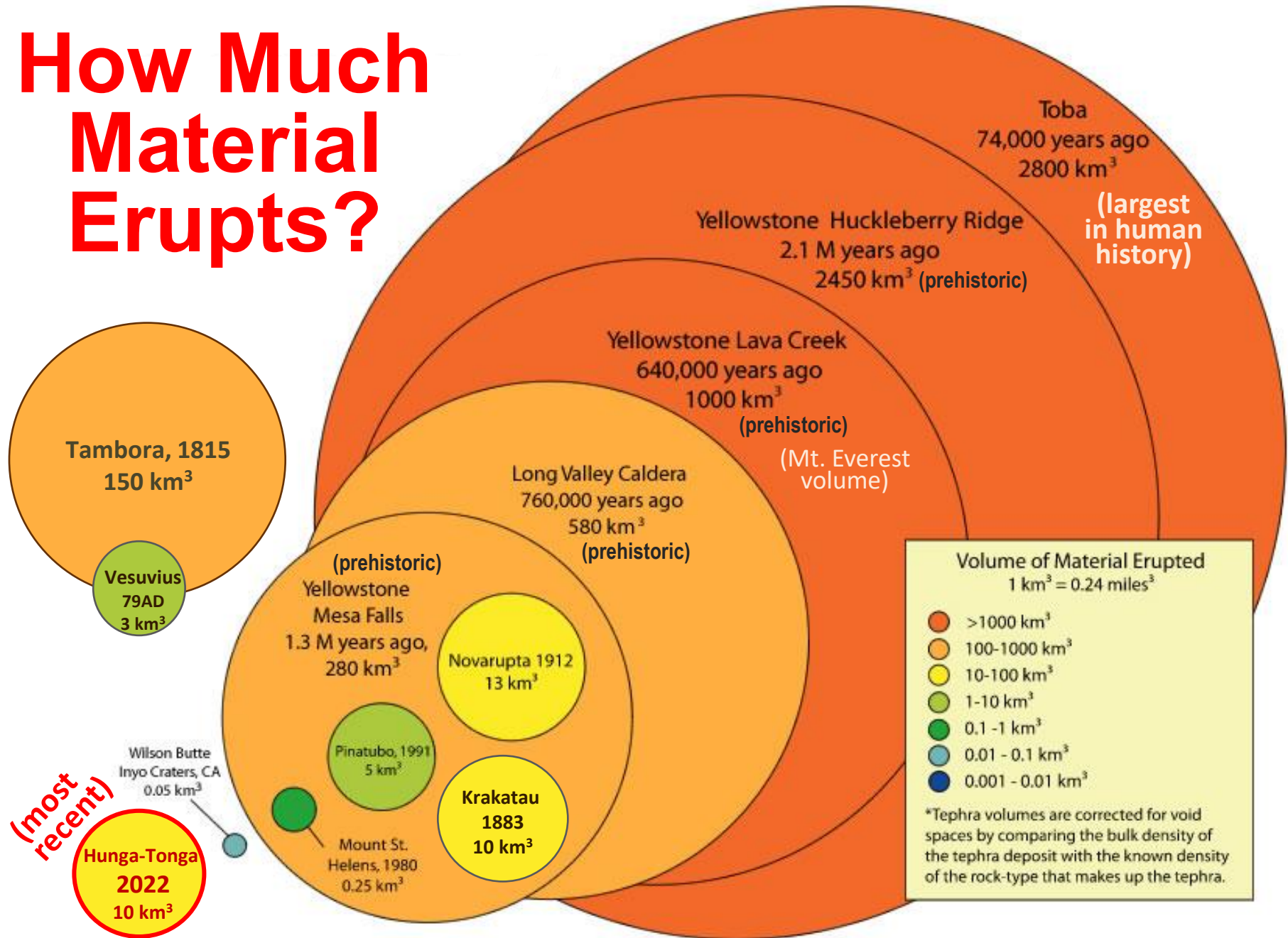
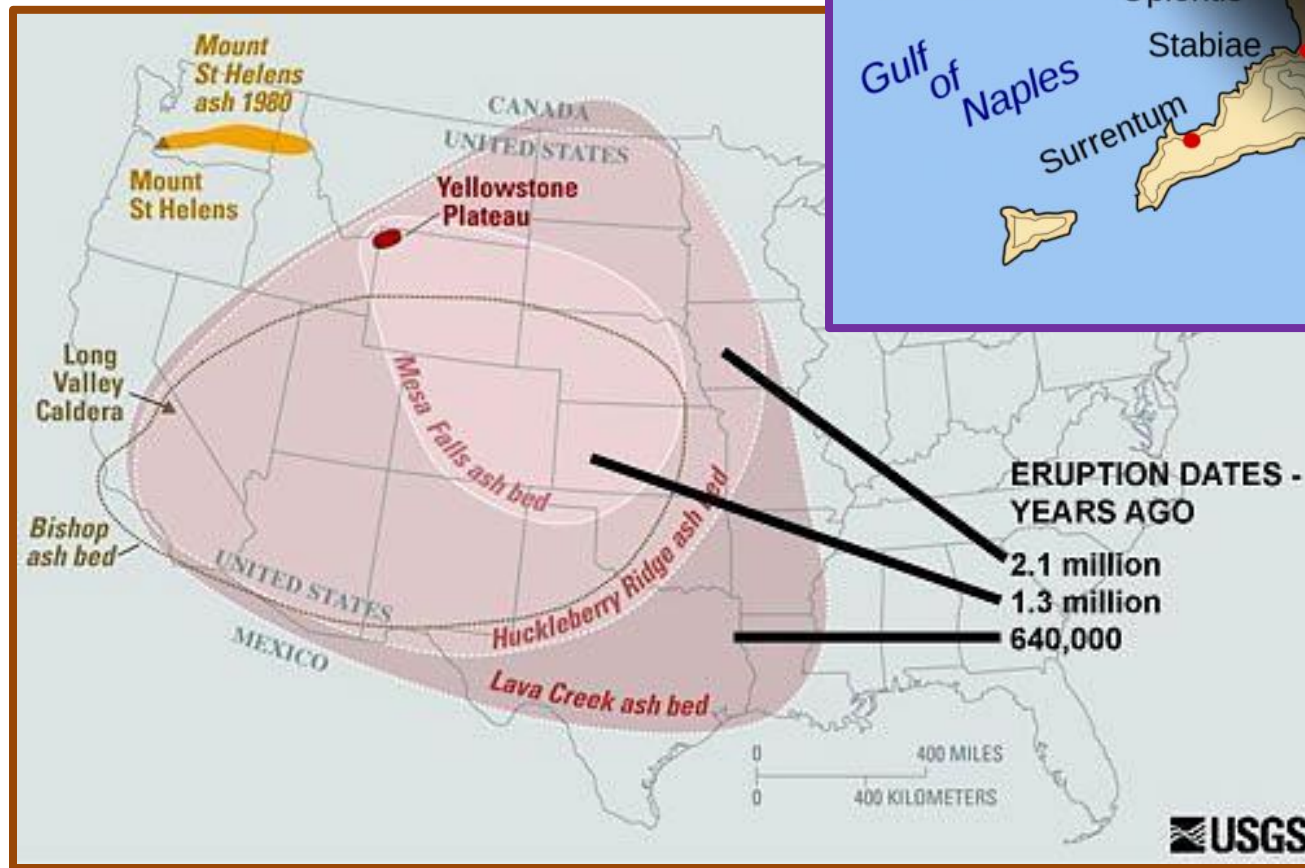


How Much Material Erupts?



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!

Volcanoes and Climate

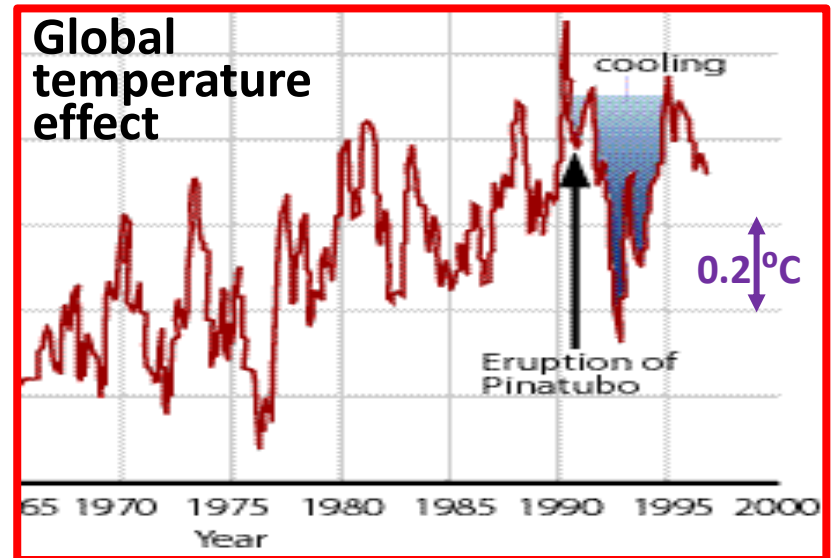
Mt. Tambora, Indonesia •

Largest observed eruption
in *recorded* history;
1816 “Year Without Summer”



• Mt. Pinatubo, Philippines

Second largest eruption of the 20th century, June 1991.

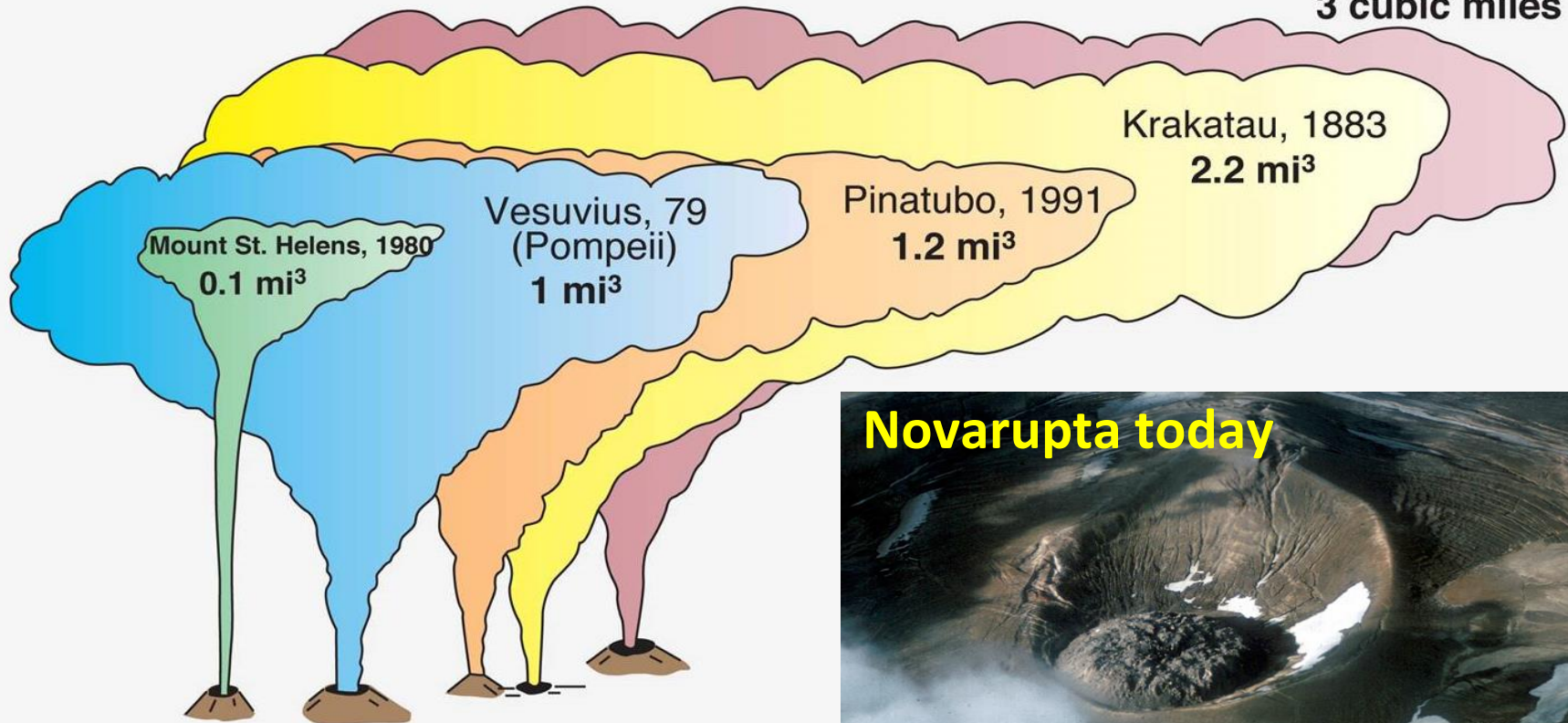


The Most Powerful Volcanic Eruption of the 20th Century



Went almost unnoticed - people in Juneau, Alaska, about 750 miles from the volcano, heard the sound of the blast – *over one hour after it occurred.*

• **NOVARUPTA**
Alaska 1912
3 cubic miles

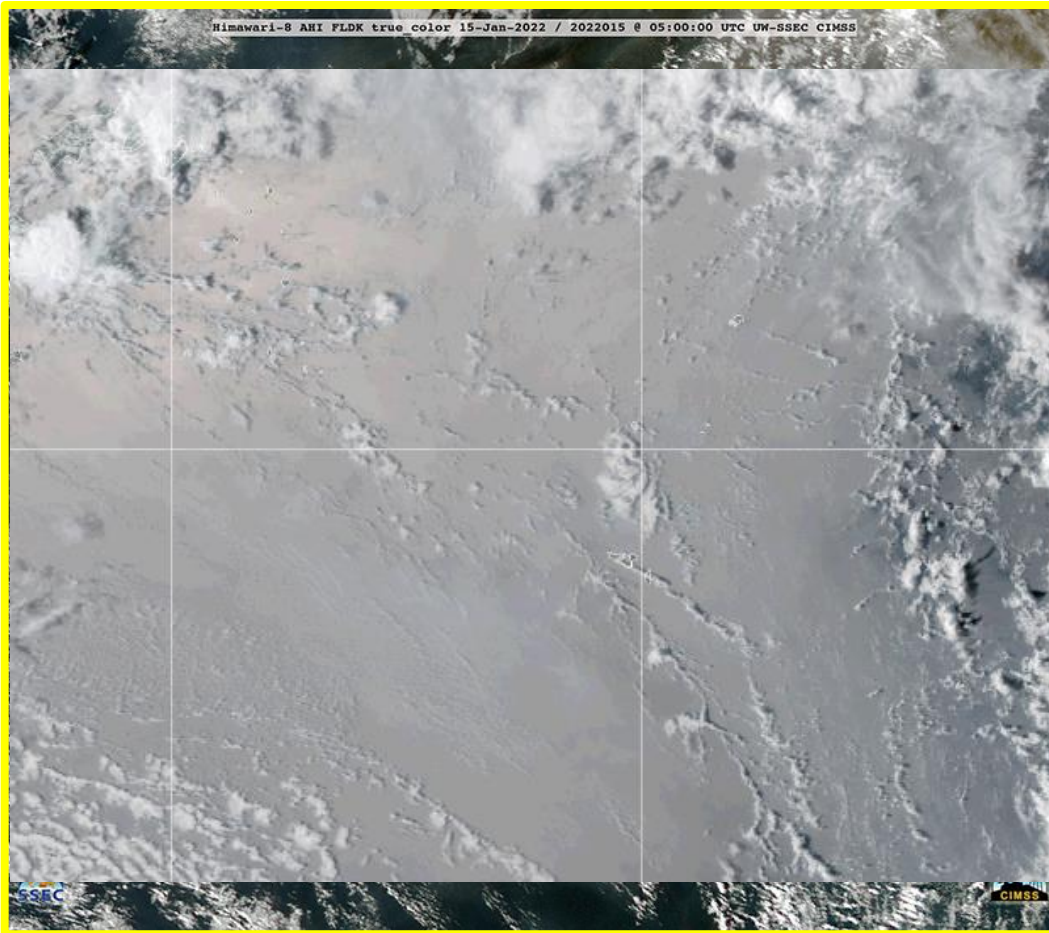


Novarupta today



The Most Powerful Volcanic Eruption of the 21st Century

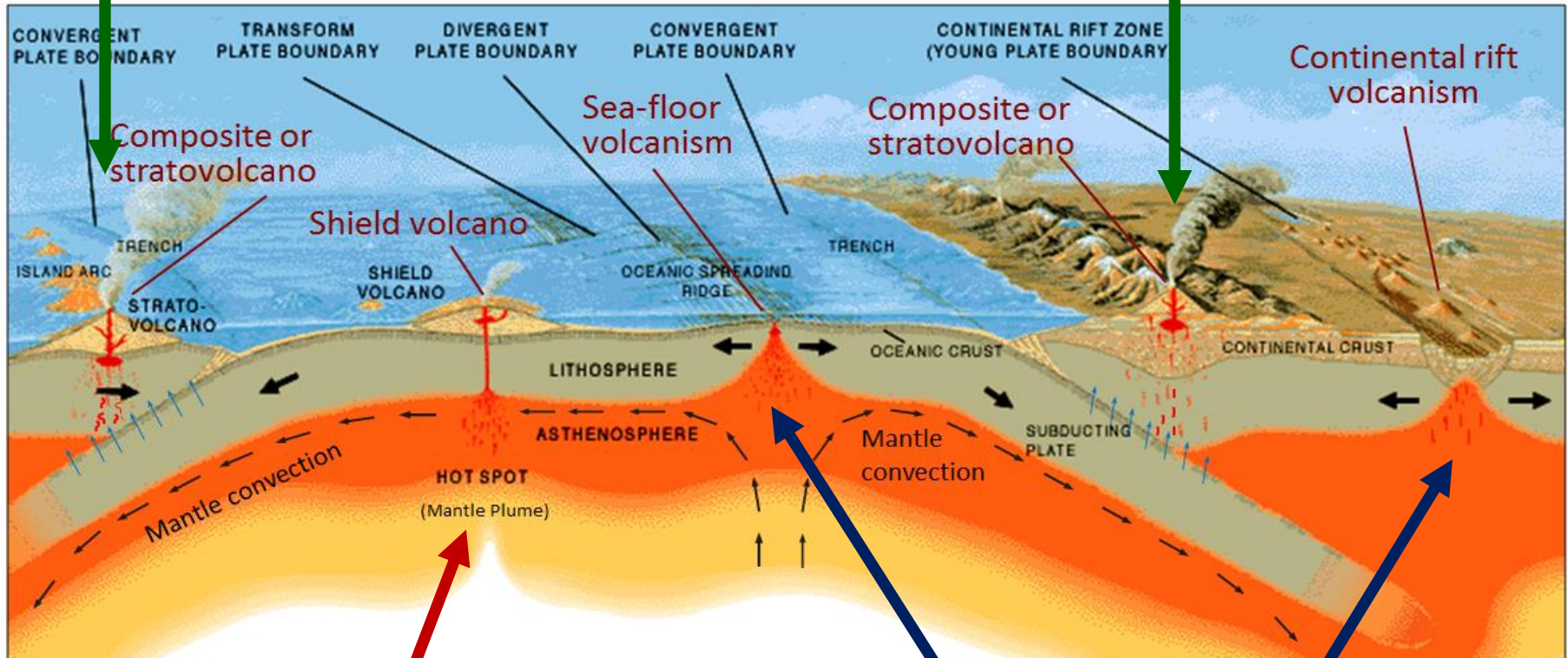
Hunga Tonga-Hunga Ha'apai, 14-15 January 2022



- Blast as powerful as Krakatoa - biggest *boom* ever recorded!
- Ejected $\sim 2 \text{ mi}^3$ (10 km^3) of material; generated an ash plume half the size of France.

Types of Volcanism

**Subduction zone volcanism
(most common)**



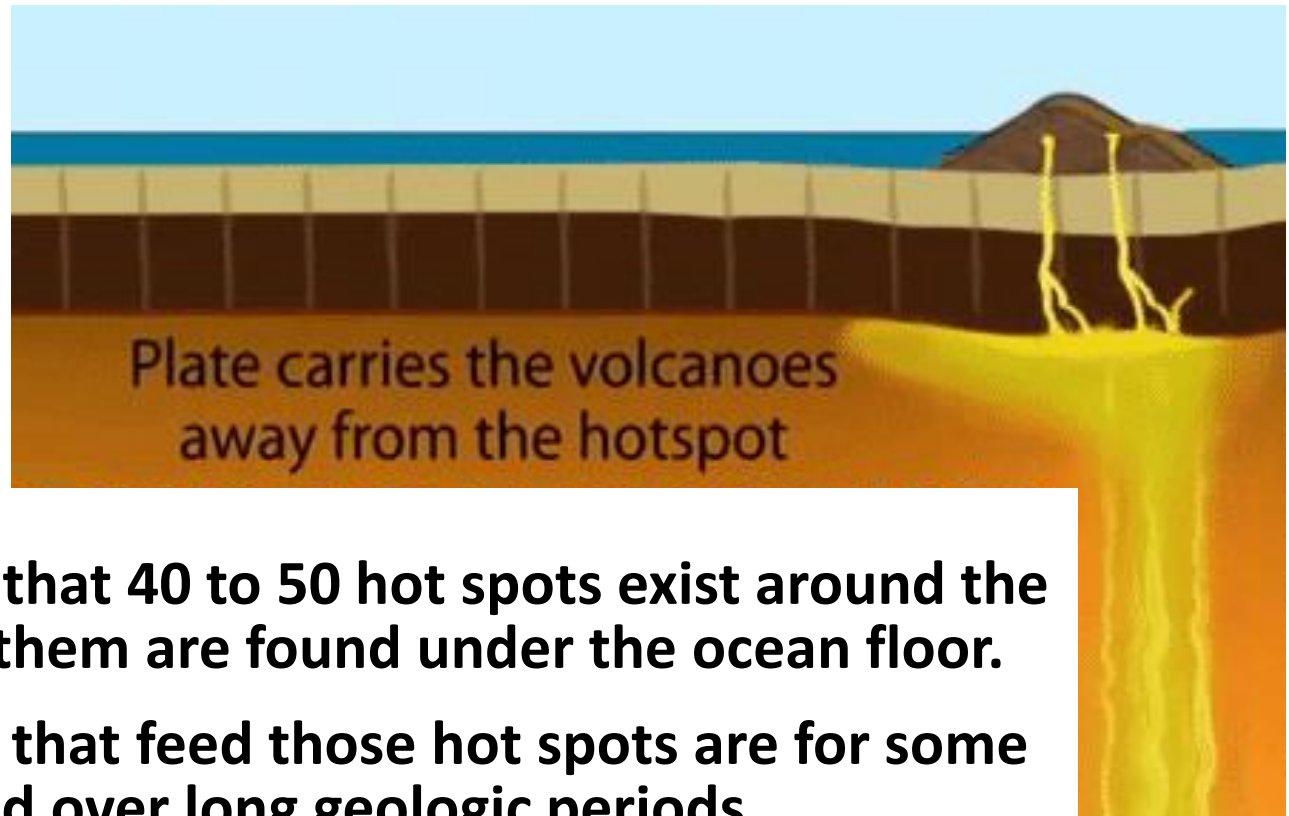
**Hot spot
volcanism (rare)**

**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**.

