A Review paper on EL Nino

EL nino and southern oscillation: mechanism and impacts on India monsoon.

ABSTRACT

EL Nino epicodes are major climatic disruptions that occur every 2 to 8 years and originate in the equatorial pacific ocean. From the coastlines of peru and Ecuador to the middle of the equatorial pacific ocean, unusally warm waters at the ocean surface mark the developed is a peculian lessening of the westward blowing trade winds, which enables warm surface waters to reverse their course eastward EL Nino's climatic effects are increassing throughout the globe, and this may have a variety of consequences on regional weather. It is linked to a broad range of changes in the climate system, and it has the potential to have siginificant socio-economic consequences in the infrastructure, agricultural, health, and energy sectors. Despite the fact that EL Nino occurs in the tropical pacific, it has an effect on world wide climate and weather events such and drought, floods, and tropical storms. The usual state in the equatorial pacific has altered because of increased greenhouse gas emissions, which has resulted in change in the EL Nino southern Oscillation (ENSO). ENSO fluctuations will continue to exist and affect global climate conditions in the future decades and millennia, we can be certain. As a result, both scientist and the public rely on predicting of EL understanding ENSO conditions.

The occurrence of EL NINO and its effect on world climate and socio-economic status have been researched and discussed in this article.

KEYWORDS :- Climate, Drought, EL NINO, ENSO, Trade winds.

INTRODUCTION

EL Nino has been described in history by a variety of authors, but there in no universal explanation. EL Nino, the spanish phrase for "christ child,". what was given to it by a peruvian fisherman. Hunlburt characterised EL NINO as a massive flood of boiling waters into the coastline areas of peru and ~~Ec~~ Ecuator from an oceanography standpoint. philander defines EL Nino as a combination of extre-mely warm sea surface conditions, a bigger and more powerfull southern coastline circulation, sever-e precipitation, and flooding in Ecuadorian and northeastern peru.

The southern-weastern Rotation is described by an annual roller coaster in subtropical sea-surface pressures throughout both the northern and northern Atlantic, accompanied by a decrease and intensification of northeastern trade winds over the equatorial of pacific ocean. EL NINO and the south-weastern Hemisphe-re are two are the more well open sea processes, ENSO.

According to Bjerknes includes positive ocean-atmo-sphere feedback. with a recurrence duration of approximately 2-8 years, ENSO is regarded as the greatest

from of interannual variability of the global climate System.

walker and Bliss neported year-to-year fluctuations in ocean level elevation, ambient atmospheric temperature, and moisture that nevealed a trould international teleconnection structure that spanned the south pacific and a large section of the Higher Latitudes (1932, 1937). EL Nino circumstances can include a wide scale deterioration of the south of the equator commence wind generators further than the regular decreasing at the time, as well as the halt of air masses along the peruvian warm subsurface natural waters saline for approximately 1000 kilometres off the coastline, as well as the water's southerly spread much outside of its regular midsummer range.

Given what is presently known about WWBs and EL Nino, the huge WWBs in spring 2014, together with associated down welling kelvin waves, drew the scientific community's attention. The media noticed the enthusiasm, with numerous articles speculating on the possibility of a severe EL Nino event peaking in the winter of 2014-2015, Instead of continued in the summer of 2014 this EWB slowed the progression of the EL 2Nino event, resulting in borderline EL Nino conditions in the winter of 2014 – 2015.

other frequency necessary but inadequate precursor for ENSO in the build up of abnormal warmth quantity of seawater over the northern equatorial pacific ocean. The warmth quality of water is piles up and functions as a thermal model during an EL Nino event, fueling production and generally preceding atmospheric warmth.

Upwelling of cold water along the coast of western south America is absent during the EL Nino phase. Due to upwelling of cold water the depth of the thermocline in the eastern pacific is shallower than in the western pacific. EL Nino occurrence have happened in the years 1897, 1891, 1911, 1925, 1940-41, 1957, 1965, 1972-73 and 1976, 1982-83, 1986-87, 1991-92 and 1993-1994. The two strongest EL Nino episodes of the twentieth century were recorded in 1982-1983 and 1977-1998. The following atmosphere conditions seem to define the warm episode that have occurred at irregular intervals and lasted usually one to two years.

1. Above-normal sea level pressure in the Australia-Indonesia trough, as well as a weakening of the southeast pacific subtropical high. These circumstances match to walker's definition of the Southern oscillation's negative phase.

2. In the equatorial central pacific, a weakening, or reversal of easterly winds, resulting in a distruption of the climatological mean east-west circulation cell in the secton.

3. Significantly increased precipitation east of 160° E at equatorial sites.

4. In the pacific area, the Hadley circulation will be improved.

MECHANISM

DISCUSSSION

Certain variations are found from the atmospheric general circulation patterns e.g surface trades, westerlies and polar wind circulation and tricellular meridional circulation. Circulation of East-west Zonal circulation of tropical winds is an important variant from general atmosphere circulation. This typical east-west circulation of tropical wind is called walker Circulation named after famous scientist G.T. walker in 1922-23. In fact, walker circulation is a zonal convective cell of air circulation, which is formad due to west pressure gradient is reversed i.e pressure gradient becomes from west to east. walker called such oscillation as southern oscillation.

By, october-November the low air pressure of the tropical western pacific is shifted to the tropical eastern pacific causing weakening of trade winds. This reversal in pressure condition facilitates the returen of warm sea water which was driven. from the coasts of south America westward, towards the tropical east pacific. consequently, low air rises upward and becomes unstable and ultimately yields rainfall after condensation. It is evident that the general normal condition. This is event is called EL NINO phenomenon. The rising air in the troposphere and ultimately descends in the tropical west pacific cools above and turns west ward in the

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In fact, change in the positions of air pressure in the tropical eastern and western pacific are called Southern Oscillations. During EL Nino event walker circulation is weakened due to the development of equatorial westerlies on sea surface but Hadley circulation is activated. This phenomenon again activates trade winds which again drive sea-water of the tropical eastern pacific westward resulting in the upwelling of cold water from below, weakening of EL-NINO event and re-establishment of normal condition.

It may be mentioned that the phases and strengths of the Southern oscillation are determined on the basis of differents of air pressure between these two areas, to be more specific, between tahiti and Darwin (Australia, western pacific, 12°s Latitude and 130°E longitude). The phases of the SO are termed as Southern oscillation Index wherein two phases are most significant, namely high phase and low phase. High phase of SO Indicates normal condition or non-ENSO phase wherein tropical eastern and south-eastern pacific is characterized by strong high pressure system whereas tropical western pacific, strong easterly winds dominate over the surface, tropospheric subtropical westerly

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Jet streams are weakened and shift poleward in both the hemisphenenic, La Nina effects set in, monsoon becomes strong and brings copious precipitation in the south and South-eastern Asian regions, tropical South America and Africa; and Almost dry conditions in the tropical eastern, pacific western coastal areas of S. America. mainly peru and chile.

The low phase of so is indicative of reversal of non-ENSO phase as described above and onset of EL-Nino phase characterised by the development of high pressure system over tropical western pacific and low pressure system over tropical eastern pacific, dominance of EL Nino event off the peruvian and chilean coasts and accentuated rainfall but disappearance of La Nina phenomenon from the tropical western pacific and decreased precipitation in India and Indonesia resulting into drought condition.

GENERAL ATMOSPHERIC CIRCULATION

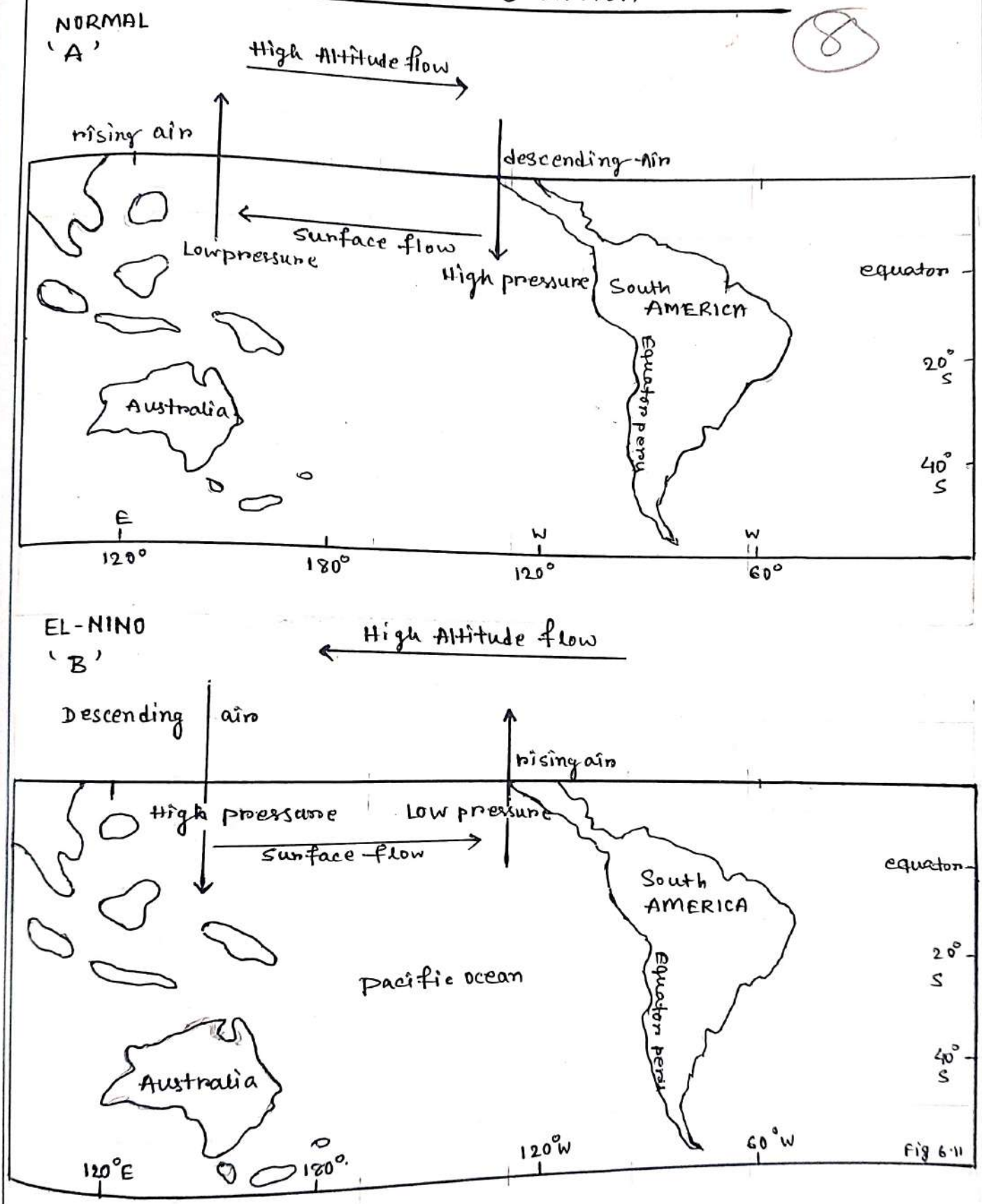

Fig :- Southern Oscillation, Walker Circulation and EL-NINO.

CAUSES

As per oceanography study, the reduction in trading wind around ENSO causes a Horizontally redistribute of energy in the above oceans, culminating in the formation of unseasonably warmer rivers and streams in the northern and southern equatorial Atlantic ocean. prevailing winds coming from east down the equatorial collect the warmer water bodies on the western edge of the equational pacific. ocean. conversely, convective transports nutritionally cold subterranean seawater to the upper, displacing warm ocean waves driven out from the west America. This cold water is crucial for fisheries to thrive. Because of the carried warm surface waters, Heavy rainfall and low-pressure are found over the western tropical pacific, whereas the air above the cool water is relativity and low pressure are found over the cool water is relativiely dry in western. most Atlantic Signals the onset of EL Nino. As a result, the Bjerkenes assumption for the initiation of EL Nino is as follows —

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coast, and the east – west extension thermal contour will continue to fall.

IMPACT

Because EL NINO is warm Equatorial phenomena, its effects on changes in weather and temperature, as well as the ecological, socioeconomic, and ecosystem spheres, are world wide, In the winter time during EL Nino, there is a prevalence with an above rainfall in 30° and 35°S Latitude, however during La Nina incidents, there will be a direction with below moisture - sea levels rise as a result of EL Nino event. Agricultural, forests, and tranport networks among some other items, are all affected by weather, temperature, warmth, and rainfall variations. As according Lisa Goddard, ENSO events have culminated in social calamities and tens of hundreds of billions in has global finincial damages. This episode has had a significant influence on the medical industry, because it has raised the danger of Malaria, dengue, and Rift valley feven, among other vector - borne diseases. Figure I shows the Global impact of EL Nino.

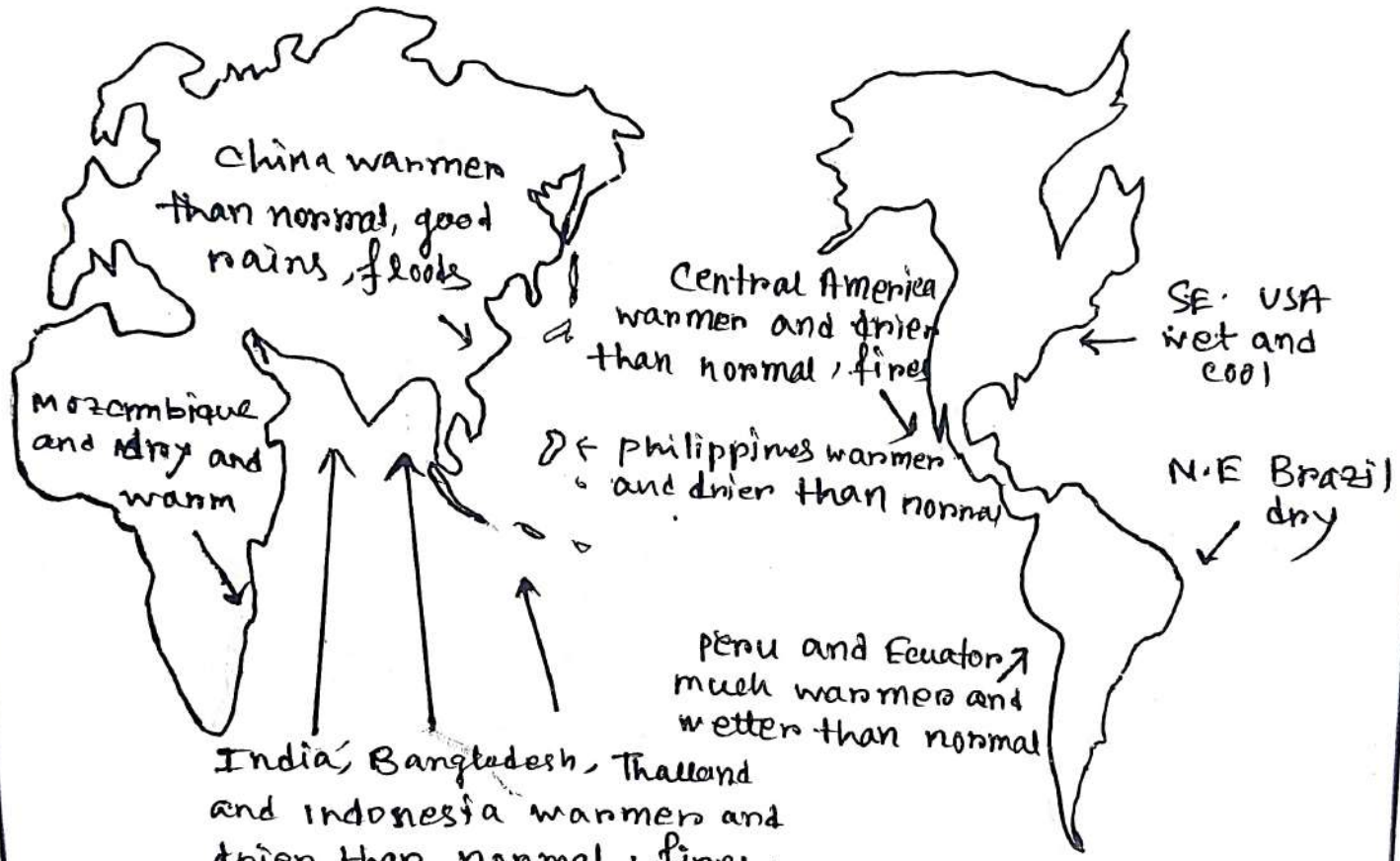

Figure- The above figure shows the Global impact of EL-NINO.

CONCLUSION

EL - Nino episodes are major climatic disruptions that occurs every 2 to 8 years and originate in the equatorial pacific ocean. EL - Nino events are characterized by the arrival of unusually warm seas in the central and eastern tropical pacific, which have catastrophic consequences for vast areas of the globe. EL Nino's climatic impacts are becoming more widespread across the world, which may have a range of repercussion on regional weather. It is connected to a wide variety of climate - related changes, and it has the potential to have major socio - economic implications in the infrastructural, agricultural, health, and energy sector. Because of increasing greenhouse gas emissions, the normal condition in the equatorial pacific has changed, resulting in variations in the EL Nino Southern oscillation, Consequently, both scientists and the public depend on ENSO forecasting and comprehension. It is linked to an increase in the danger of vector - borne illnesses. EL Nino influences the frequency of tropical cyclones in most basins.