

SIO 117: The Physical Climate System

Spring 2007

Homework #4

Due May 3 in class

1. Hartmann 4.1. *Note how it takes much more energy to change the temperature of the ocean than it takes to change the temperature of the atmosphere.*
2. Hartmann 4.3. *My edition of the textbook erroneous gives units of s^{-1} to C_D (it should have no units).*

Under the stated conditions of the problem, which process is more efficient for removing heat from the surface: radiative transfer or atmospheric turbulence?

Which process is more efficient under conditions of very weak wind?
3. Hartmann 5.1. *Note that unsustainable use of groundwater is a big problem in many areas of the world.*
4. Hartmann 5.2. *Please provide your answer in units of cm of water evaporated per day.*
5. Hartmann 5.5. *The shift from snow to rain during winter is a big concern for future global warming.*