I. Introduction
   A. We will lump the parks of the Sierra Nevada into one lecture
   B. Forming the Sierra Nevada
      1. Paleozoic-Mesozoic accreted terrains
      2. Sevier Orogeny
      3. Eocene Uplift
   C. Pliocene/Pleistocene Glacial Features
   D. Big Trees!

II. Location
   A. Western margin of Basin and Range
      1. Owens’ Valley Fault marks the east side of Sierra Nevada
      2. Basin and range province is to the East
   B. Great Valley of CA is to the West – recall this is the former for-arc basin of subduction zone
   C. Sierra Nevada Runs length of CA
      - Related Mesozoic plutons extend down through Baja Peninsula

II. Formation of Sierra Nevada Mountains
   A. Paleozoic-Mesozoic subduction (Antler Orogeny)
      1. Accreted Terrains were added to Laurentia
         - Blocks of crust sutured to Laurentia during subduction reversals
      2. These represent the crust upon which subduction during the Sevier Orogeny built a volcanic Arc
         - Think Andes volcanoes on SA crust
   B. Sevier Orogeny (165-80 Ma)
      1. Accretionary Prism and Forearc Basin
         - Recall coastal ranges of CA and the Great Valley
      2. Volcanic Arc builds on the crust
         a. The crustal magma chambers that feed these volcanoes are later exposed as the Sierra Nevada Batholith
         b. A Batholith is a huge (100s km x 100s km), thick body of intrusive igneous rock
      3. Fold and thrust belt behind the arc
         - Recall Death Valley, and Glacier National Park
   C. Laramide uplift and Basin and Range Extension
      1. Laramide (80-40 Ma) Orogeny
         a. Shallowing of slab causes volcanisms to migrate eastward
            - Recall Absaroka Volcanics, Devils Tower
         b. Uplifts the old arc and much of the crust to the east
            i. Recall Colorado Plateau, and Rocky Mountain NP
            ii. Upper crust (volcanics) is eroded and exposes the deeper crust
               - Batholith and the rocks it intruded (accreted terrain)
Geol 104 Lecture 20
Sierra Nevada: Yosemite, Kings Canyon and Sequoia NP

- The intruded rocks are metamorphosed by contact with the intrusion
- These are called Roof Pendants because the ‘hang’ over the top of the batholith
  c. Tallest Mountain in Conterminous US: Mt. Whitney – 14,494’

2. Basin and Range extension
   a. Sierras are the uplifted edge of the basin and range
   b. Tilted to the west
3. San Andreas faulting dices the Sierra Nevada a little – separating CA portions from Baja portions.

D. Geomorphology (shape of the land)
   1. Large dome structures (probably) from combination of
      a. Exfoliation during uplift = sheeting
      b. Spheroidal weathering (chemical weathering focused at corners) of batholith
      c. Joints cut the domes and allow mass wasting (e.g. Half-Dome)
   2. U-shaped valleys from glacial erosion
   3. V-shaped valleys from rivers cutting canyons since glaciation

III. Huge Sequoia Trees
   A. Few in Yosemite, Many in Sequoia and Kings Canyon
      - Sequoia and Kings Canyon geology is same as Yosemite – they are only a few miles apart and all three are in the Sierra Nevada Mountains
   B. Sequoia Trees
      1. Very old – 3-4000 years old
      2. Very Tall – tallest is ~275’
         - Enough wood added each year to grow and average 60’ tree!