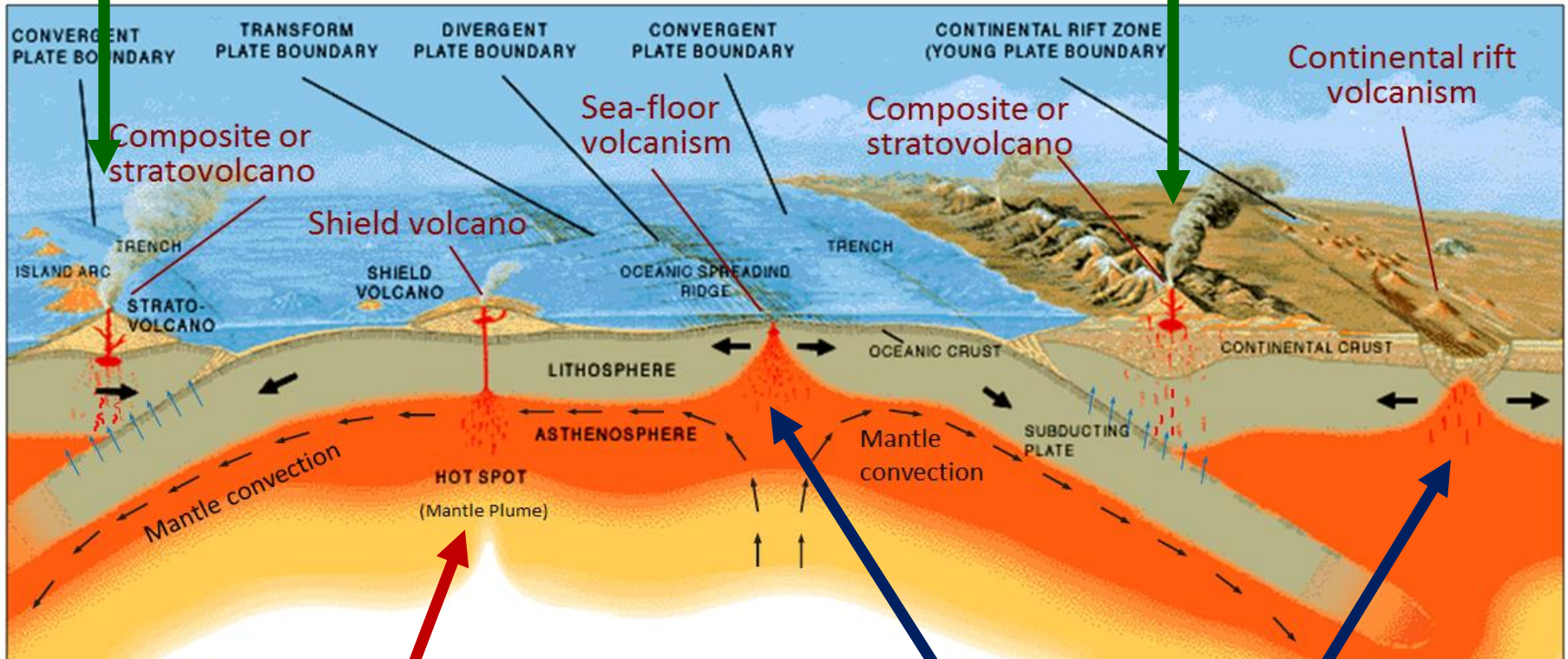


Types of Volcanism

**Subduction zone volcanism
(most common)**



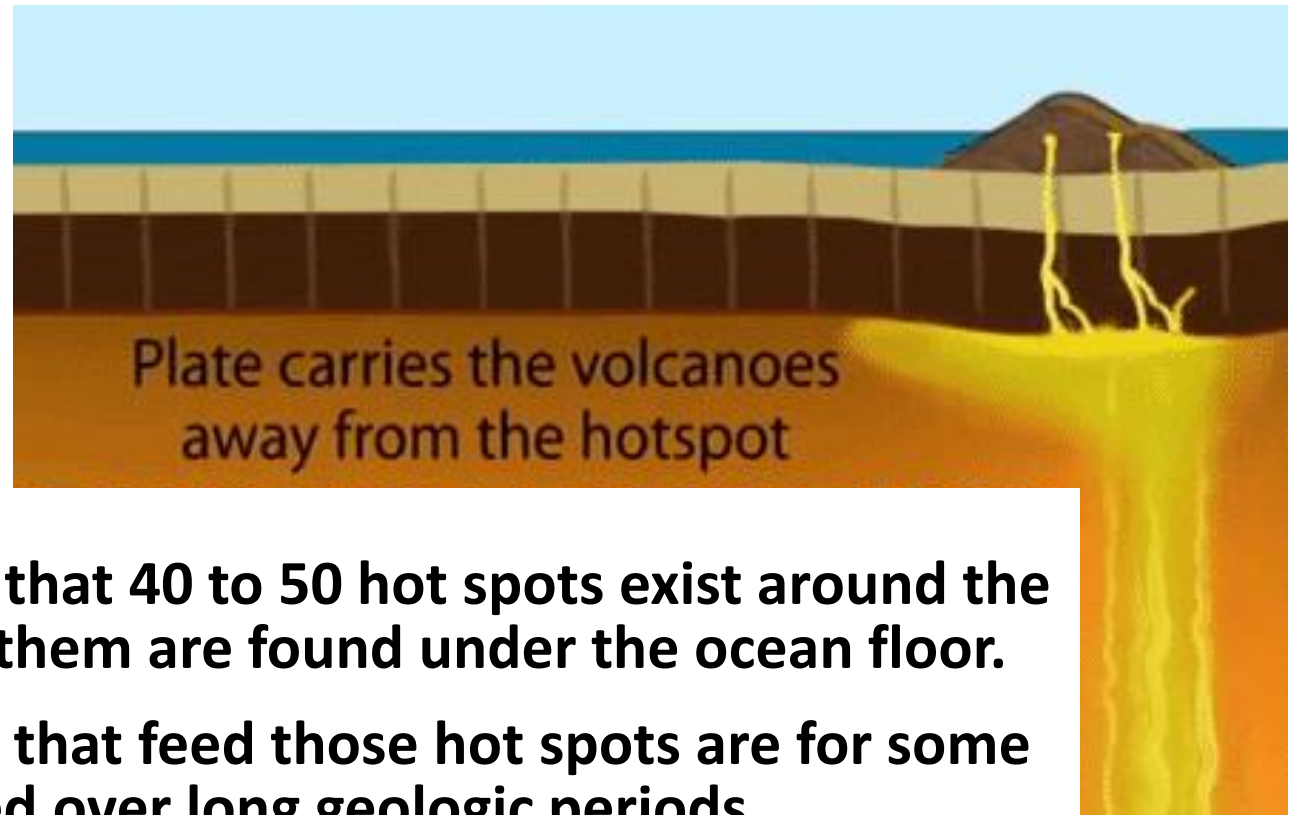
**Hot spot
volcanism (rare)**

**Spreading
ridge/rift volcanism**

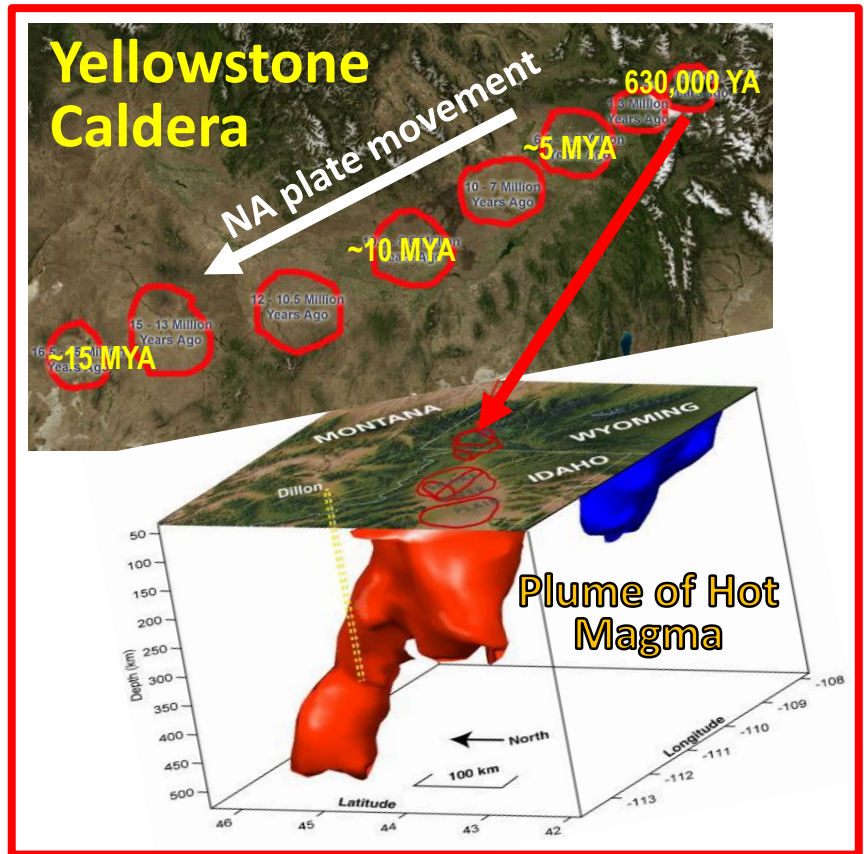
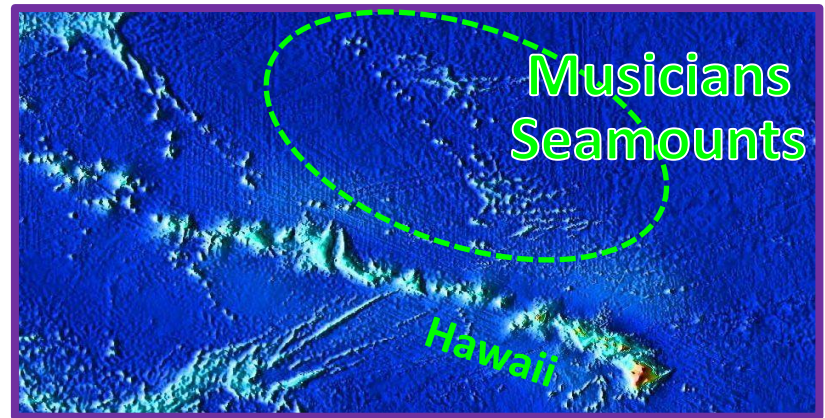
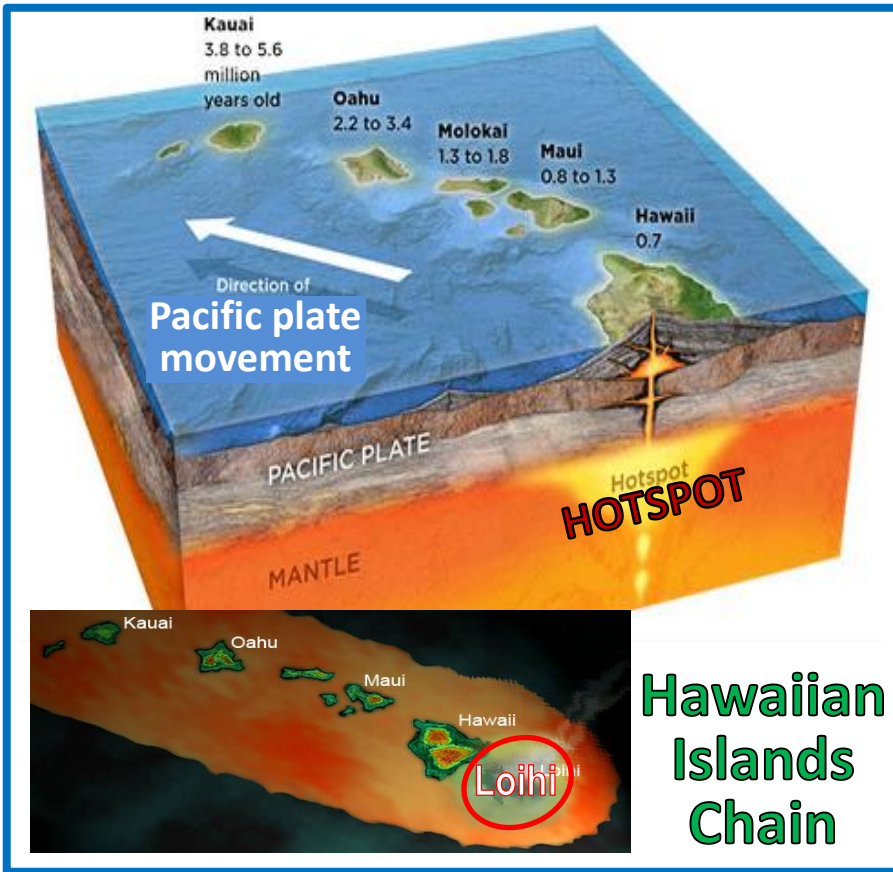
Hot Spot Volcanism

Hot spots are due to a **plume of hot magma** flowing up to the crust from the core-mantle boundary.

- Over time, the **tectonic plates of the Earth move over** the hot spots leaving a **trail of volcanoes**.



- Scientists think that 40 to 50 hot spots exist around the world; most of them are found under the ocean floor.
- Magma plumes that feed those hot spots are for some reason sustained over long geologic periods.
- Volcanoes carried far away from the hot spot become **extinct**.



Volcanic Caldera *(Spanish for “cooking pot”)*

Volcano rapidly empties its magma chamber, and support is lost. Overlying material collapses into the magma chamber: a caldera forms.

- **Explosive calderas**

Silica-rich magma feeding these volcanoes has high viscosity; gases tend to become trapped at high pressure within the magma, resulting in explosion.

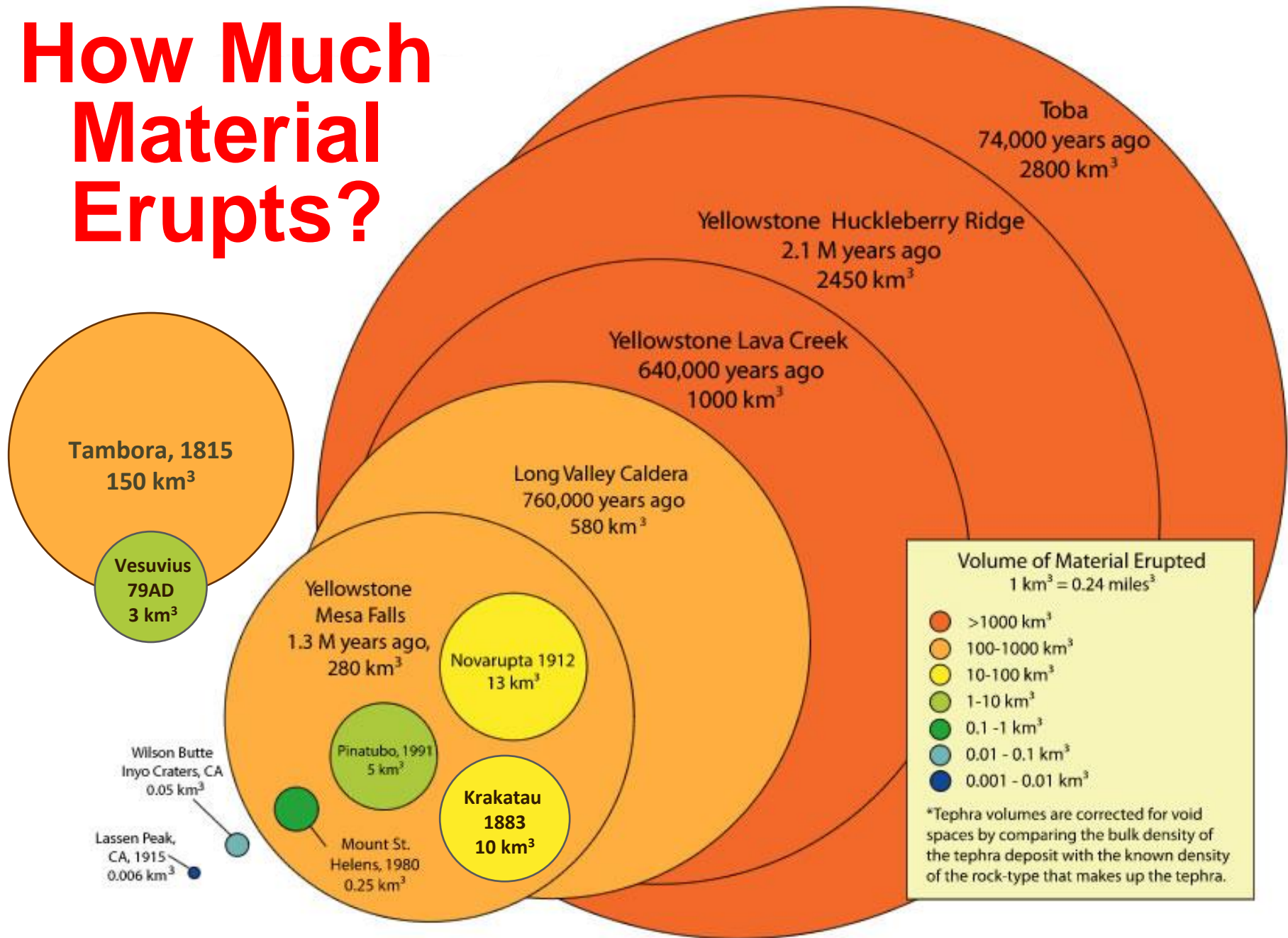


- **Non-explosive calderas**

Basaltic magma feeding these volcanoes is silica poor and much less viscous; the magma chamber is drained by large lava flows rather than by explosive events.



How Much Material Erupts?



Solid Ejecta

Ash and **pyroclastic material** (“the solid”) is airborne material ejected by a volcano:

- **Volcanic ash**
< 0.06 mm to 2 mm;
composed of rock, mineral,
and volcanic glass
- **Cinders**
2 mm to 64 mm;
composition same as ash
hazardous when falling!

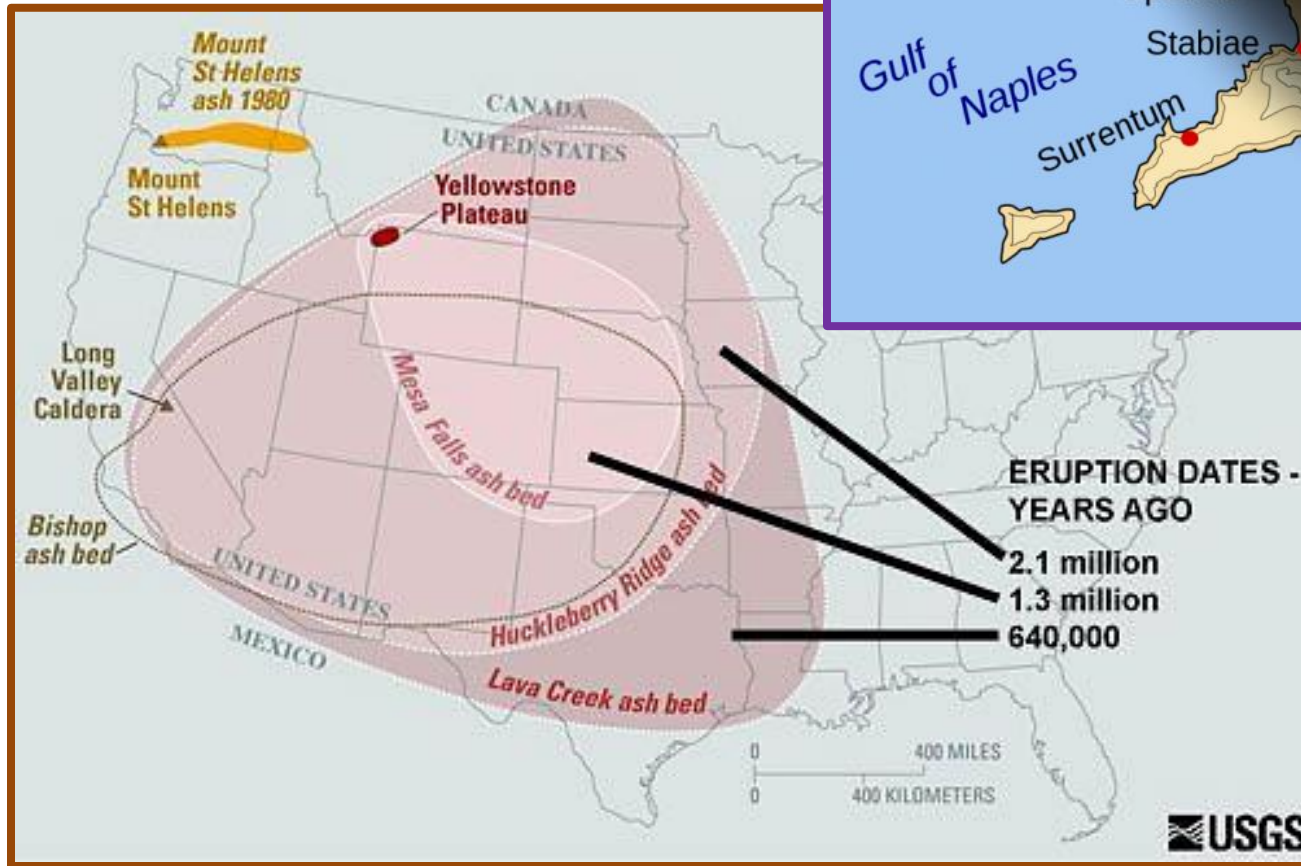


- **Bombs**
> 64 mm, shapes vary;
formed by molten rock
solidifying in the air



Volcanic Ash Fall Zone

Can cover hundreds of thousands square miles!



Vesuvius ash fall zone was roughly 100 times smaller than that of the latest (640,000 YA) **Yellowstone** eruption!

Volcanic Gases



Significance?
Determines violence
of an eruption:

**High gas = violent
eruptions!**

- **Volatiles** (substances that easily boil and evaporate)

H_2S – Hydrogen sulfide

H_2O – Water vapor

SO_2 – Sulfur dioxide

CO_2 – Carbon dioxide

N_2 – Nitrogen

HCl – Hydrochloric Acid

Effect on global climate

← block sunlight

← greenhouse gas