CHAPTER ONE

1) How does climate differ from weather?

Climate is a composite of temperature, precipitation, snow and ice cover, as well as wind direction and strength. It records long-term variations (i.e., years and longer). Weather records short fluctuations that last from hours to months.

2) In what ways does climate science differ from traditional sciences such as chemistry and biology?

Climate science is a very broad topic and actually utilizes and encompasses all the “traditional” sciences. Climate science illustrates the connection between all studies related to the Earth.

3) How does climate forcing differ from climate response?

Forcing and response are nothing more than cause and effect. Climate forcing are factors that cause (or drive) climate, while climate responses are the results of the forcing.

4) In the example in which the Bunsen burner is lit and the beaker of water at first warms quickly and then more slowly, how does the response time of the water vary through time?

The water begins to heat up as soon as the heat source (Bunsen burner) is first turned on. This represents climate forcing. The rate of the water warming up is rapid at first but slows down with time as it reaches its equilibrium state. The time the water takes for the water temperature to reach half of its way toward equilibrium is the response time. Each step moves the system half of the remaining way toward equilibrium. Note that this is not a linear relation but an exponential one, and each step has a decrease in the actual amount of change.