Introduction

El Niño or the southern oscillation is often abbreviated as ENSO and is the warm phase of an oscillation over the tropical central and eastern Pacific which warms or cool the waters or weaken or increase the strength of the pressures plying there. El Nino is manifest in all the variables namely pressure, temperature, wind, moisture, cloudiness and many oceanographic variables namely surface temperature and currents, thermocline depth and undercurrents. Large scale zonal (east-west) overturning of the air occurs across the equatorial Pacific Ocean due to convection (heat and mass transfer through fluids) and by advection(larger scale fluids transports matter and heat). The Walker Circulation (i.e.; wind circulation) show global variations in circulation, clouds and percipatation and is used to measure the scale of EL Nino. Bjerknes in studies since 1966 to 1972 showed that the surface pressure alteration caused variation in rain and sea surface temperature(SST) in equatorial eastern Pacific and in particular over the Peruian coast.

Tests done: METHODS:

Isotope analysis was done using a Finnigan Delta-Plus –Advantage mass spectrometer couple and Finnigan Gas Bench II . δ^{18}O, δ^{13}C ($\pm 1\sigma$, $N = 637$). were measured. Paleo temperatures were reconstructed from Mg/Ca ratios. Temperature estimation was done from 2.1; 3.7; 4.8 to 5.5Ma time periods and between 3.7 to 4.8 Ma. Analysis was done as mentioned in Materials and methods In the Pliocene Mixed-Layer Oceanography for Site 1241, multiproxy studies were done. Sediments were studied. Paleotemperature equation was taken of planktons as specified by Anand et al. (2003). Proxy records were smoothed using the least-squared error method as shown by Cleveland, in 1979 and a smoothing factor of 10% oo was applied. At site 1241 Tiedemann et al., (2007) conducted LEG 202 studies.

Test reults:

Multiproxy studies of the Lago Frias (northern Patagonia) sediments show variations in glacial clay and slit. Sedimentological evidence from Lake Mascardi taken for the 1992-1998 interval point show ENSO signal here at 2.5 and 3.0 years intervals and provides new insight into complex forcing

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mechanism namely anthropogenic. **LEG 202 syntheses** was conducted. Millennial-scale climate and biogeochemical systems of the southern Pacific and Chile are closely aligned to those of Antarctica and southern oceans, extending to the equatorial Pacific. Early Miocene and Pliocene δ18O ratios as seen from foraminifers of the western Pacific show little difference from Pleistocene or present-day ratios indicating lower temperatures compared to the glacial maxima with saltier water. This is characteristic of El Nino events of today. Between ~5 and 4 Ma the SST of east Pacific was warmer. Lower temperatures came about during 2.0–1.5 Ma. Surface dwellers dominated Miocene period when "a consequent expansion of niche space for intermediate-water dwellers" occurred (Chaisson and Leckie). Then the thermocline deepened and invertebrates dominated, which shows in the deep thermocline today in the western Pacific Ocean maintained by Walker Circulation even today

Trenberth did cross-spectral **analyses** on Port Darwin, Easter Island and Tahiti. And the surface pressure over 32-years was studied and the Nyquist frequency was mapped as ¼ per month. Bjerknes studied west South America OST. Ichiye and Peterson analyzed precipitation and sea level pressure in the equatorial Pacific during 1957-58. Anomalously large precipitation and positive OST was seen in the central pacific islands associated with the changes in the strength of the trade winds. Between 1935 and 1965 scientists measured Puerto Cicada, and the OST showed precipitation anomalies as 50% oo of the normal from Nauru and the Ocean Islands east of S. America. Conclusion was that the teleconnections of the rainfall and sea temperature in tropical Pacific is limited to the arid regions of the equator. Recently anomalously warm surface water has appeared off the American Coast. OST near the equator and the currents in the tropical Pacific were measured and fluctuations of the major ocean currents over a 20 year interval was mapped with the influences of CO2 and some more reactive gases, such as dimethyl sulphide, iron which altered cloud formation and hence albedo, being shown.

Past and present of the tropical climate:

Aeolian deposits over east equatorial Pacific, a global cooling, a deepening of the thermocline and weakening of the easterly trade winds in the eastern waters was seen in the mid Pliocene showing a shift in the setting from El Nino to El Nina type by the late Pliocene. Although the Pliocene ocean closely resembled the El Nino stage it was not exactly alike and atmospheric circulation differed from

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that at present. Colder Greenland is shown in a more saline western Pacific and a summer cooler by 2 °C and a temperature difference of 1-1.5°C due to salinity increase. These deep-sea temperatures warmed by 0.5 to 0.68 C due to CO_2 excess. Surface warming around ~2.7 Ma was seen in Canada. The annual temperatures at that time was above freezing in around 5.9 Ma. Now it is -3°C. Similarly higher temperature is seen in mid-Pliocene time along the east coast of Northern America. One exception is the lower Pliocene temperatures in Florida and South Carolina than those that appear today which around 3.2 Ma. Warm Alaskan and Canadian climate coupled with a wet winter in the Gulf of Mexico are results, which show due to the perturbations in the atmospheric circulations in the tropics because of high SST and a low-level convergence over the Pacific. Jet streams here are perturbed and they amplify or weaken these high and low-pressure areas. The climates of the present day and the Pliocene climate could thus have a lot in common, although whether there existed an El Nino like state there is difficult to say. Idaho and central Arizona fossils and Paleopollens at around 4.5 and 2.5 Ma show a wetter climate in Pliocene than that today. But then again by the flooding of the Salt Lake City, which took place in 1983, we see an El Nino like climate, which causes higher than normal rainfall in spring, summer and autumn. Similarly South America (Northeast Argentine, Uruguay, and southwest Brazil) also receives more rain during El Nino events. S.G .H Philander and W.J. Hurling (1987) showed in realistically stimulated models that the heat of 1982-83 El Nino was due to enormous change in wind patterns due to heat transport. In this type of El Nino weather warm surface waters flows polewards and the thermocline declines and unusually high sea surface temperatures prevail in the eastern tropical Pacific and a meridional redistribution also takes place.

But Zarte and Fasana found thermocline dwellers during their studies and so think the earth may be in a permanent state of EL Nino. India receives less rain in El Nino years than in normal times, though this fails sometimes. May be because warmer temperatures and lesser snow cover over Eurasia causes a Walker circulation shift to the southeast. Early and middle Pliocene scene shows wooded grasslands in south Himalayas. This area is now having mountainous flora and fauna. Cooling and drying started since the mid-Pliocene time. Japan shows cooler taxa no longer existing there, but which

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thrive in warmer China. The drying of the northeastern South America shows El Nino climatic and extra tropical teleconnections associated with El Nino Gabriel et al. (2006).

Such ENSO conditions in the pre-ice-age would mean that areas like Canada and the Great Lakes would have thinner ice and the Mexico Gulf and South America would be noticeably cooler and wetter. . India, northeast South America (near mouth of the Amazon), northeast Australia would be having far more heat and East Africa would have much more moist weather. Finally the difference of the western and the eastern Pacific would be suppressed, if not absent. This was the state some 5 to 3 Ma. Lesser Co_2 caused ice sheets to grow. The Indonesian Seaway closed, New Guinea approached the equator. When fresh warm water used to passed into the Indian Ocean, it caused East African rainfall but with colder waters from the North Pacific coming it after the closure, it caused aridification of East Africa. Cane and Molnar (2001) showed after 5.0–3.0 Ma the West Pacific Warm Pool (WPWP) was strengthened and enhanced. The SST of the West. Pacific is 3°C to 8 °C more than the eastern and during El Nino a tropical Pacific weakens and warm water moves east with the SST of central, eastern and western almost matching. A climate matching El Nino in pre-ice age would mean a SST slightly cooler than today and the thermocline less deeper than today in the west and the east would have a deeper thermocline with higher temperatures. Planktons from Pliocene would have differed little from the present day ratio. Drying over northeastern South America, North East Australia is seen today as in an El Nino state. But in Pliocene time it was humid. Aridity began late Miocene time. This indicates a state, which is opposite to the El Nino. And there is heavy rain in East Africa, which is an anomaly. Since ~ 4 Ma Aeolian deposits have decreased and this point to a wetter South America, almost like the El Nino state of pre ice age than of the present.

Aberration of 1997-98 El Nino shows over India and Australia when there was regular rainfall in these areas. Over East Africa aberrations sometimes when the regions is sometimes drenched and sometimes not during El Nino. Pliocene saw Africa as humid. Today's climate is due to changes in the Indian Ocean. The climate, the surface water in the Pliocene appears to have been cooler than at present the thermocline shallower in the east. (http://rainbow.ldeo.columbia.edu/papers/MolnarCaneBlue.pdf),

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Peruvian Andes ice cores examined show LGM conditions to be considerable cooler than today's Andean climate. Coral reefs near Barbados suggest that the LGM could have been cooler by 5 °C than today. Guilderson et al., (2001) But the corals data from Barbados are not fail-safe also. The oxygen thermometer is questionable too. As questioned by Broecker (1995) " do the seemingly invincible oxygen isotope[s]" really signal a warm ocean surface? Other paleofossil of plankton shells show a warm glacial tropical ocean and that the Pacific was warmer than now. Broecker (1986). It is crucial that one finds out whether and how far the tropics were "thermostated" (Pierrehumbert 1995). With evidence we can state that the surface of the glacial tropical Pacific was not much cooler than today. (Anderson)

Conclusion: The Pliocene time prior to NHG(northern hemisphere glassification) is used as a possible near future analog because temperatures then were more warmer than today. Here one may expect higher tropical SST (sea surface temperature). Variations in the heat budget critically determines if El Nino occurs or not. If the thermocline exceeds a certain value El Nino is caused by meridional redistribution of heat. Since the SST today indicates an interglacial temperature, at their maximum we conclude that the tropical temperatures of the Pliocene were not too different from modern interglacial SST. Therefore in an early Pliocene climate, the El Nino like times is not seen in the SST of east Pacific. Also we are dissuaded from the theory that there was a permanent EL-Nino like climate because there is a significant shallowing of the thermocline between 5.3 and 4.0 Ma. The closure of the IG (Indonesian Gateway) around 4.0 to 3.0 Ma and the decrease in east pacific SST could be one cause of increasing the SST gradient to its present state. Although Pliocene $SST_{Mg/Ca}$ for plankton such as *G. sacculifer* for Site 1241 studied show a shallow thermocline development, no evidence clinches the point that a permanent El Niño-like Pliocene climate might have existed during the early Pliocene or Pleistocene(quaternary).

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