

Homework #3**Geology 1020****FULL Name (clearly):** _____*Due Thursday February 12, 2009. THERE ARE 5 QUESTIONS ON THIS HOMEWORK*

1. (0.5 pts.) Which major component of the Earth system is the fundamental driving force for the Earth's H₂O cycle? (circle one)
 - A. Oceanic circulation
 - B. Rising water vapors and the jet stream
 - C. Tropical rain forests
 - D. Solar energy
 - E. Glacial and river discharge
2. (2 pts.) Briefly list at least two key observations, or lines of evidence, that were used by early plate-tectonic advocates (e.g. Alfred Wegener, Alexander Du Toit) to demonstrate that the separate continents had once originated from a single landmass (use the back of this sheet to answer this question; please just make a list, a long commentary is not needed).
3. (0.5 pts.) In a balanced (pre-Industrial!) "equilibrated" Earth system, subsequent **increases** in the global deposition of marine organic matter on the continental shelves or in deep marine sedimentary basins would result in the following atmospheric effects (circle one):
 - A. An **increase** in the Earth's N₂ and a **decrease** in O₂ levels
 - B. A **reduction** in the Earth's O₂ and an **increase** in CO₂ levels
 - C. A **reduction** in the Earth's CO₂ and an **increase** in O₂ levels
 - D. A **reduction** in the Earth's CO₂ and a **reduction** in O₂ levels
 - E. An **increase** in the Earth's CO₂ and an **increase** in O₂ levels
4. (0.5 pts.) When the rate of burial of isotopically **light** (i.e. **low** ¹³C/¹²C values) organic material (C_{org}) **decreases** in marine sediments, the Earth's **atmospheric and oceanic CO₂ reservoir** – i.e. the CO₂ that is dissolved in water and in air and upon which phytoplankton and reef builders depend for photosynthesis – becomes (circle one)
 - A. Isotopically heavier or enriched in ¹³C
 - B. Steady and unchanging with time because it's always in equilibrium
 - C. Isotopically heavier or enriched in ¹⁴N
 - D. Isotopically lighter or enriched in ¹⁶O
 - E. Isotopically lighter or enriched in ¹²C

5. (1.5 pts.) The carbon isotope ratios of $^{13}\text{C}/^{12}\text{C}$ in sedimentary rocks provide geologists with information about
1. *Ancient atmospheric oxygen concentrations*
 2. *Paleoclimates ("ancient climates") linked with past greenhouse gas levels*
 3. *Rates of burial of organic matter*

Briefly discuss how these isotopes are used to assess changes in the ancient environmental factors listed above. (Use the back of this sheet)

Question #2.

Question #5.

1.

2.

3.

