



Impact of Climate Change on El Nino and La Nina

Why in News

According to recent research, [climate change](#) can cause extreme and more frequent [El Niño](#) and [La Niña](#) events.

- The findings have been obtained **using one of South Korea's fastest supercomputers, Aleph.**

Key Points

▪ About the Recent Findings:

- **Increasing atmospheric carbon dioxide** can cause a weakening of future simulated El Nino-Southern Oscillation (ENSO) sea surface temperature variability.
- Future **El Niño events will lose heat to the atmosphere more quickly** due to the evaporation of water vapour. Also, in the future there will be a **reduced temperature difference between the eastern and western tropical Pacific**, inhibiting the development of temperature extremes during the ENSO cycle.
- There can be a **weakening of Tropical Instability Waves (TIWs)** in the projected future which can cause a disruption of the La Niña event.
 - **TIWs** are a dominant feature of monthly variability in the equatorial Pacific and Atlantic Ocean.

▪ ENSO:

- **El Nino and the Southern Oscillation**, also known as ENSO is a **periodic fluctuation in sea surface temperature (El Niño)** and the **air pressure of the overlying atmosphere (Southern Oscillation)** across the **equatorial Pacific Ocean**.
- **El Nino and La Nina** are complex weather patterns resulting from variations in ocean temperatures in the Equatorial Pacific Region. They are **opposite phases of** what is known as the **ENSO cycle**.
- El Nino and La Nina episodes **typically last nine to 12 months**, but some prolonged events may last for years.

▪ El Nino:

◦ About:

- El Nino is a **climate pattern that describes the unusual warming of surface waters** in the **eastern tropical Pacific Ocean**.
 - It is the **"warm phase" of ENSO**.
 - It occurs **more frequently than La Nina**.

◦ Impact:

- The warmer waters **cause the Pacific jet stream to move south of its neutral position**. With this shift, **areas in the northern US and Canada are dryer and**

warmer than usual. But in the US Gulf Coast and Southeast, **these periods are wetter** than usual and have increased flooding.

- As El Niño brings rain to South America, it **brings droughts to Indonesia and Australia**.
- El Niño also has a **strong effect on marine life off the Pacific coast**.
 - During normal conditions, **upwelling** brings water from the depths to the surface; this water is cold and nutrient rich.
 - During El Niño, **upwelling weakens or stops altogether**. Without the nutrients from the deep, there are fewer phytoplankton off the coast. This affects fish that eat phytoplankton and, in turn, affects everything that eats fish.
 - The warmer waters **can also bring tropical species, like yellowtail and albacore tuna**, into areas that are normally too cold.

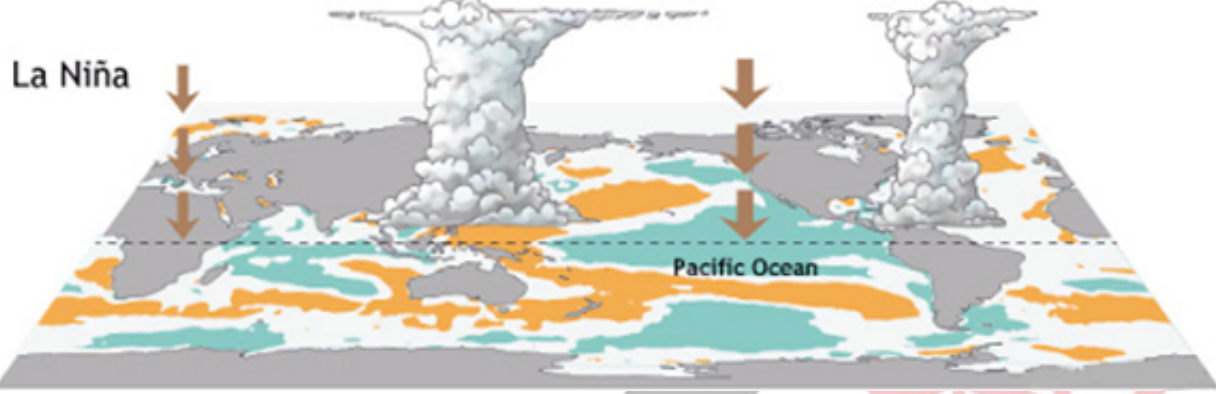
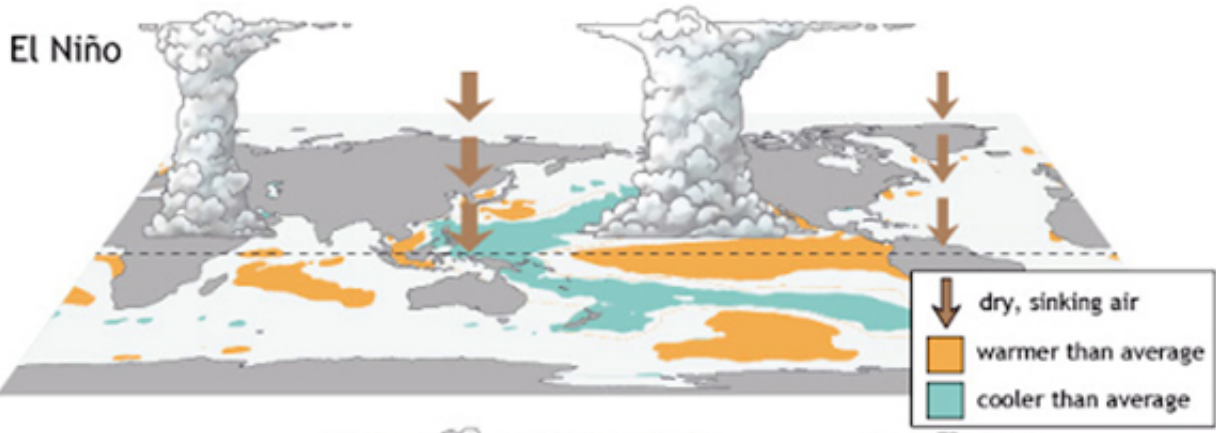
▪ La Nina:

◦ About:

- La Nina, the **“cool phase” of ENSO**, is a pattern that describes the unusual cooling of the tropical eastern Pacific.
 - La Nina events **may last between one and three years**, unlike El Niño, which usually lasts no more than a year.
 - Both phenomena tend to peak during the **Northern Hemisphere winter**.

◦ Impact:

- Off the west coast of the Americas, **upwelling increases**, bringing cold, nutrient-rich water to the surface.
- It usually has a **positive impact on the fishing industry of western South America**.
- It can also lead to a **more severe hurricane season**.
- Causes the **jet stream** to move northward and to weaken over the eastern Pacific.
- **Causes drought in the South American countries** of Peru and Ecuador.
 - There are **increased temperatures in Western Pacific, Indian Ocean and off the Somalian coast**. It also leads to **heavy floods in Australia**.



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