Lab 4

Q1: Identify two sources of carbon in the picture. Identify two sinks.

Soil and fossil carbon

Q2: Where did the 9 petagrams of carbon emitted into the atmosphere by anthropogenic activities in 2010 end up going?

It went into the atmosphere

Q3: If that wheatgrass were out in nature (instead of in a videographer's studio), what would happen to the carbon captured in the wheatgrass once it died?

It would be releases into the atmosphere

Q4: Green plants both photosynthesize (causing them to act as a carbon sink) and respire (causing them to act as a carbon source); based on the carbon cycle picture to the right above, are these plants a net sink or source of carbon?

Net Sink

Q5: People have concerns about the use of slash and burn partly because it affects the carbon cycle in multiple ways. What are two of those ways?

Slash and burn affects the carbon cycle because it take away all of the plants and animals that contribute to the emission of carbon to the carbon cycle.

Q6: Overall, is there a greater amount of carbon exchanged between the atmosphere and the biosphere, or between the atmosphere and the hydrosphere?

Atmosphere and hydrosphere

Q7: How did the amount of carbon absorbed by the hydrosphere compare to the amount carbon released by the hydrosphere in 2010?

More carbon was absorbed

Q8: Which form of fossil fuel did you expect would have contributed the most to carbon dioxide production? Which form actually contributes the most?

I expected petroleum to contribute the most to carbon dioxide production but it turns out that coal actually contributes the most.

Q9: In the Plant Bowen picture, the cooling towers are highlighted. Many people incorrectly link the presence of cooling towers to the presence of nuclear power plants, but all large-scale power plants have them. What is it that is coming out of the cooling towers? (Hint: This has an important relationship to the matter cycle you considered in the Troposphere lab.)

Water vapor

Q10: What is meant by “fracking”?

Uses millions of gallons of liquid pumped into the ground to fracture the rock to release the gas.

Q11: What are the benefits – and the risks – with getting natural gas and oil from shale through the fracking process?

The risks involve lighting your kitchen tap water in fire, health affects to livestock and people and environmental damage at the well sites.

The benefits it supplies 20% of our natural gas needs

Q12: What do you think would be the effect on life on this planet if the kind of net release of carbon described above for 2010 were to continue for the next 20 years?

If the net release of carbon described above for 2010 were to continue for the next 20 year then life on this planet would improve because there would be more carbon released by the biosphere and hydrosphere to take out the decreasing amount of carbon released by fossil fuels.

Q13: What has been the general trend in the sizes of sources and sinks from 1959-2010?

Sources increased and sinks decreased

Q14: For each year, what is the relationship between the magnitude of carbon emissions and the magnitude of carbon uptake?

Q15: How does the trend in fossil-fuel emissions differ from the trend in land-use change emissions?

Q16: For the source that had the largest increase over those years, what do you think was responsible for that increase?

Q17: From what regions/countries was most of the carbon emitted in 1950?

Eastern Coast of United States and Northern Europe

Q18: From what regions/countries was most of the carbon emitted in 2010?

United States and China

Q19: What has been the general trend in the amount of carbon taken up by the atmosphere, oceans, and terrestrial biosphere over the last 50+ years?

Q20: How did carbon uptake during 2001-2010 differ from carbon uptake during 1959-1968? Where has more and more of the carbon been going?

Q21: What was that anomaly? Provide some reasonable hypothesis for what might have caused the unusual data collected in that year?

Q22: Why was the uptake of carbon in 1992 so much larger for the terrestrial biosphere than for the atmosphere and oceans (i.e. why did that anomaly in the 1992 data occur)? Does this match the prediction in Q21?

Q23: How can carbon be transferred between the atmosphere and Earth's other spheres?

Q24: How would you describe changes in fossil-fuel carbon emissions from 1959 to 2010?

Q25: How would you best describe general changes in the uptake of carbon by the atmosphere, oceans, and terrestrial biosphere from 1959 to 2010?