

12.340: Global Warming Science  
Problem Set #4: The Carbon cycle and Other Greenhouse Gases  
Date assigned: Friday, 6 Apr 2012  
Date due: Thursday, 12 Apr 2012

Questions 1-3: The Carbon Cycle

Do exercises 1-3 from Chapter 8 on page 102 of Archer's book.

Archer, David. *Global Warming: Understanding the Forecast*. Wiley, 2011. ISBN: 9780470943410.

#### Question 4: Global Warming Potential

Consider a new Chlorofluorocarbon called Freon-X. Freon-X has been proposed as a replacement technology for other CFCs. Freon X can be considered to react away with a half-life of 1000 years. Per unit mass, it absorbs 4427 times the infrared energy that CO<sub>2</sub> does.

What are the 20-, 100- and 500-year Global Warming Potentials (GWPs) of Freon-X? For simplicity, assume CO<sub>2</sub> is removed with a half-life of 50 years. You need not perform a full integration and may instead interpolate concentrations where necessary.

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