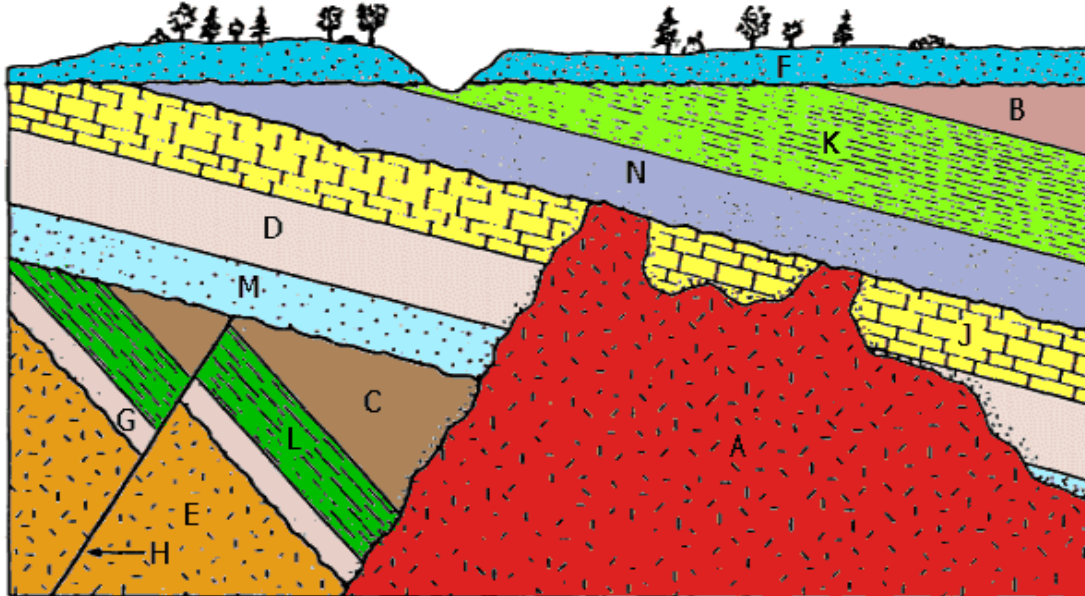


GEO1111 : Lecture 7 – Geological Time

Short answer questions:

- 1) Daughter material and parent material refer to the half-life parts remaining, in the process of radiometric dating, to calculate the absolute age of rocks. If the daughter material is 87.5% and the parent material is 12.5%, the rock has undergone
 - a) 1 half-life
 - b) 2 half-life
 - c) 3 half-life
 - d) 87.5% half-life
 - e) 12.5% half-life

- 2) Determine the relative sequence of events in the diagram below, from oldest to youngest. List both the sequence of letters and the geological events (erosion, tilting, faulting and intrusion). Please note that all the rocks in this cross-section are sedimentary, except A and E



*A and E are igneous rocks

** N=800 Ma (absolute date from radioactive elements), K=210 Ma

***Lines below M, G and N are curved lines

- 3) Identify the unconformities in the diagram of Q7, and specify the reason and type(s) of the unconformities.

- 4) Many of the rocks in the west end of Ottawa and north of the River contain the mineral zircon, which is rich in U. Uranium decays to lead, and there are several by-products of this decay. Why is this an environmental concern?

Lead pollution coats the surface of the leaf and reduces the amount of light reaching it. This results in stunting the growth or killing the plants by reducing the rate of photosynthesis, inhibiting respiration. It can also wipe out bacteria and fungi populations that are essential for decomposition in the food chain.

- 5) What makes a useful index fossils for making regional (large-scale) chronostratigraphic correlations?

Ammonites were abundant, survived many mass extinctions and their hard shells were easily fossilized, making them useful index fossils.

- 6) Which of the following geologic observations would not bear directly on working out the sequence of geologic events in an area:

- a) a well-exposed granite dike across a sandstone bed
- b) feldspar and quartz contents of a granite pluton
- c) an unconformity between a granite pluton and sandstone bed
- d) sandstone inclusions in a granite pluton
- e) a conformable contact between upper limestone and lower sandstone

- 7) When comparing the original atom to a radiogenic isotope that underwent beta emission, which of the following are true:

- a) The parent:daughter ratio increases and the number of protons increases
- b) The parent:daughter ratio decreases and the number of neutrons decreases
- c) The parent:daughter ratio decreases and the number of protons decreases
- d) The parent:daughter ratio decreases and the number of protons increases
- e) The parent:daughter ratio increases and the number of neutrons increases

- 8) What do we mean that radioactive decay occurs as a closed system?

- a) It is impossible for parent material to diffuse out of the system once the mineral has crystallized and the radiogenic clock has been set
- b) The mineral initially only has parent material, and no daughter is lost through time
- c) New parent and/or daughter material will not fit into the mineral's crystal lattice
- d) To decrease analytical errors and simplify age calculations based on the decay constant
- e) None of the above

- 9) Why can rocks from the Archean period not be dated with the radioisotope C-14?

- a) Nitrogen-14, which transforms to carbon-14, was not present on Earth until 57,000 years ago
- b) Global warming has only recently provided enough heat to transform nitrogen-14 into carbon-14 in Earth's atmosphere
- c) The early Earth did not contain life, which is the source of carbon-14
- d) The half life of carbon-14 is approximately 5,700 years, so the limit of the technique is limited to <100k years
- e) Both C and D