

ERSC 1P92 Extreme Earth

Assignment 4 (worth 14% of the final course grade)

Due Date: Saturday, August 4, 2018

Interpretation of Earthquakes and Volcanoes on Tralfamadore.

Introduction

Earthquakes and volcanoes not only cause disasters on Earth, they also provide valuable information about the structure of the Earth, particularly its crust. Earthquakes occur most commonly along plate margins, as we saw in the section on the distribution of earthquakes. In fact, the distribution of earthquakes can be used to distinguish divergent and transform plate boundaries from convergent plate boundaries. Some types of volcano develop along plate margins and other types form in settings that are well way from plate margins. In this assignment you will use the distribution of earthquakes and volcanoes on the fictitious planet of Tralfamadore (a place created by the late American author Kurt Vonnegut in his novel “Slaughterhouse Five; or, The Children's Crusade: A Duty-Dance with Death”). The purpose of the assignment is to give you the opportunity to determine the location of tectonic plate boundaries and other features that have been discussed in this course (most from Modules 3, 4 and 5 but one feature comes from Module 2).

In addition to this document you will need to download the Assignment 4 map and the Assignment 4 Tutorial. The map shows: 1) the distribution of land masses on Tralfamadore that are surrounded by an ocean, 2) the location where volcanoes occur (and the magmatic type of volcano), and 3) where earthquakes have taken place on the planet.

You should review the lecture material on the distribution of earthquakes and volcanoes in order to interpret the data on the map provided. The Assignment 4 Tutorial provides crucial information and advice on how to go about completing the assignment. **You are strongly encouraged to review the tutorial before completing the assignment.**

Instructions

To complete this assignment you are required to submit a copy of the map on which you have added the information outlined below.

The map is available in PNG format that you can download to any software that will allow you to add coloured lines and text to the image and then save it for submission through Sakai.

If you cannot annotate the map digitally you can print it out and add the required information with coloured pencils and then scan or photograph your work and submit that electronically as the completed assignment.

A scanned or photographed image of your map can be submitted in PDF, PNG, JPG, or GIF format.

On the map complete each of the following:

1. Sketch the location of all plate boundaries that can be identified on the basis of the distribution of earthquakes:

- a) Show any trenches as a continuous RED line. (5 points)
- b) Show any oceanic ridges that you think might be present as BLACK lines. (5 points)
- c) Show the location of any transform faults that might be present as GREEN lines. (5 points)

Note: Be very precise in the placement of your lines for these tectonic boundaries.

2. Based on the pattern of depth of earthquakes:

- a) Identify where subduction is taking place on the map **at the steepest angle from the horizontal** (label this location "A"). (2 points)
- b) Identify where subduction is taking place on the map **at the lowest angle from the horizontal** (label this location with the letter "B"). (2 points)
- c) Can you recognize any location where there may be a "seismic gap"? If you think that there is one label it with the letter "C". (2 points)

3. If you can recognize any other features that have been discussed in the notes for the course please label them with numbers and describe each feature in the space provided below the map. (2 points each total 10 pointsyes, there are 5 additional features that you should be able to find on the map).

Total: 31 points

Submit your completed map via the "Assignments Tool" on the Sakai site for this course.