

## ESS 502: Assignment #1; January 5, 2012

Summary:

1. Read Vine and Matthews (1963).
2. Thursday, January 12: Turn in requested paragraphs, participate in class discussion
3. Tuesday, January 17: Turn in abstract and answers to additional problems given below.

The paper by Vine and Matthews (1963) is considered a watershed publication. All concepts discussed in the paper had been subjects of prior science discussion but these authors succeeded in putting the ideas together in a compelling way. Read the paper and identify:

1. their observations (data),
2. the theory and assumptions they invoke,
3. their ideas that link the observations to the theory.

For Thursday: write a succinct paragraph with specifics for each of these three items. Write a concluding paragraph giving your perspectives on why this paper was so successful in influencing the science community.

For Tuesday, write an abstract for Vine and Matthews:

Forget all experimental detail, omit references and lengthy expositions of your detailed knowledge. Limit yourself to a short description of (i) the problem and (ii) the solution. "An abstract should be defined as a summary of the information in a document." "The abstract should (i) state the principal objectives and scope of the investigation, (ii) describe the methodology employed, (iii) summarize the results, and (iv) state the principal conclusions." Conclusions should be said 3 times: in the Abstract, Introduction and, in more detail, in the Discussion. Keep your abstract to one paragraph and less than 250 words. Shortest abstract of a very complex paper is  $E=mc^2$ . A paper is often judged by its abstract. Examine every word with care, remove unnecessary words, if it can be said in 100 words rather than 250, do so.

Also for Tuesday,

1. Describe the geometry of Earth's magnetic field. (how are magnetic lines of force oriented around the earth?) (including dipole and non-dipole)
2. Describe variations in time and space of Earth's magnetic field. (secular, reversals, polar wander, field strength)
3. Under what conditions does the "geocentric axial dipole hypothesis" hold?
4. Describe the essential features of the theory for the origin of the earth's magnetic field that provide explanation for answers to 1 and 2.
5. Describe the process by which a sedimentary rock deposited in a quiet lake environment becomes magnetized.
6. What rock properties of remnant magnetism are measured in paleomagnetic studies? What do these quantities tell us about the past history of the rock?
7. Concerning the continental paleomagnetic record:
  - a. What is observed?
  - b. How interpreted?
8. Questions 2 and 3, from Chapter 3 of Fowler