**Climates of the Past and Future**

**Day 1:**

1. **Climate of a Planet**
   1. Radiation and energy   
      activity: rainbow glasses
   2. Albedo
   3. Blackbodies and thermal IR radiation  
      activity: thermal camera  
      exercise: cooling rates
   4. Molecules and absorption
   5. Planetary energy budgets  
      activity: UCAR planet interactive  
      activity: glass plates
   6. Climate Sensitivity   
      exercise: Arrhenius calculation
2. **Climates of the Past**
   1. Geologic time
   2. Origin of the Earth and atmosphere
   3. Plate tectonics & climate change  
      activity: plate movies
   4. The faint young sun paradox
   5. Geologic carbon cycle  
      activity: fizzy water
   6. Ice ages  
      activity: Ice core movie  
      exercise: Milankovitch calculator
      1. How glaciers work
      2. Ice sheet time scales
      3. Ice age cycles
      4. Ice sheet collapse
   7. Deglaciation and the Early Holocene
   8. Medieval Warm Period and Little Ice Age  
      activity: UCAR tree ring builder  
      exercise: last millennium calculator
   9. 20th Century warming  
      exercise: historical climate records
   10. Climate variability: ENSO, volcanoes, & the Sun

Day 2:

1. **Climates of the Future**
   1. The Discovery of Global Warming
      1. Fourier (1820’s)
      2. Agassiz (1830’s)
      3. Tyndall (1860’s)
      4. Arrhenius (1890’s)
      5. Callendar (1930’s)
      6. Keeling (1950’s)
   2. Climate forcing, response, sensitivity, and feedback  
      exercise: climate sensitivity calculator
   3. Where does global warming go?  
      exercise: observations and data
   4. Perturbed carbon cycle
   5. Simple climate model  
      activity: Earth:carbon calculator
   6. Earth System Models
   7. IPCC Process
   8. Emissions, energy, and the Kaya Identity  
      activity: emissions calculator
   9. Climate projections for 21st Century and beyond
   10. Climate impacts
       1. Global
       2. Regional
       3. Local
   11. Solutions  
       activity: climate wedges
       1. Energy
       2. Economics
       3. Policy
   12. Simple, Serious, and Solvable