



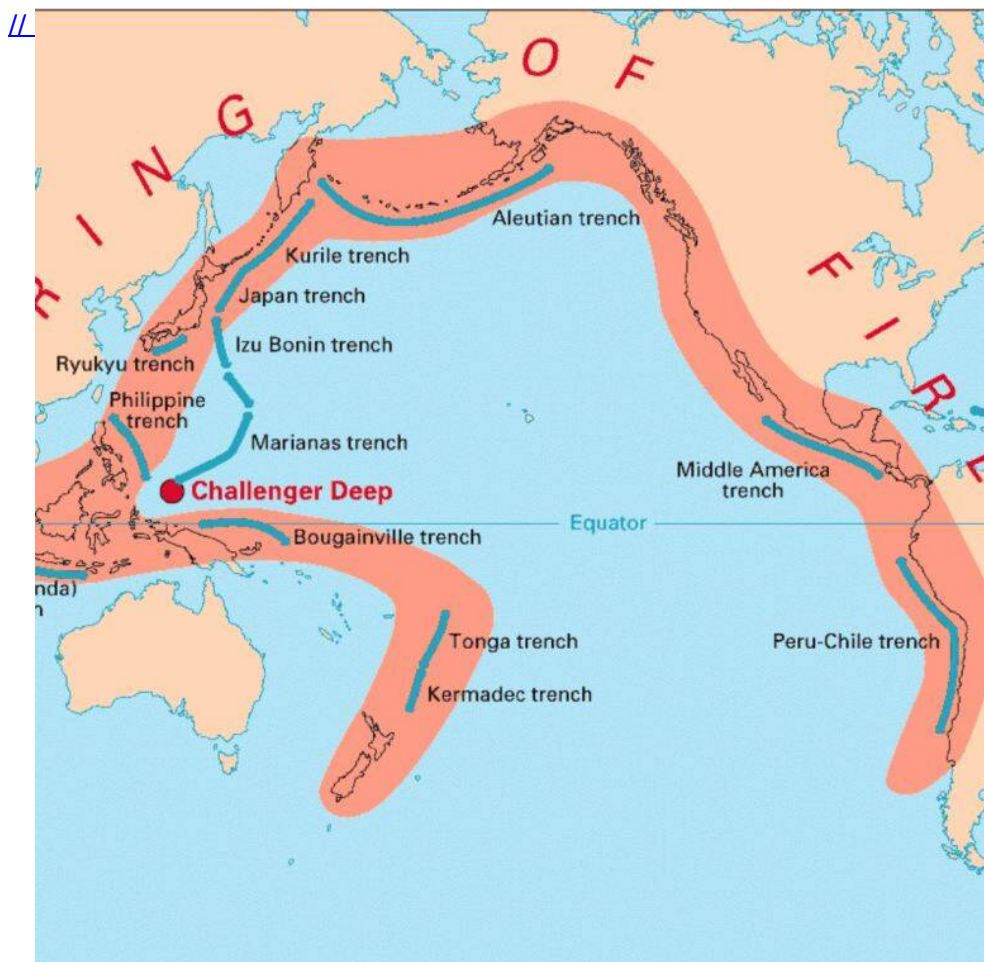
Pacific Ring of Fire

For Prelims: Pacific Ring of Fire, Volcano, Earthquakes, Tectonic Plates, Subduction.

For Mains: Features and Causes of Frequent Earthquakes in the Pacific Ring of Fire.

Why in News

The [Pacific 'Ring of fire'](#) is situated just over 60 kilometers from the island nation of Tonga, where recently [Hunga Tonga-Hunga Ha'apai volcano](#) erupted sending ash and smoke thousands of feet into the air.



Key Points

- **About:**

- Also called Pacific rim or the Circum-Pacific Belt, is an area along the Pacific Ocean that is characterized by active volcanoes and frequent earthquakes.
- It is home to about 75% of the world's volcanoes - more than 450 volcanoes. Also, about 90% of the world's earthquakes occur here.

▪ **Geographical Stretch:**

- The Ring of Fire is stretched to approximately 40,000 kilometers tracing boundaries **between several tectonic plates including the Pacific, Juan de Fuca, Cocos, Indian-Australian, Nazca, North American, and Philippine Plates.**
- The chain runs up **along the western coast of South and North America, crosses over the Aleutian Islands in Alaska**, runs down the eastern coast of Asia past New Zealand and into the northern coast of Antarctica.
- Bolivia, Chile, Ecuador, Peru, Costa Rica, Guatemala, Mexico, United States, Canada, Russia, Japan, Philippines, Australia, Papua New Guinea, Indonesia, New Zealand, and Antarctica **are some of the important places located in the ring of the fire.**

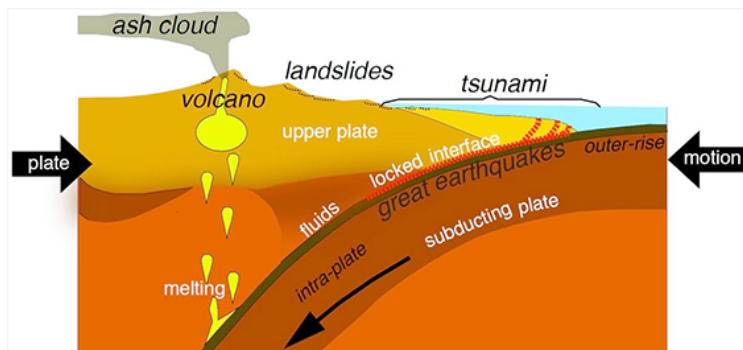
▪ **Causes of Volcanic Activity:**

- Tectonic plates move towards each other **creating subduction zones.** One plate gets pushed down or is subducted by the other plate. This is a very slow process - **a movement of just one or two inches per year.**
- As this subduction happens, **rocks melt, become magma and move to Earth's surface and cause volcanic activity.**
 - In the **case of Tonga, the Pacific Plate was pushed down below the Indo-Australian Plate** and Tonga plate, causing the **molten rock to rise above and form the chain of volcanoes.**

▪ **Recent Research:**

- The Pacific Plate, which drives much of the tectonic activity in the **Ring of Fire, is cooling off.**
- Scientists have discovered that the **youngest parts of the Pacific Plate (about 2 million years old) are cooling off** and contracting at a faster rate than older parts of the plate (about 100 million years old).
- The younger parts of the plate **are found in its northern and western parts**, the most active parts of the Ring of Fire.

Subduction



- Subduction happens **when tectonic plates shift, and one plate is pushed under another. This movement of the ocean floor produces a "mineral transmutation", which leads to the melting and solidification** of magma i.e., the formation of volcanoes.
 - In other words, when a **"downgoing" oceanic plate is pushed into a hotter mantle plate, it heats up, volatile elements mix**, and this produces the magma. The magma then rises up through the overlying plate and spurts out at the surface.
- A subduction zone **is the biggest crash scene on Earth.** These boundaries mark the collision between two tectonic plates.
- When two tectonic plates meet at a subduction zone, one bends and slides underneath the other, curving down into the mantle, the hotter layer under the crust.

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