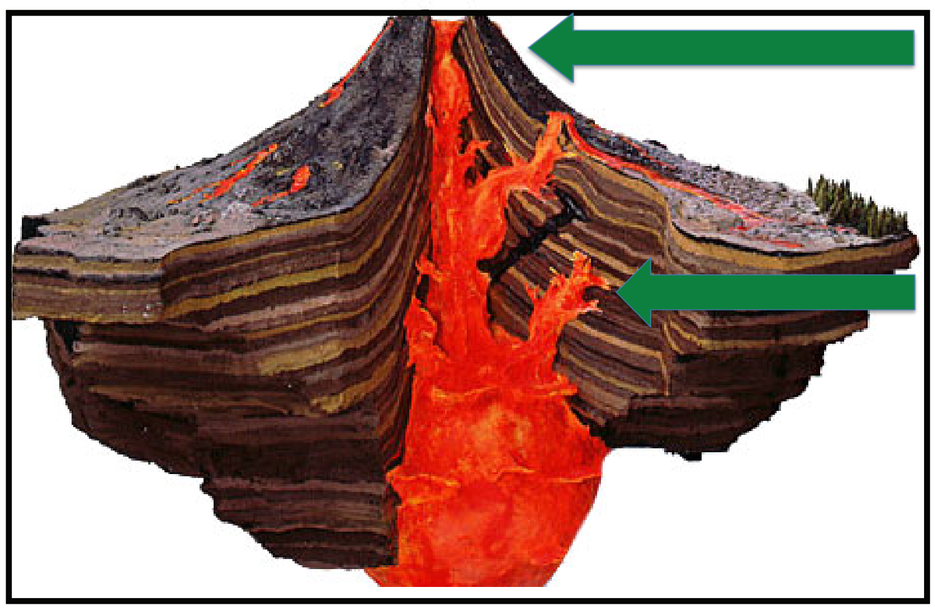
MAGMAS & METALS

LMDR-Laboratory for Mineral Deposits Research



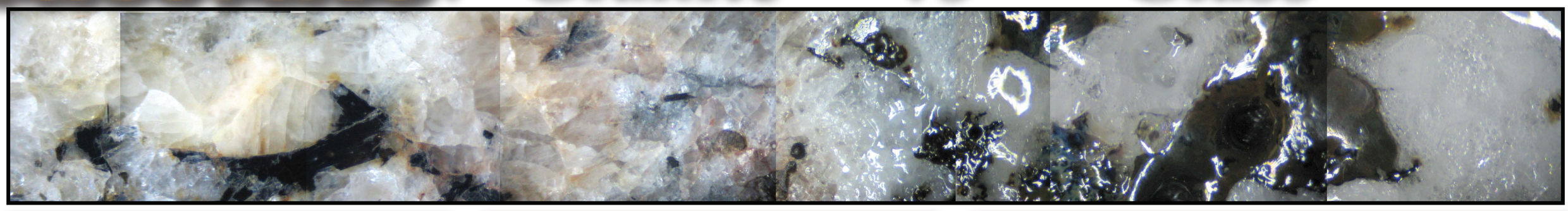
Eruption:

When magma rises and reaches Earths surface it erupts as a volcano and the liquid magma is called lava before it cools and solidifies into volcanic rocks like Basalt or Rhyolite.

Intrusion:

Sometimes magma gets stuck deep underground and cools and solidifies very slowly, becoming an intrusive igneous rock. Some common intrusive rocks include granite, or gabbro. Magmas are also very impotant because they often contain metals which are used in many parts of our everyday life. But in order to get the metals out of the magma we need help. Thankfully, intrusive magmas often have something else trapped inside them that can help get the metals out...water.

MAGMAS: Granite vs Glass



Granite: Slow Cool

When Magma is trapped deep udergground it can cool slowly, changing from liquid to solid over 10,000 or even 100,000 years. This long time lets crystals grow and become big enough to see with the naked eye. Above is a picture of granite just like what some people use to make countertops. Granite cools from magma miles below the Earths surface and grows mostly crystals of quartz and feldspar. This granite also has a black mineral: hornblende.

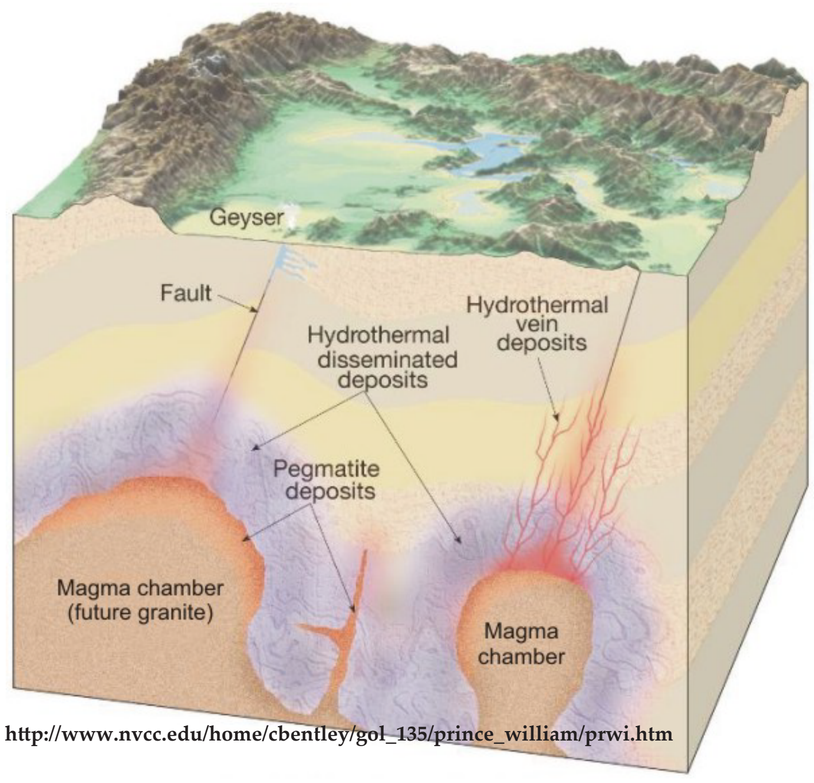
Melting

If a rock is heated to a high enough temperature it can melt. In our lab we can heat granite to above 1000°C or 2000°F until almost all the crystals melt and dissolve together becoming a liquid. But granite forming magma is made deep underground where there is almost no oxygen gas. When we melt it at the surface some of the iron in the rock reacts with oxygen in the air making its own melt that, just like oil and water, wont mix with the other magma.

Glass: Fast Cool

When our man-made magma cools in air it becomes a solid in less than a minute instead of 10,000 years. There is no time for crystals to grow and instead the magma makes a glass. Above is a picture of granite that we melted, then cooled to form a clear smooth glass and dark iron-oxides that wouldn't mix. If you look closely you can see one more thing in the glass. Deep underground, water was squeezed and trapped as part of the crystals of the granite. Granite melting in air releases bubbles of ancient water as it melts. But some of the bubbles of water get trapped in the newly formed glass. Water in magmas turns out to be very important for all of us.

METALS



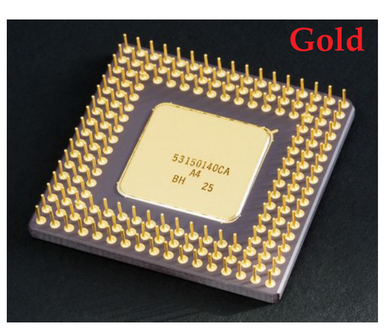
http://www.nvcc.edu/home/cbentley/gol_135/prince_william/prwi.htm

Ore Deposits:

Many magmas contain a large ammount of **water** and **metals** dissolved into the liquid rock. Sometimes, as the magmas cool, they release the water along with concentrated amounts of metals. This **hot water carries the metals** as it rises away from the trapped magma through tiny cracks or faults and as it soaks through the rocks themselves. But as the water cools and rises it can no longer hold onto the metals it carries. If conditions are just right, the **metals all get left behind** in one small area. If one of these areas can be mined at a profit then it is called a **Magmatic-Hydrothermal Ore Deposit**.

LMDR - Ore Deposit Experiments:

Throughout our lab you will see a wide variety of equipment that students and faculty have built to conduct experiments to better understand **Magmatic-Hydrothermal Ore Deposits.** We make miniature versions of **intrusive magma chambers** and try to understand the conditions that make it just right for an ore deposit to form. That way, others can use our work to find ore deposits more easily, and get the metals people need with as little environmental impact as possible.



Metals in Everyday Life:

Everyday we all use metals in almost every aspect of modern life. Some of the most common metals that are mined from **Magmatic-Hydrothermal Ore Deposits** include **Copper, Gold, Silver, Lead and Zinc**. Everything from our phones, computers, electricity, plumbing, and manufacturing to paints, mirrors, and medicine require the use of these metals. Below are examples of some uses for these metals that you might not have expected.

Gold foil as thin as a few atoms is used in astronaut visors to sheild them from solar rays. It is also used in some office buidings as an excellent tint.

Using copper for door handles and faucets is being shown to reduce dangerous bacteria in hospitals by up to 95% over current materials, helping prevent the spread of disease.

Silver is being used in Solar Panels to greatly increase current generation and increase our ability to capture and use solar power.

Special zinc compounds are used in X-ray detectors to increase sensitivity and decrease the dosage needed for medical imaging.