

Origin of Earth's Oxygen

December 2, 2022

In news— A new study has found interesting information about the origin of earth's oxygen.

Key findings-

- 21 percent of the atmosphere consists of this life-giving element. But **in the deep past, as far back as the Neoproterozoic era 2.8 to 2.5 billion years ago this oxygen was almost absent.**
- As per the new study **at least some of the Earth's early oxygen came from a tectonic source via the movement and destruction of the Earth's crust.**
- The **Archean eon represents one third of our planet's history**, from 2.5 billion years ago to four billion years ago.
- This alien Earth was a water-world, covered in green oceans, shrouded in a methane haze and completely lacking multicellular life. Another alien aspect of this world was the nature of its tectonic activity.
- On modern Earth, the dominant tectonic activity is called plate tectonics, where oceanic crust – the outermost layer of the Earth under the oceans – sinks into the Earth's mantle (the area between the Earth's crust and its core) at points of convergence called subduction zones.
- However, there is considerable debate over whether plate tectonics operated back in the Archean era.
- **One feature of modern subduction zones is their association with oxidised magmas.**
- These magmas are formed when oxidised sediments and bottom waters – cold, dense water near the ocean floor are introduced into the Earth's mantle. This **produces magmas with high oxygen and water contents.**
- This research aimed to test whether the absence of

oxidised materials in Archean bottom waters and sediments could prevent the formation of oxidised magmas.

- The identification of such magmas in Neoproterozoic magmatic rocks could provide evidence that subduction and plate tectonics occurred 2.7 billion years ago.
- **Researchers collected samples of 2750- to 2670-million-year-old granitoid rocks from across the Abitibi-Wawa subprovince of the Superior Province – the largest preserved Archean continent** stretching over 2000 km from Winnipeg, Manitoba to far-eastern Quebec.

