1. SLIDE 3
   1. Continuation of Cretaceous movements.
      1. Laramide Orogeny
      2. Closing of Tethys
      3. Formation of the Himalayas
      4. Drake Passage (41Ma) (Eocene)
      5. NA and SA attached Pliocene
2. SLIDE 5
   1. The Paleocene – “ancient recent life”
      1. The Atlantic Ocean is small because South America and Africa have just separated
      2. India is not yet connected with Asia
      3. Australia is joined with Antarctica
      4. Europe and North America are joined together.
   2. The Eocene – “dawn of recent life”
      1. North America and Europe separate
   3. The Oligocene – “slightly recent life”
      1. Sea levels are low
      2. Antarctica is covered by glaciers
      3. India crashes into Asia creating the Himalayan Mountains
      4. Australia separates from Antarctica
3. SLIDE 6
   1. Paleogene started cooling and drying trend from the Cretaceous.
   2. Paleocene
      1. Spike in CO2 levels caused by the chain reaction of Methane Release in the humid parts of the world.
      2. Due to the warmer climate and sea level rise associated with the early Eocene, more wetlands, more forests, and more coal deposits would be available for methane release. Comparing the early Eocene production of methane to current levels of atmospheric methane, the early Eocene would be able to produce triple the amount of current methane production. The warm temperatures during the early Eocene could have increased methane production rates, and methane that is released into the atmosphere would in turn warm the troposphere, cool the stratosphere, and produce water vapor and carbon dioxide through oxidation. Biogenic production of methane produces carbon dioxide and water vapor along with the methane, as well as yielding infrared radiation. The breakdown of methane in an oxygen atmosphere produces carbon monoxide, water vapor and infrared radiation. The carbon monoxide is not stable so it eventually becomes carbon dioxide and in doing so releases yet more infrared radiation. Water vapor, traps more infrared than does carbon dioxide.
      3. ^In Summary:
         1. Methane is 23 times more effective than CO2 in warming potential.
         2. It was humid and warm so swamps made more Methane.
         3. Methane warms the troposphere and produces CO2 and water vapor through oxidization.
         4. Biogenic production produces Methane, CO2, water vapor, and infrared radiation.
         5. The oxidization effect takes the Methane, and produces CO, water vapor, and infrared radiation.
         6. The CO is not stable and becomes CO2 but releases more infrared radiation in the transition.
         7. All the produced water vapor stores infrared radiation better than the produced CO2.
      4. All this built up until the PETM boundary and then crashed as the CO2 deposits in the atmosphere as organic material settled on the bottom of the ocean floors.
      5. One of the major climatic event is the Azolla event (~49Ma).
         1. Aquatic ferns (Azollas) grew massively around the Arctic Ocean (The Artic was still warm at this time). The rapid growth was caused by the massive amount of CO2 in the atmosphere at the time.
         2. They all became buried on the seabed when they died and brought an estimated 470PPM out of the 900PPM with them.
      6. Middle Eocene Climatic Optimum Around (~41Ma) the southern oceans had a massive spike in CO2 levels (up to 4000PPM
         1. This is theorized to be a result of the Himalayas forming.
         2. Or to be sea floor rifting and metamorphic events releasing massive amounts of CO2 into the atmosphere.
      7. Eocene-Oligocene Extinction Event
         1. Theorized to be caused by rapidly decreasing CO2 levels.
         2. Not as widespread as earlier mass extinctions.