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ENVI.2020 - PRINCIPLES OF EARTH & ENVIRONMENTAL SYSTEMS I

STUDY QUESTIONS I

THE EARTH SYSTEM

1. What is a system? We decide to study the behavior of elk and groundhogs in Yellowstone National Park. How would you define the system for each of these animals (they are not the same)?
2. Name and briefly describe the four major reservoirs (perhaps five, you decide) that make up the Earth.
3. Distinguish between closed and open systems. Give an example of each.
4. Distinguish between positive and negative feedbacks. Give an example of each.
5. Mercury is an important environmental contaminant. Below you will find data for the pre-human cycle of mercury, i.e. before anthropogenic activities significantly affected the mercury cycle.

Reservoirs (Hg mass in units of 105kg)

Atmosphere – 40

Ocean – 415,000

Sediments – 3,300,000,000

Land – 100,000

Fluxes (105kg/year)

Vapor – land to atmosphere – 83 Rain – atmosphere to land - 83

Vapor – ocean to atmosphere – 167 Rain – atmosphere to ocean – 167

Rivers – land to ocean – 13

Sediments to land (uplift) – 13 Ocean to sediments (deposition) – 13

(1) Draw the box model for the pre-human Hg cycle. (2) Draw arrows between the various reservoirs showing the Hg flux. (3) Calculate the residence time for Hg in the atmosphere, ocean, sediments, and land. (4) Which reservoir is most easily perturbed and why? (5) Which reservoir is hardest to perturb and why?