth. This includes the biosphere, hydrosphere, atmosphere, and geosphere

How many types of geoscientists are there?

SO MANY!!

Geomorphologist

Field Geologist

Geophysicist

Petroleum Geologist

Geochemist

Hydrogeologist

Engineering Geologist

Economic Geologist

Environmental Geologist

Marine Geologist

Hydrogeologist

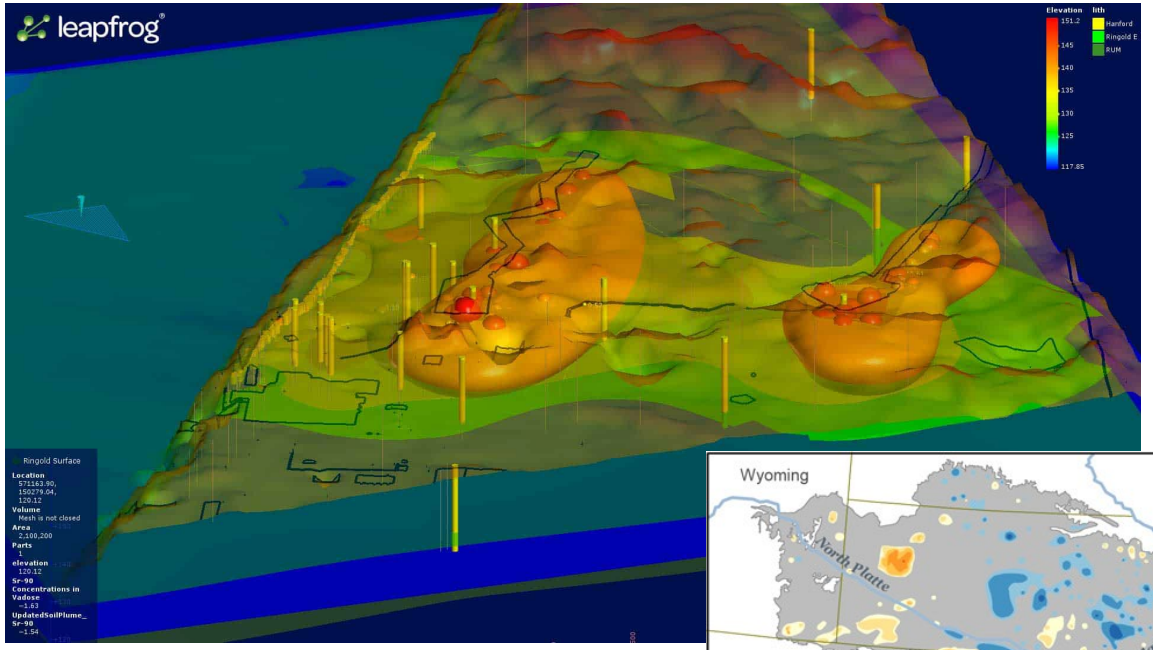
Studies how water and pollutants move through underground reservoirs (aquifers)

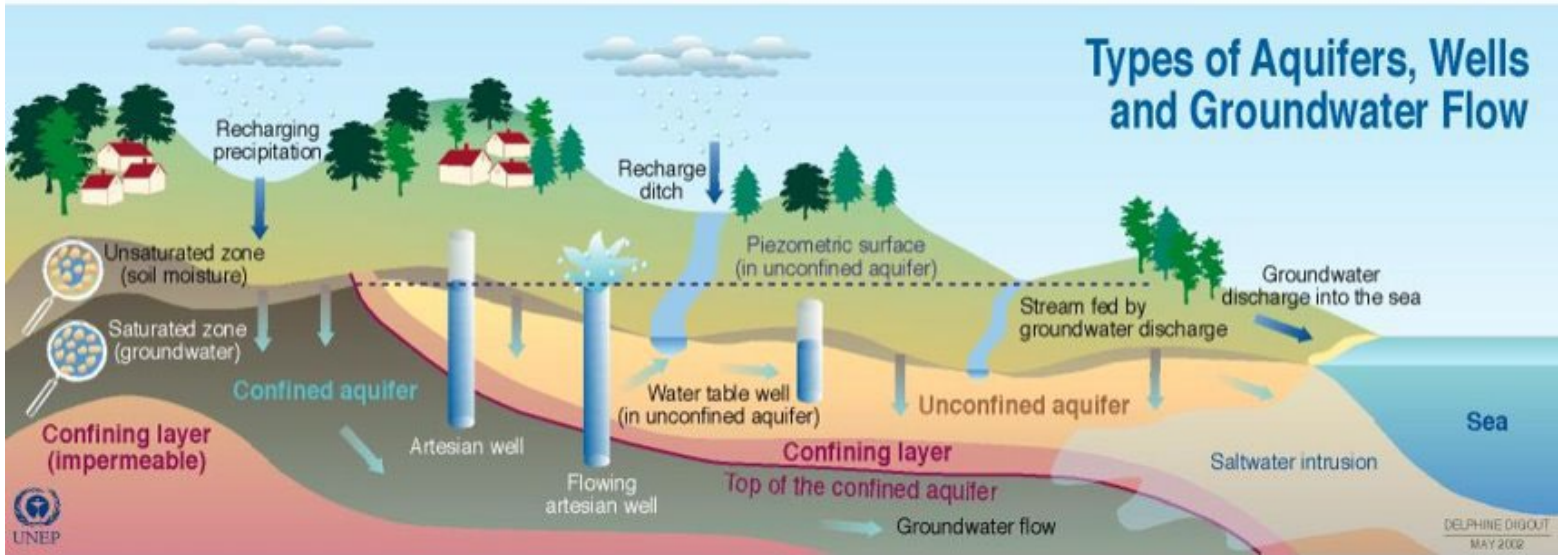
Locates and studies underground reserves of water (groundwater)

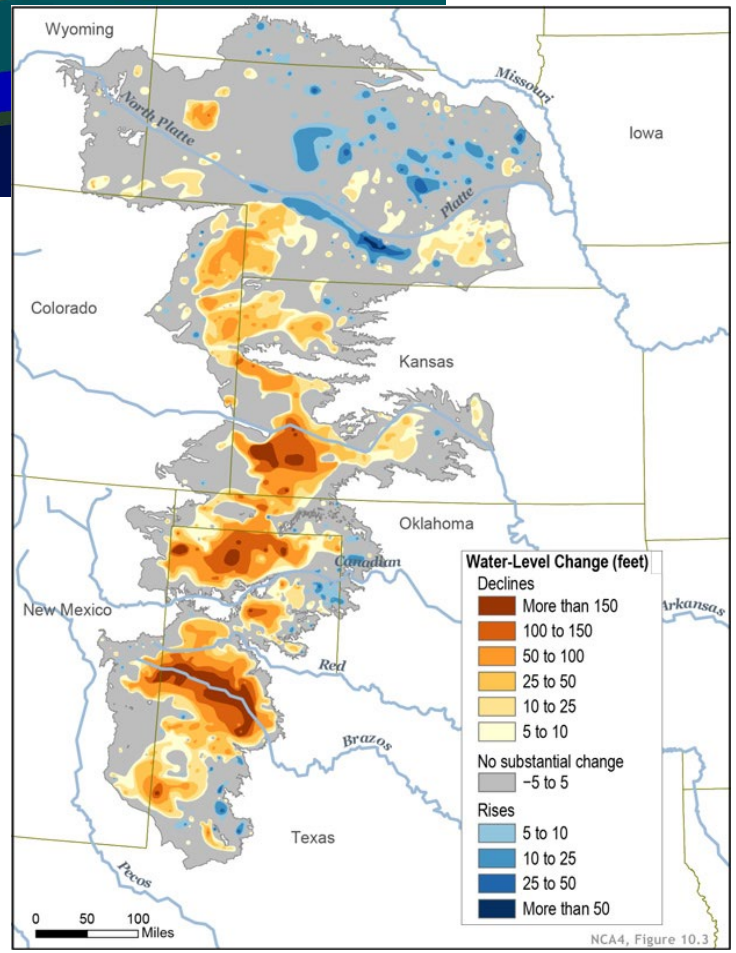
Studies how humans withdrawal water from aquifers and studies aquifer depletion and replenishment

Designs and implements systems and technologies to remediate contaminated groundwater


1988
2004
2008
2016
SAN JOAQUIN VALLEY, CA
SUBSIDENCE 6.2 ft
1988-2016
Benchmark
H1235
USGS
H 1235


leapfrog


Types of Aquifers, Wells and Groundwater Flow
Recharging precipitation
Recharge ditch
Unsaturated zone (soil moisture)
Saturated zone (groundwater)
Piezometric surface (in unconfined aquifer)
Stream fed by groundwater discharge
Groundwater discharge into the sea
Confined aquifer
Water table well (in unconfined aquifer)
Unconfined aquifer
Sea
Confining layer (impermeable)
Artesian well
Flowing artesian well
Confining layer
Top of the confined aquifer
Saltwater intrusion
Groundwater flow
UNEP
DELPHINE DIGOUT
MAY 2008


Wyoming
Missouri
North Platte
Platte
Iowa
Colorado
Kansas
Oklahoma
Canadian
New Mexico
Arkansas
Red
Brazos
Texas
Pecos
Water-Level Change (feet)
Declines
More than 150
100 to 150
50 to 100
25 to 50
10 to 25
5 to 10
No substantial change
−5 to 5
Rises
5 to 10
10 to 25
25 to 50
More than 50
0 50 100
Miles
NCA4, Figure 10.3

Marine Geologist

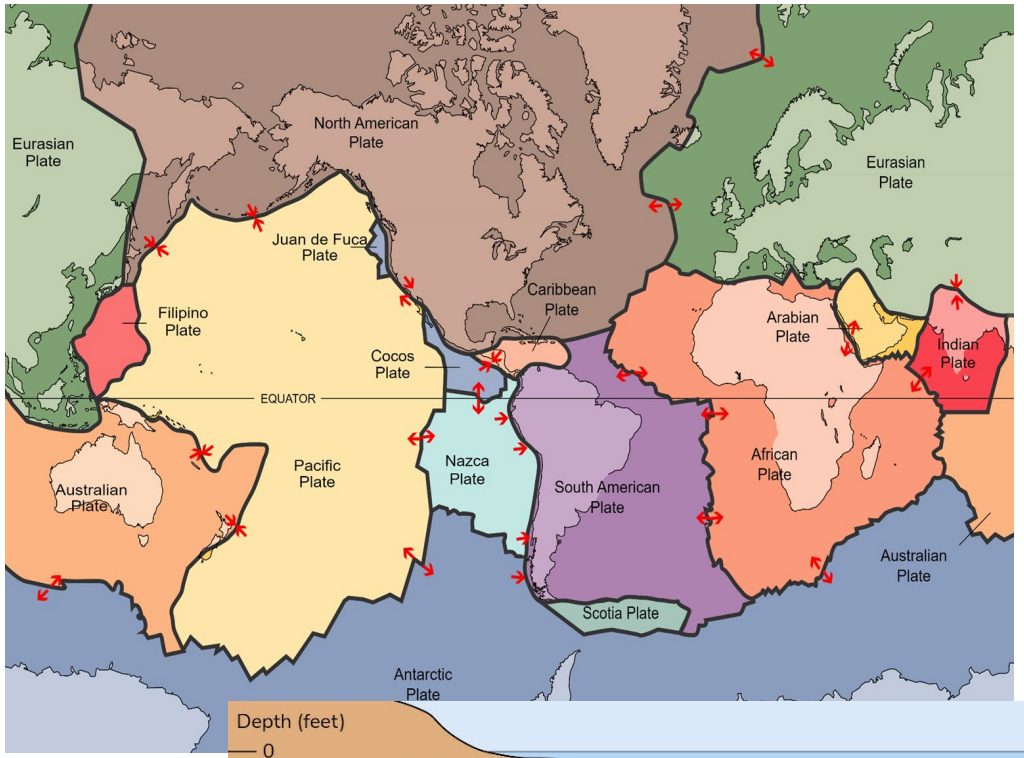
Studies the history and the structure of the ocean floor

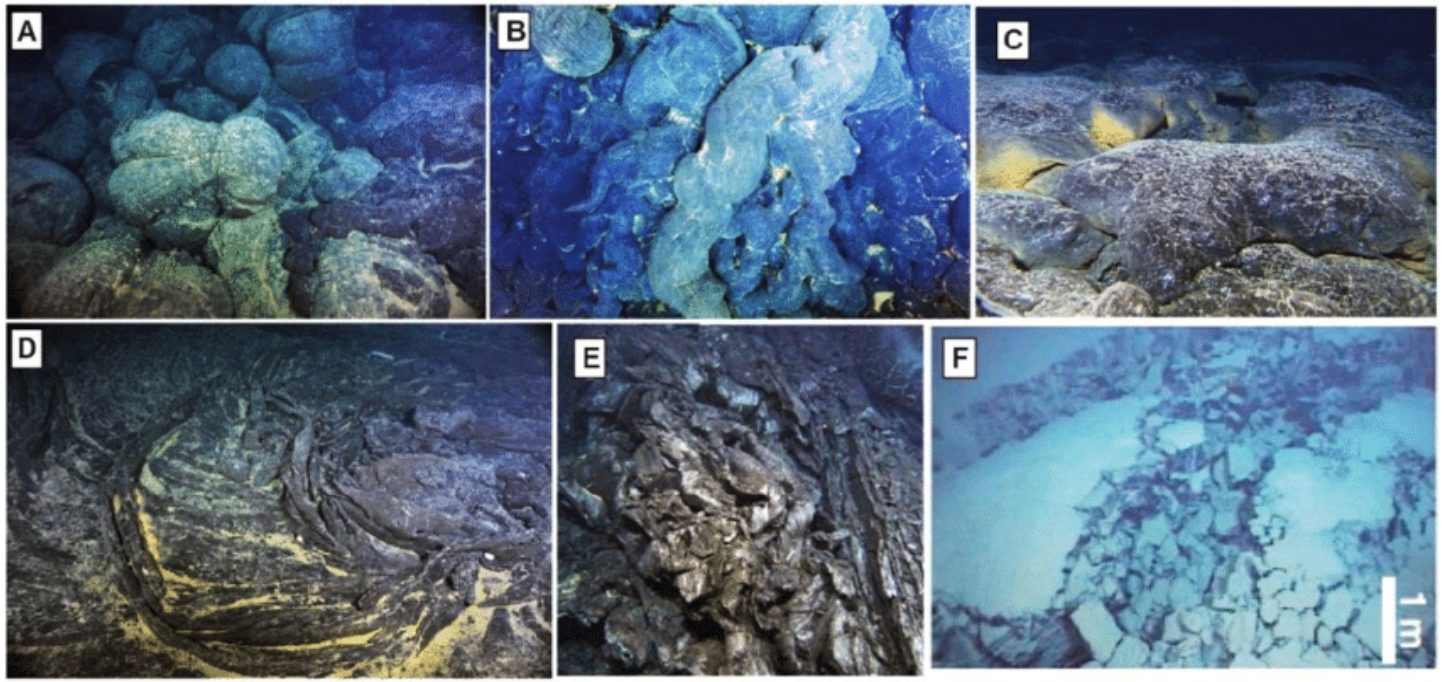
Studies the processes of seafloor spreading and plate tectonics

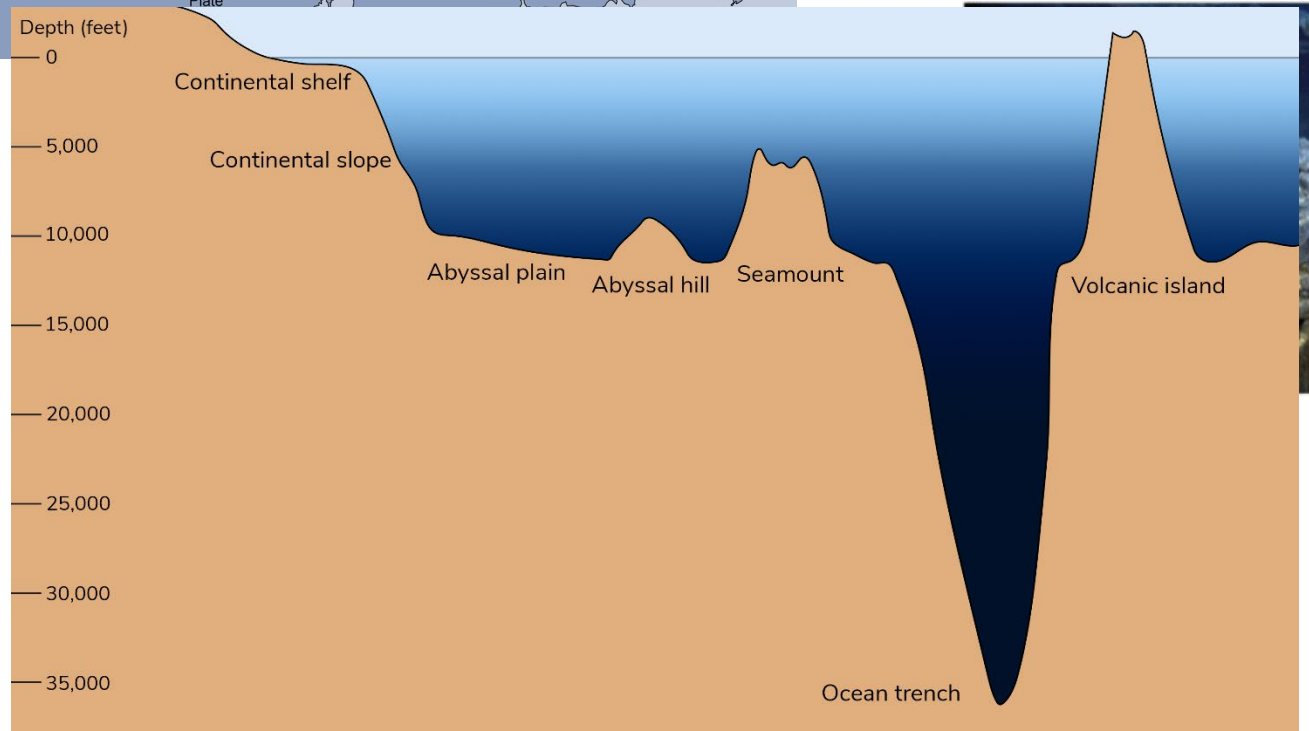
Researches new minerals or resources on the ocean floor

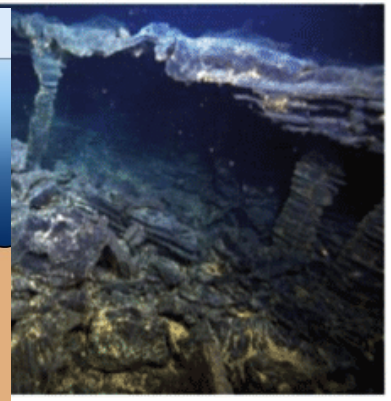
Studies rivers and estuaries that enter the oceans along continental boundaries

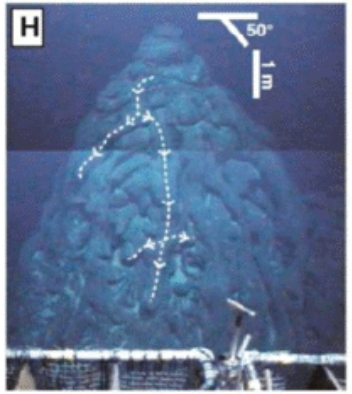
Investigates volcanism and earthquakes associated with plate tectonics in the oceans


Eurasian Plate
North American Plate
Eurasian Plate
Juan de Fuca Plate
Caribbean Plate
Filipino Plate
Arabian Plate
Indian Plate
Cocos Plate
EQUATOR
Pacific Plate
Nazca Plate
South American Plate
African Plate
Australian Plate
Australian Plate
Scotia Plate
Antarctic Plate


A
B
C
D
E
F
1 m


Depth (feet)
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
Continental shelf
Continental slope
Abyssal plain
Abyssal hill
Seamount
Volcanic island
Ocean trench



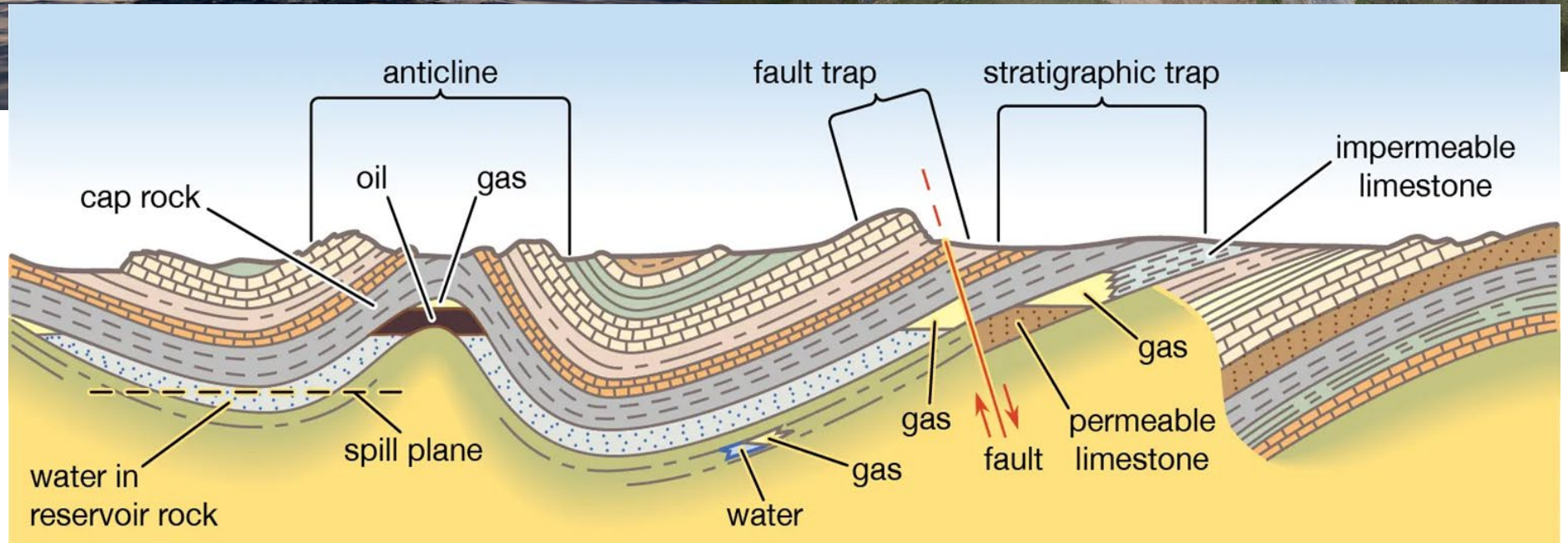

H
50°
1 m

Studies deposits of oil and natural gas to make determinations on their quality & quantity

Studies deposits in oceans, rock folds and/or faults to find possible oil and gas deposits

Petroleum Geologist

Guides decisions on where to drill for oil & gas based on potential prospects and decides the best approach to extracting the resources


anticline
fault trap
stratigraphic trap
impermeable limestone
cap rock
oil
gas
gas
gas
permeable limestone
fault
spill plane
water in reservoir rock
gas
water

Economic Geologist

Analyzes geologic formations and determines locations of valuable resources (oil, gas minerals, metals, rocks, gemstones) that can be used profitably by humans

Uses geological methods to evaluate mining sites and plans efficient and safe extraction methods

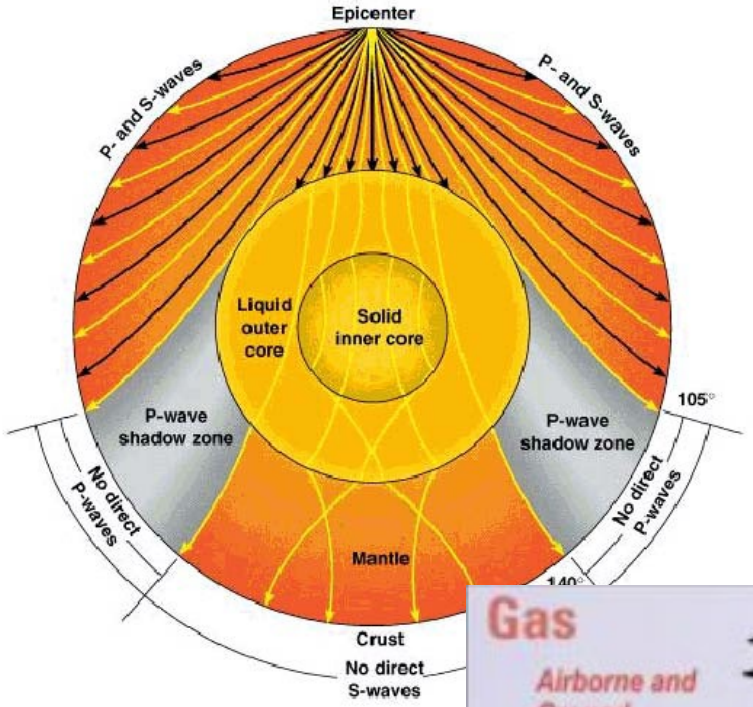
Develops extraction methods to ensure safety and maintain compliance with safety and environmental regulations

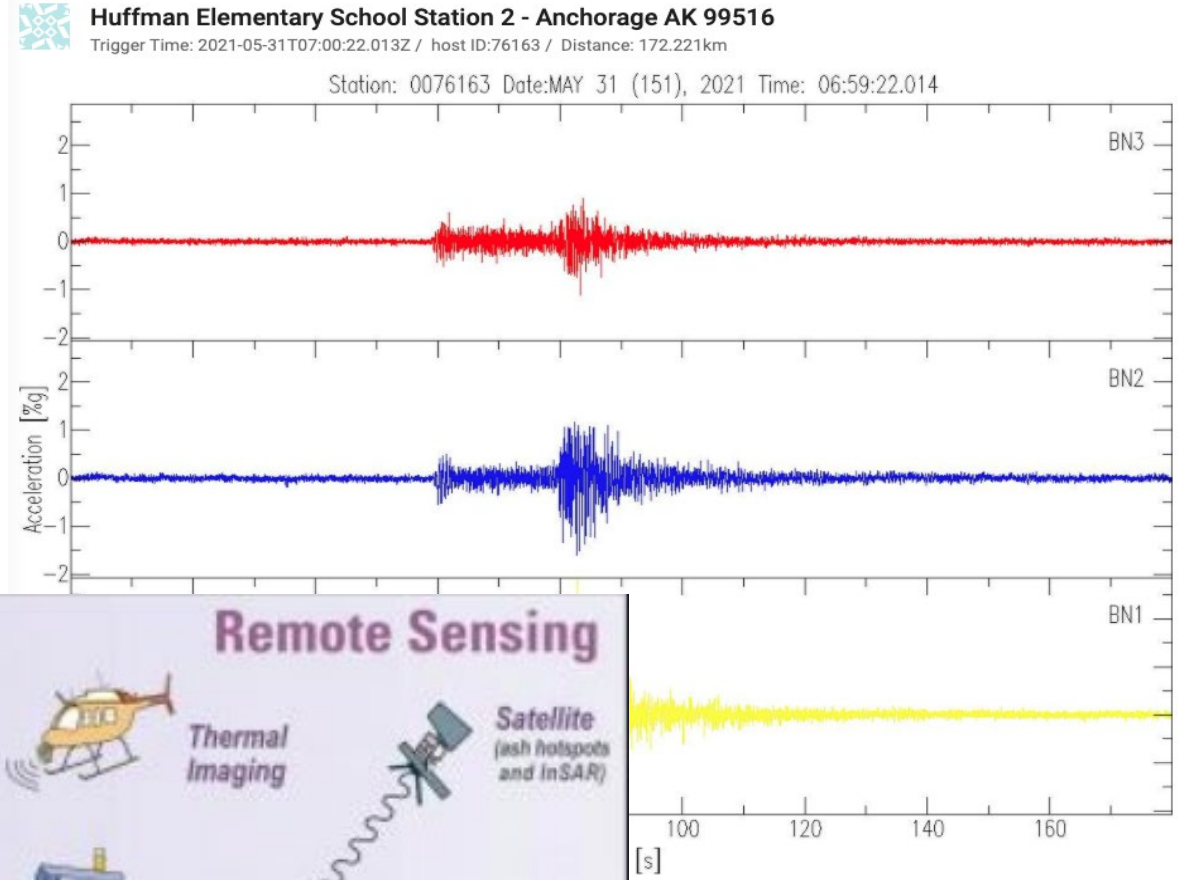
Geophysicist

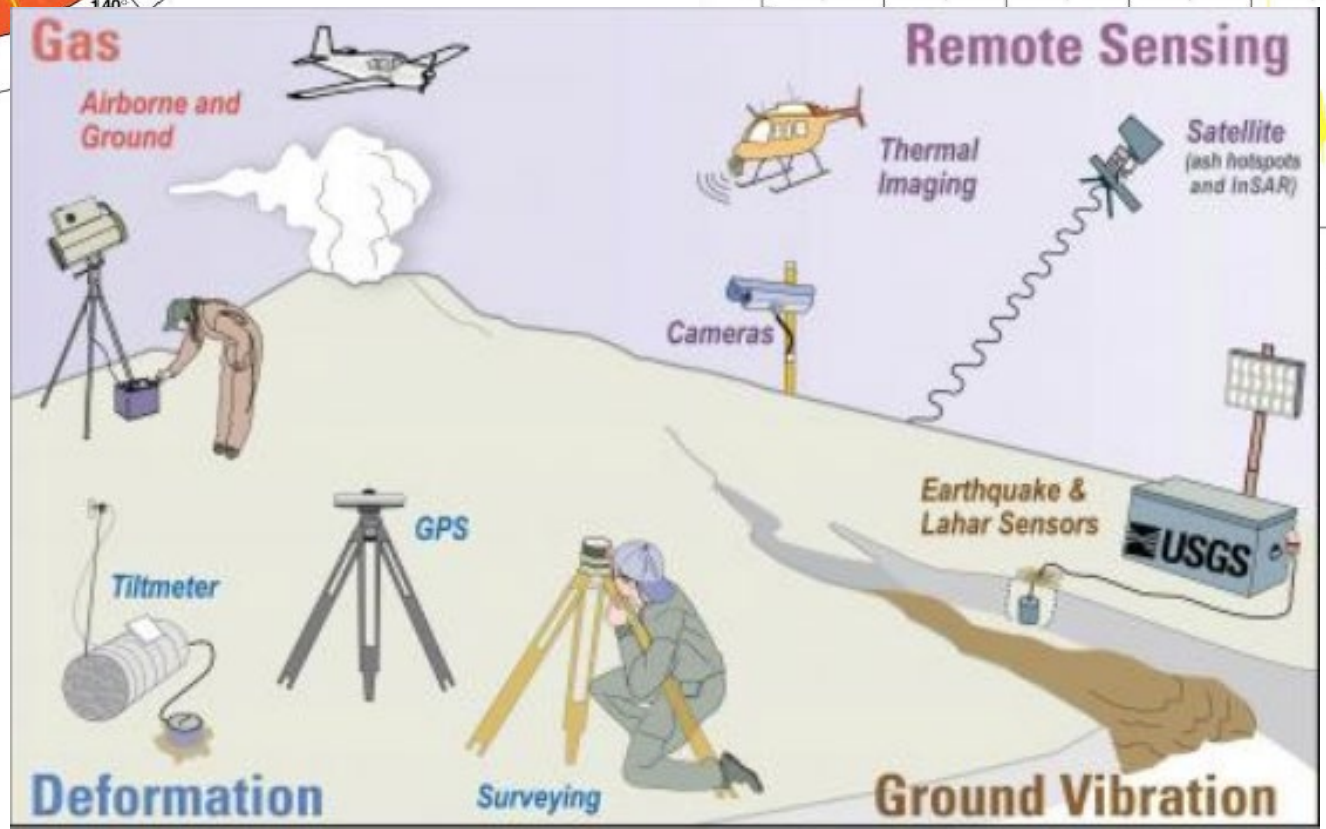
Studies Earth's internal structure using magnetic, electrical, and seismic methods

Studies volcanoes & earthquakes to determine why these events occur and how to predict future activity

Uses computer models & simulations to reveal information about Earth's interior structures that aren't visible on the surface


Epicenter
P- and S-waves
P- and S-waves
Liquid outer core
Solid inner core
P-wave shadow zone
P-wave shadow zone
105°
No direct P-waves
No direct P-waves
Mantle
140°
Crust
No direct S-waves


Huffman Elementary School Station 2 - Anchorage AK 99516
Trigger Time: 2021-05-31T07:00:22.013Z / host ID:76163 / Distance: 172.221km
Station: 0076163 Date:MAY 31 (151), 2021 Time: 06:59:22.014
BN3
BN2
BN1
Acceleration [%g]
2
1
0
−1
−2
100
120
140
160
[s]


Gas
Airborne and Ground
Remote Sensing
Thermal Imaging
Satellite
(ash hotspots and InSAR)
Cameras
Earthquake & Lahar Sensors
USGS
GPS
Tiltmeter
Deformation
Surveying
Ground Vibration

Studies how Earth processes such as erosion & deposition create, destroy & affect landforms

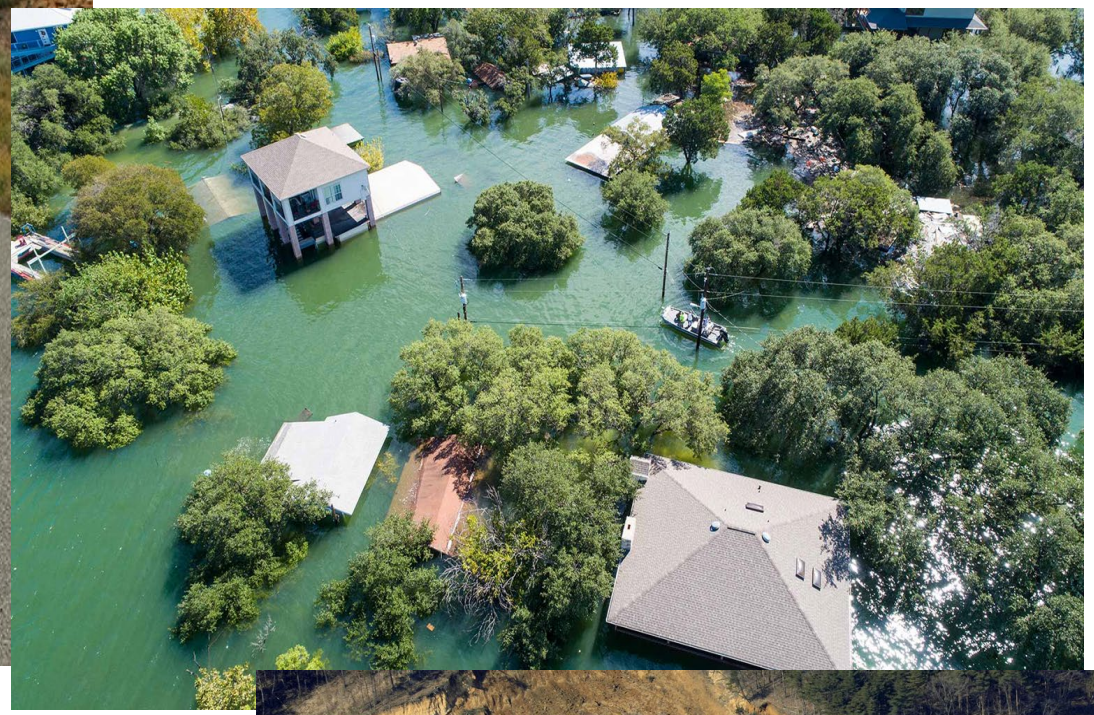
Studies the effects of rivers, streams, landslides, glaciers, and wind on Earth's surfaces

Geomorphologist -

Part Geographer/Part Geoscientist

Studies past climates, current climate, and extreme weather events

Studies effects of events like volcanic eruptions, sea level rise, and even human activity on ecology and local environments



Assesses stability of the ground beneath potential building sites

Studies the chemical and physical properties of rocks and soil in areas of potential construction

Engineering Geologist

Makes recommendations to civil engineers about a location's potential for building & construction

Environmental Geologist

Studies the interactions between the geosphere, hydrosphere, atmosphere, biosphere, and human activities

Works to solve problems associated with pollution, waste management, urbanization, and natural hazards

Works to keep our environments free from pollutants and environmental degradation

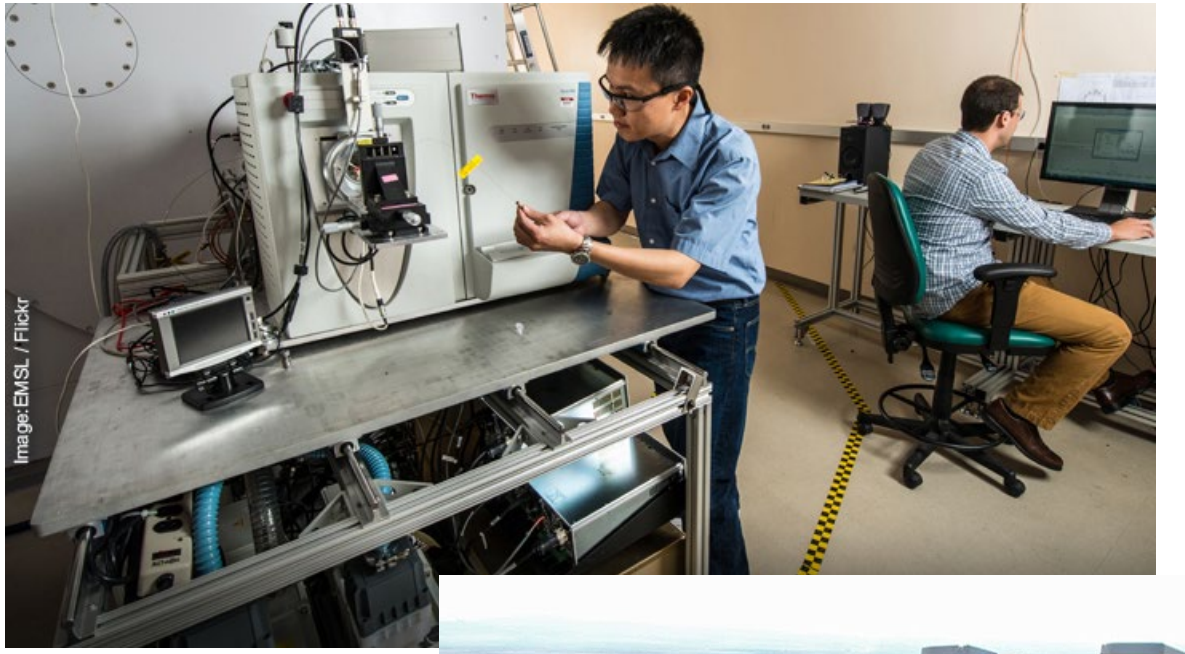


Image:EMSL / Flickr


Image: UUSC / Flickr

Educators come in all forms- formal, nonformal, K-12, colleges & universities

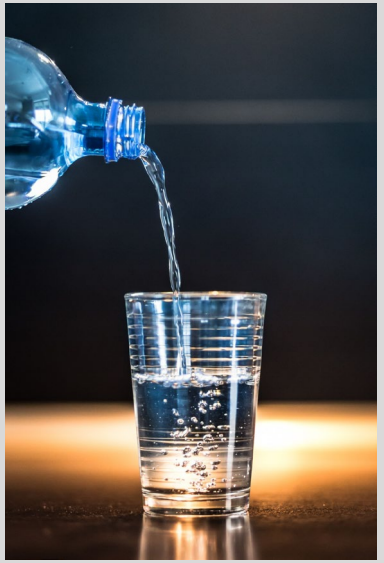
Geology educators love teaching students of all ages about the cool stuff happening on Earth

Geology Educator

Educators work with, and gain knowledge from, scientists & pass along this information to non-scientists


Frost-Wedged Hoodoos
Rainwater Eroded Hoodoos


Highest Mountain
Tallest Waterfall
Whitewater Falls in the Mountains of North Carolina cascades over 400 feet, making it the tallest in the southern Appalachians.
GEOLOGICAL SURVEY
N.C.
1823
DEQ
Department of Environmental Quality
NC Geological Survey



Can you think of ways that each of these geologists affect your life every day?