SIO 15 (FQ 2024) – Homework #4 Due October 29, 2024
Maximum score: 20 points + 2 bonus point
Homeworks submitted late (after due date) are subject to a 2-point reduction.
Divide by 4 for contribution to total cumulative

ANSWERSHEET

Topics 11 – 13

1) a) Name the most deadly recent mass movement in the U.S. as shown in class. Also provide the date this event occurred. (0.5 pt)
b) Provide the three factors how, in this particular case, human action (or non-action) contributed to the damage and death toll of this disaster. (0.5 pt)
c) Which recent U.S. mass movement was the second deadliest. Provide date and location. (0.5 pt)
d) Apart from 'heavy rain', which other type of natural disasters was ultimately responsible for this mass movement? (0.5 pt)
(2 points total)
a) Oso mudslide; 3/22/2014
-0.25 pt for partial answer
b) building on unstable ground; careless logging; ignorance/disregard of hazards
-0.25 pt for partial answer
c) 1/9/2018; Montecito, SoCal
-0.25 pt for partial answer
d) a wildfire

2) Find the 2021 Hpakant jade mine disaster in Wikipedia.
a) In which country do we find this mine? (0.5 pt)
b) Which fraction (in percent) of the world's traded jade comes from Myanmar? (0.5 pt)
c) Compared to other jade mines in the world, how big is the Hpakant mine? (0.5 pt)
d) Where do "jade pickers", who live in the mine, come from? (0.5 pt)
e) Which fact makes identifying missing people at this mine difficult? (0.5 pt)
(2.5 points total)
a) Myanmar
b) 90%
c) the biggest
d) migrants from other regions of Myanmar
e) the 'jade pickers' are unregistered

3) a) Which two forces hold a mass on a slope in balance? (0.5 pt)
b) The reduction of which of these forces will cause the mass to move? Provide an example of how this force can be reduced. (0.5 pt)
c) The increase of which of these forces will cause the mass to move? Provide an example of how this force can be increased. (0.5 pt)
d) In which natural environment would we find sinkholes? (0.5 pt)
e) How are sinkholes typically caused in San Diego? How much water is typically lost in cities? (0.5 pt)
(2.5 points total)

a) downslope and resistance force
-0.25 pt for partial answer; no credit for gravity/gravitational force
b) resistance force;
for the second part, any of the following or similar:
vibrations, earthquakes, rain entering the glide horizon, irrigation entering the glide horizon, water entering the glide horizon, groundwater rising above glide horizon
-0.25 pt for partial answer;
c) downslope force;
for the second part, any of the following or similar:
steepening the slow, adding mass
-0.25 pt for partial answer;
d) karst
e) failing underground water infrastructure; 30%
-0.25 pt for partial answer;

4) a) In the Portuguese Bend, Palos Verdes Peninsula, what natural/geological setting increases the risk of mass movement? (0.5 pt)
b) In the mid-1900s event, during what time period and at which rate did the main hillside move? (include units!) (0.5 pt)
c) How many homes were destroyed? (0.5 pt)
d) Which two distinct human actions were ultimately responsible for this movement? (0.5 pt)
(2 points total)

a) any of the following:
- **impermeable volcanic ash lying below permeable layers so water pools in the glide horizon;**
- **volcanic tuff over ash layer weathering to bentonite**
- **seaward dipping stack of layers**

b) 1956-1985; 0.3 – 2.5 cm/day
-0.25 pt for partial answer, missing units
c) 150
d) leaky septic tank; deposition of fill at head of slump
-0.25 pt for partial answer

5) a) What is another word for stream profile? (0.5 pt)
b) Compare the gradient near the top and bottom of a stream profile. (0.5 pt)
c) What is the flood plain of a river? (0.5 pt)
d) What are the four longest rivers in the world? (0.5 pt)
e) Which four rivers have the highest average discharge? (0.5 pt)
(2.5 points total)

a) longitudinal profile
b) the gradient is larger near the top than near the bottom
c) the floor of a stream or river during flood stage
d) Nile, Amazon/Ucayali Apurimac, Yangtze (or Chang Jiang), Mississippi/Missouri
even though not strictly correct, it's ok to omit the name after the /
-0.25 pt for partial answer (more than one name different)
e) Amazon, Congo, Orinoco, Yangtze (or Chang Jiang)
-0.25 pt for partial answer (more than one name different)

6) News clip September 4, 2024
a) Governor Newsom declared a state of emergency for which city? (0.5 pt)
b) Which type of natural disasters is ongoing? (0.25 pt)
c) What was the immediate consequence for more than 200 homes? (0.25 pt)
d) What is the average rate of movement? (include units!) (0.5 pt)
e) About a month ago, many homes lost what kind of service? (0.5 pt)
(2 points total)

a) Rancho Palos Verdes
b) landslide
c) power was shut off
d) 9-12 inches/week
NB: this amounts to 3.3 – 4.4 cm/day and so is at least twice faster than the 1956-1985 slide!
-0.25 pt for partial answer
e) gas service

7) News clip August 26, 2024

a) Where was the body of a woman found after a flash flood? (0.5 pt)
b) From which river was the body recovered? (0.25 pt)
c) Along which water way was the woman originally hiking? (0.25 pt)
d) How many people had to be evacuated from the area? (0.5 pt)
e) What type of natural feature attracts many tourists? What is unusual about the particular features in that area? (0.5 pt)

(2 points total)

a) Grand Canyon National Park
b) Colorado River
c) Havasu Creek
d) more than 100
also accepted: 104
e) water falls; their blue-green color – not accepted: brown
-.25 pt for partial answer

8) Earthwatch October 7, 2024:
a) How does air pollution affect lightning? (0.25 pt)
b) According to scientists at Arizona State University which group of people is particularly vulnerable to suffer during extreme-heat events? (0.5 pt)
c) Targeted policies are supposed to include which three measures to reduce the risk of rising temperatures? (0.5 pt)
d) When did the pack ice around the North Pole reach its minimum this year? (0.25 pt)
e) Compared to previous years where did the 2024 pack ice minimum place? Over which time span? (0.5 pt)

(2 points total)

a) contributes to more severe lightning storms
b) low-income families without cars
-.25 for partial answer
c) additional shaded public spaces, declaration of heat emergencies, urban design improvements
-.25 for partial answer
d) Sept 11
e) 7th-lowest; in nearly 46 years
-.25 for partial answer

9) Google Earth (GE): open the kmz file in Google Earth. Zoom in on Mt. St. Helens (green pin).

a) In east-west direction, how wide is the summit crater? INCLUDE UNITS (error margin: 200 m) (0.5 pt)

b) answer only one of the two questions under b)

For stand-alone Google Earth app users:

Assuming that a pyroclastic flow started at the green pin and reached Spirit Lake. How far did it travel? Measure the ground length to the farthest point of the closest shore, where your heading should be between 20 and 27º. INCLUDE UNITS (error margin: 0.2 km) (0.5 pt)

OR

For Browser Google Earth users:

Measure the area of the summit crater. Use the two pink pins to connect and close the polygon! (error margin: 0.2 sq-km) (0.5 pt)

c) Follow the link to Wikipedia: How old is Mt. St. Helens? (0.5 pt)

d) Streams that originate on the volcano enter which three main river systems? (0.5 pt)

(2 points total)

a) 2100 m;
also accepted: values between 1900 and 2300 m
-0.25 pt for missing unit

b)
EITHER
8.2 km;
also accepted: values between 7.9 and 8.4 km
OR
3.3 sq-km
also accepted: values between 3.1 and 3.5 sq-km
-0.25 pt for missing unit
no additional credit if both answers are given

c) 40,000 years

d) Toutle, Kalama and Lewis Rivers
-.25 for partial answer
NB: the Lewis River flows into the Columbia River in the southwest

10) Go back to Google Earth and zoom out.

a) How far is Mt. St. Helens from the Pacific ocean (a bay/estuary is not the ocean!)? INCLUDE UNITS (error margin: 4 km) (0.5 pt)
b) Given the elevation of Mt. St Helens at the bottom of the green pin. What is the gradient between the volcano and the pacific coast? Include units! (error margin: 0.6 m/km) (0.5 pt)
c) Measure the distance from Mt. Rainier to Seattle. (hint: zoom out enough so that Seattle is marked by a white dot) (error margin: 4 km) (0.5 pt)
d) Click on the box for Mt. Rainier and follow the link to Wikipedia: What is the other name of this volcano? (0.25 pt)
e) Mt. Rainier is a decade volcano. Why is a decade volcano worthy of particular study? (0.25 pt)
f) Name four other decade volcanoes. (0.5 pt)

(2.5 points total)

a) 136.4 km;
also accepted: values between 132.4 and 140.4 km
-0.25 pt for missing unit
b) 18.6 m/km
also accepted: values between 18.1 and 19.2 m/km
-0.25 pt for missing unit
c) 94.5 km
also accepted: values between 90.5 and 98.5 km
-0.25 pt for missing unit
d) Tahoma
NB: no credit for "Tacoma"
e) either of the two:
history of large, destructive eruptions
proximity to densely populated areas
+0.25 pt if both answers are given
f) any four of the following:
Mauna Loa, Colima, Galeras, Santa Maria, Teide, Vesuvius, Etna, Santorini, Nyiragongo, Merapi, Sakurajima, Ulawun, Taal, Unzen, Koryaksky, Avachinsky (even though the last two is actually considered one and the same complex)
-0.25 pt for partial answer