

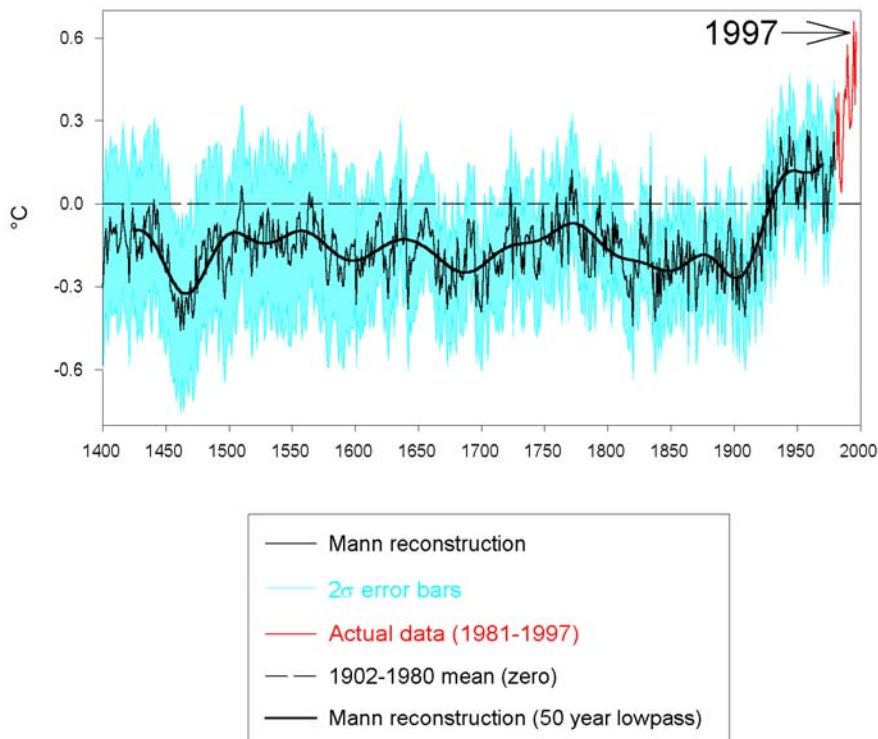
2. Hour Exam

Name: _____

Please answer 5 out of the following 6 Questions. Make sure you answer each question completely and provide data or arguments that back up your statements.

1. Climate Change (10 points)

- a) Describe 3 techniques that can be used to reconstruct past climates. (3 points)
- b) How do CO₂ and CH₄ change the Earth's climate? (4 points)
- c) Shown below is a climate reconstruction of northern hemisphere temperatures for the last 600 years. Based on this graph, give an estimate of how much northern hemisphere temperatures will have increased by the end of the 21st century. Show your work!(3 points)



2. The Absolute Age of the Earth

(10 points)

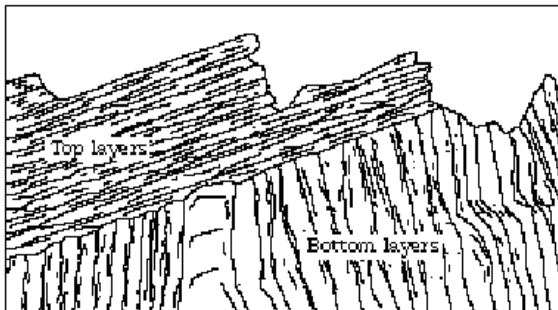
- a) How old is the Earth, according to geologists? (1 point)
- b) What is this age estimate based on? (1 point)
- c) A radioactive isotope **A** has a half life of $T_{1/2} = 10,000$ years and decays into a stable daughter isotope **B**. At $t = 0$, the rock cools just below its blocking temperature and begins to trap the daughter isotope B, which would otherwise be lost. On the provided sheet of graph paper **carefully** plot the relative abundance of A and B from $t = 0$ to $t = 5 T_{1/2}$.
The analysis of an igneous rock specimen yields 12,500 isotopes of A and 87,500 isotopes of B. How old is the rock?

(8 points)

3. Relative Geologic Time (10 points)

a) How are fossils used in the development of the geological timescale? (4 points)

b) The image below shows an outcrop of sedimentary rocks. Reconstruct its geologic history. (6 points)



4. Sedimentary Environments (10 points)

- a) How do transport processes affect the physical properties of sediment? (3 points)
- b) During spring break your host from Southern Florida claims that his entire county was once glaciated. Unfortunately you can't remember how far the glaciers extended southward during the last glaciation, but you are very skeptical. What would you look for to test your host's claim? (5 points)
- c) The image below shows a dry stream bed. Which way did the water flow? Justify your answer.



5. The Formation of Continents, Mountain Ranges and other Large-Scale Structures (10 points)

- a) Explain how andesitic and granitic continental crust can form from basaltic mantle. (3 points)
- b) How can you reconstruct the position of old (now eroded) mountain ranges? (4 points)
- c) How is it possible that large parts of the continent are covered by marine sediments? (3 points)

6. The Geology of Trinity College

(10 points)

Trinity college is located on a prominent ridge within the Connecticut river valley. Based on your observations from field trips, lab exercises as well as the material covered during lectures give a brief account of the geological history of the campus and its surroundings. Make sure you include the evidence you saw in the field or in class that backs up your story.