Outline of Lecture 2 (3-28-02)

I) Force drives the dynamic earth comes from heat energy
   1) Earth's internal heat
   2) Solar heat
II) What is heat? [units ?]
   1) Fourier (Heat flow) equation
      A) heat flow (q) [units ?]
         i) what is it?
         ii) values on earth’s surface.
      B) conductivity (K) [units ?]
         i) what controls conductivity?
         ii) values near surface.
   2) Specific heat (a.k.a. heat capacity; C_p) [units ?]
   3) Thermal diffusivity (κ) [units ?]
III) Temperature with depth (Geotherms)
   1) Calculated from just conduction
   2) Calculated included effects from radioactivity (A)
      A) Value for Granite as compared to deeper earth
      B) What does this show?
   3) What are we still missing in the Geotherm?
   4) How do these calculations compare to what we know from seismology
IV) Convection (definition) and how does it work fundamentally?
   1) Three basic controls on convection
      A) Adiabatic temperature gradient (need to be super adiabatic). What does this mean?
      B) Viscosity (η) [units ?]
         i) What is it?
         ii) What is an ideal fluid?
         iii) Values for air, water, mantle
      C) Coefficient of thermal expansion (α) [units ?]
         i) What is it?
         ii) Value in mantle
   2) Other controls
      A) gravity
      B) density
      C) depth (thickness of layer to convect)
      D) thermal diffusivity
   3) Rayleigh Number
      A) what is it and what does it tell us about convection?
      B) How does individual parameters effect it?
      C) What would we assume for mantle values?