

(Due Tuesday, May 23, 5 pm)

Name:

Section:

ID #:

AOS 1 Homework # 3

1. Attached here

(http://www.atmos.ucla.edu/%7Eliougst/Lecture/Ruddiman_SciAm_2005.pdf) is a website to obtain a copy of the article, "How Did Humans First Alter Global Climate?", published in Scientific American. Write an essay (approximately **one page, double-space** typed with font size # 12) to summarize:

- a. The scientific basis for the effect of humans on global warming 8000 years ago.
- b. The potential sources of greenhouse gases during that period.
- c. The role of the Earth's orbit about the Sun in the thesis.
- d. Discuss uncertainties in the proposed theory.

2. The following questions are for understanding of the climates of the past; particularly the ice ages (use **one but no more than two sentences** to answer them).

- a. What is the Laplace theory for the formation of solar system?

b. How has the current Earth's atmosphere been evolved?

c. What is the meaning of "Pleistocene" in the geological time scale?

d. Define the meaning of the oxygen isotope, ^{18}O .

e. State the rationale that ice sheets and ^{18}O are correlated.

f. What is the meaning of an ellipse and what is the eccentricity for a sphere?

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- g. What is the prime effect of obliquity on the Earth climate and why?
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- h. Assuming that due to the Earth's wobbling motion (precession), its perihelion advances 40 minutes a year, what would be the precession index in this case?
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- i. What are the major time components associated with the periodicities of eccentricity, obliquity, and the precession index?
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- j. What is the central theme of Milankowitch's theory for climate change?
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- k. Approximately which year did the Earth recover from the ice ages? What is the geological term for this time period?
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- l. What is the reason that during the period called "Younger Dryas" the Earth experienced cooling?
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- m. What is the meaning of the 11-year sunspot cycle? How many cycles do we have since 1860?
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- n. When more dark sunspots appear, the Sun emits more or less solar radiation and why?
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- o. Define the term "solar constant".
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p. How do we determine the CO₂ concentration before the year 1800?

q. What is the meaning of ice-albedo feedback?

r. Did volcanic eruptions warm or cool the Earth and why?

s. Since the Industrial Revolution, human also contributed to the production of sulfate aerosols. Do they act like greenhouse gases and if not, why?
