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Solar Tsunami Can Trigger the Sunspot Cycle

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The scientists have found that solar tsunamis are responsible for triggering an 11-year cycle of sunspots.

It is believed that the “solar dynamo” is linked to the production of sunspots.

Solar Dynamo

Solar Dynamo is a naturally occurring generator which produces electric and magnetic fields in the sun.

Sun Spot

- Sunspots are areas that appear dark on the surface of the Sun. They appear dark because they are cooler than other parts of the Sun’s surface.
- The temperature of a sunspot is still high around 6,500 degrees Fahrenheit.
- Sunspots are relatively cool. It’s because they form at areas where magnetic fields are particularly strong. These magnetic fields are so strong that they keep some of the heat within the Sun from reaching the surface.
- The amount of magnetic flux that rises up to the Sun's surface varies with time in a cycle called the solar cycle. This cycle lasts 11 years on average. This cycle is sometimes referred to as the sunspot cycle.

Solar Tsunami

- Solar tsunami is the waves of the magnetic field and hot, ionized gas moving across the Sun at about 400 km per second.
- Tsunamis are generated after a release of matter into space called a coronal mass ejection (CME).
- Solar tsunamis were discovered in 1997 by the SOHO (Solar and Heliospheric Observatory) of European Space Agency.

Coronal Mass Ejection

- A coronal mass ejection (CME) is a significant release of plasma and accompanying magnetic field from the solar corona. They are often followed by solar flares.
- Solar Flares on reaching earth causes spectacular light shows by interacting with the earth's magnetic field called Aurora's.
- Solar Flares can also disrupt radio transmission and harm satellites in orbit.

How Solar Tsunami leads to Sunspot?

- The extreme temperature and pressure conditions that prevail some 20,000 km below the sun's surface cause its material to form a plasma consisting primarily of hydrogen and helium in a highly ionized state.
- The plasma is confined with huge magnetic fields inside the sun. Holding these fields in their place requires that there is extra mass (plasma mass) pushing at the bands from higher latitudes.
- Thus, a magnetic dam is formed which is storing a big mass of plasma. At the end of a solar cycle, this magnetic dam can break, releasing huge amounts of plasma cascading like a tsunami towards the poles.
- These tsunami waves travel at high speeds of about 1,000 km per hour carrying excess plasma to the mid-latitudes. There they give rise to magnetic flux eruptions. These are seen as the bright patches that signal the start of the next cycle of sunspots.