

Geology 111 and 111A Assignment - *Crustal Displacement Theory*

Introduction

In a book entitled “When the Sky Fell” Rose and Rand Flem-ath⁽¹⁾ suggest that Plato’s continent of Atlantis is actually Antarctica, and that it was shifted about 11,600 years ago to its present location at the south pole.

The Flem-ath's theory is that approximately every 41,000 years there has been a dramatic and catastrophic shifting of the **entire crust** of the earth with respect to the mantle and core. It is suggested that the event of 11,600 years ago involved a maximum displacement of over 3000 km (approximately 30° of rotation). A time-frame for the movement is not provided, but from my interpretation of the book it may have been very fast in a geological context - perhaps hundreds of years - perhaps much less. At this time *Atlantis* is assumed to have moved towards the south pole, while North America is assumed to have been moved away from the north pole. Other crustal displacements - of a similar magnitude - are suggested to have occurred at 52,600 and 93,600 years ago.

The proposed mechanism behind these crustal displacements is related to build-up of thick ice-sheets in polar and near-polar regions. The idea of dramatic crustal displacements was originally proposed by Charles Hapgood in 1970⁽²⁾. In a forward to Hapgood's book Albert Einstein wrote:

In a polar region there is a continual disposition of ice, which is not symmetrically distributed about the pole. The earth's rotation acts on these unsymmetrically deposited masses, and produces centrifugal momentum that is transmitted to the rigid crust of the earth. The constantly increasing centrifugal momentum produced this way will, when it reaches a certain point, produce movement of the earth's crust over the rest of the earth's body, and this will displace the polar regions towards the equator.

Although Einstein wrote this, it is also stated that he had some doubts that the weight of the ice-caps would have been sufficient to move the crust.

Assignment

Firstly, there is no need to read either of the books cited here. You already have enough information to proceed. You are welcome to go and look up “Flem-ath” and “Crustal Displacement” on the internet, but I really don’t think that the information you’ll find there will help you complete the assignment.

Your assignment is to devise and describe a procedure for testing the Crustal Displacement hypothesis using available and reasonable scientific techniques. Please note that this **WILL NOT** include digging the ice away from part of Antarctica in order to look for evidence of the Atlantean civilization. It may include any of the kinds of studies that we have discussed in the lectures on plate tectonics, or any other established technique that you can think of. You might find that it would be useful or necessary to use more than one type of test. (Remember that the hypothesis suggests that the **ENTIRE** crust is displaced with respect to the mantle and core, thus one would not expect to see much evidence of movement of one continental mass with respect to any other.)

I do not want you to argue for or against the crustal displacement hypothesis, and I am not concerned whether or not you agree with it. I only want you to suggest a credible procedure for testing the hypothesis, one that should be effective whether the hypothesis is true or false. Your paper should include the following:

- a prediction (or several predictions) of what you might expect to observe if the hypothesis is true and if it is false,
- a description of a carefully-planned method (or methods) for testing the prediction,
- a summary of what results you would expect to get from your method(s) if the hypothesis is true **and** if it is false, and
- some comments on what sources of error might exist in the data that you gather, and how those errors might affect your ability to interpret your results

(All of this could take the form of a mini research proposal in which you very briefly describe the theory, what your predictions are based on the theory, what you are going to do to test them, and how you will interpret your results.)

For example, if the hypothesis is: **Mt. Benson is a volcano that has been active in the past million years**, one sensible prediction is that we should be able to find volcanic rocks on the sides of Mt. Benson that are less than 1 million years old. A method to test the prediction would be to collect some outcrop samples from widely-spaced locations on the mountain, determine if they are volcanic in origin, and, for those that are, use a method such as K-Ar dating to estimate their age. If we find that there are no volcanic rocks on Mt. Benson, or that all of the volcanic rocks are much older than 1 m.y., then we would have to reject the hypothesis. Possible errors are that we didn't collect enough samples and we missed sampling the one location where young volcanic rock is situated, or that our dating method may not be sufficiently precise to date rocks less than 1 m.y. old.

You are limited to 600 words of text (~1½ pages single-spaced), plus any diagrams that are useful to present your arguments. Anything beyond the 600-word limit will not be marked. Please make sure to provide references to any sources of information that you use.

I will be looking for evidence that you understand what we have discussed about plate tectonics and how the theory of plate tectonics was substantiated and **for experimental methods that are well thought out and likely to give useful results**. I will also be looking for a description what results you might get if the hypothesis is true or false and for an evaluation of possible errors.

The assignment is due by midnight on Thursday November 20th. Any papers not given to me in class that day should be e-mailed to me before midnight, but I'd also like you to bring me a paper copy the following week. Late submissions will have marks deducted.

1) Rand and Rose Flem-ath, 1995, **When the Sky Fell**, *Stoddart Publishing Co. Ltd.*, Toronto

2) Charles Hapgood, 1970, **The Path of the Pole**, *Chilton Book Co.*, Philadelphia