

Name: _____

Student ID: _____

ATOC 1060: Our changing environment

Homework assignment 6

Climate of the past

Due: 1:45 pm, Thursday 19 November 2009

The figure shows climate records from the Vostok ice core drilled in Antarctica, which provide insight to climate variability over the last 420,000 years. Each year snow piles up on top of the ice sheet and the chemical composition of each annual layer can be used to understand climate variability. (*Remember to give units for your answers*)

1) The ice sheet at Vostok Station is about 3300 meters thick.

Calculate the average thickness of one year of ice? _____

2) The graph shows "Temperature", but temperature is not something that is directly measured in the ice. What is the proxy quantity used to infer temperature in the Vostok record? _____

3) For how many years before present has the temperature remained approximately constant? _____

4) How many years ago was the last glacial period? _____

5) From the figure estimate the difference in temperature and CO₂ concentration between glacial and interglacial times?

Temperature: _____

CO₂: _____

6) In 2009 the CO₂ concentration measured at the NOAA's Mauna Loa Observatory is about 386 ppm. Given your results above, what temperature change would you expect in Antarctica between preindustrial times and 2009. _____

7) Look up the global average temperature change over the last 150 years measured by thermometers. (*Hint: recall the figure from class and on the midterm*). List this, and give one reason why the the global mean temperature change and the Antarctic temperature change may be different.

Temperature change: _____

Reason: _____

9) The third set of data on the graph shows the dust concentration in the ice.
Is there more dust in the ice during glacial or interglacial times?

10) List two climatic factors which may contribute to higher dust concentrations at certain times
in the record:

1) _____

2) _____

