Climate Modelling in-class worksheet 4 (week 5)

Group members:

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The focus of this week's assignment is to calculate forcing and feedback using a 1-dimensional radiative equilibrium model. The scientific community has failed to converge on a standard notation for any of this, so this worksheet compares the differences and similarities between Hartmann Chapter 10, the Gerard Roe feedback article presented by Luke, and the course notebooks.

1) Define the symbol ΔR used in Rose notebook *14-climate sensitivity and feedback,* including units

2) What symbol does Hartmann Chapter 10 use for this same concept?

3) How about Roe?

4) In Section 14.2.3, Rose calculates the *stratospheric adjusted radiative forcing* and gets a value of 4.3 Wm^{-2} for doubled CO2. How does this compare with Hartmann's value in Section 10.3.1?

5) Hartmann in section 10.3.1 discusses the *Planck feedback*. Is this the same as Rose's *Equilibrium climate sensitivity without feedback*? Explain how they are similar or different? What are the units and values for each?

6) Can you find the same Planck feedback concept in Roe? Is Roe's approach more similar to Hartmann or Rose?

7) Hartmann shows OLR as a function of surface temperature, and surface temperature as a function of CO2, in figures 10.2 and 10.3. How do his values of OLR and surface temperature compare with values you get for OLR in Lab 14 section 5?

8) Hartmann writes the climate sensitivity parameter with Planck and H2O feedbacks as $(\lambda_R)_{FRH}$. How would Rose represent this using the notation of lab 14? How about Roe?