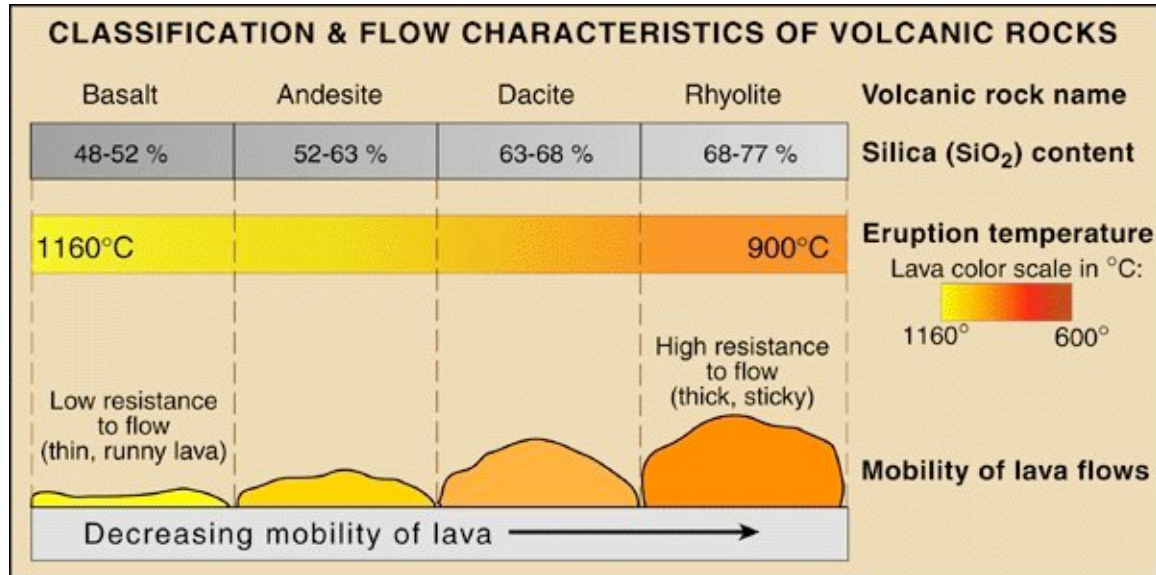


April 12, 2010 Class notes



Silica poor minerals melt at higher temperatures.

All Magma comes for the Asthenosphere \***Exception**\* Heat transfer also makes Magma in the Earth's crust

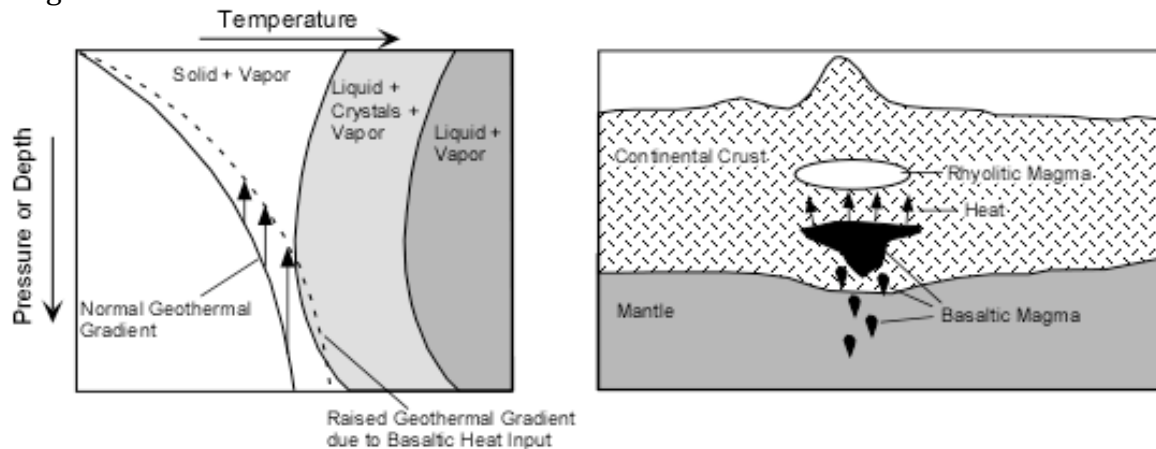


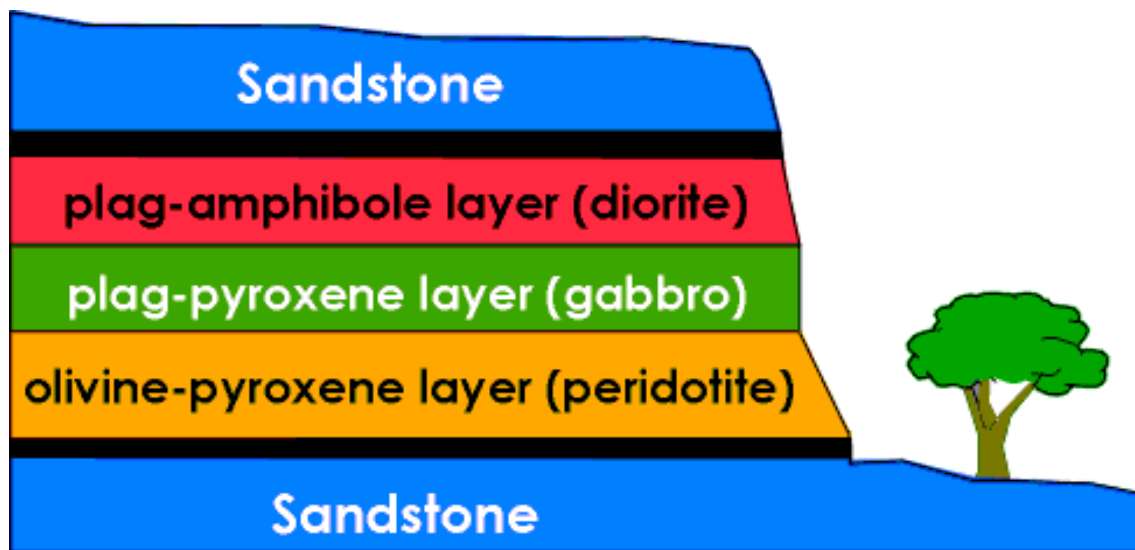
Fig2: Is an example of geothermal gradient and Heat transfer respectively (Nelson, 2007)

Heat Transfer: Anywhere there is a rising convection current, hotter material at depth will rise carrying its heat with it. As it rises to lower pressure (decompression) it will cool somewhat, but will still have a temperature higher than its surroundings. Thus, decompression will result in raising the local geothermal gradient. If this new geothermal gradient reaches temperatures greater than the peridotite solidus, **partial melting and the generation of magma can occur**. This mechanism is referred to as **decompression melting** (Nelson, 2007) and is composed of **Rhyolitic Magma**.

Hawaii and Yellow Stone are examples of this process.

### **Things that change magma composition:**

**Fractional Crystallization:** Most common in Lava Flows that cool underground (such as Sill) or in thick lava flow (200' - 300' thick). Rocks cool slowly if crystal is heavier it sinks to the bottom. As the Lava flow cools a component is removed from the magma flow. This creates a range of rocks illustrated by the Fig. 3 below.



(Unknown)

**Why do we have Volcanoes? :** This is a complex answer. The simple answer is the interior of the Earth is hot (Hotter than the surface) The interior is  $\approx 9,000^\circ - 10,000^\circ\text{F}$

**Earthquakes: Several reasons**

One reason is the earth is trying to cool off.

Why is the earth hot? There are multiple processes that have heated or are still heating the Earth.

- 1) Things that heat the Earth's interior started when the Earth was forming, but no longer provide heat. (Formational heating)
  - A) Accreted heating: heat from when the planet formed and accreted, which has not yet been lost.
    - 1) A large gas cloud forms => nebula
    - 2) The Gas cloud collapsed => most of these particles formed/fuel the sun
    - 3) Super Nova Explosion => pushes out remaining unused particles to form our solar system
  - B) Things that still are heating the Earth...end of class.

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