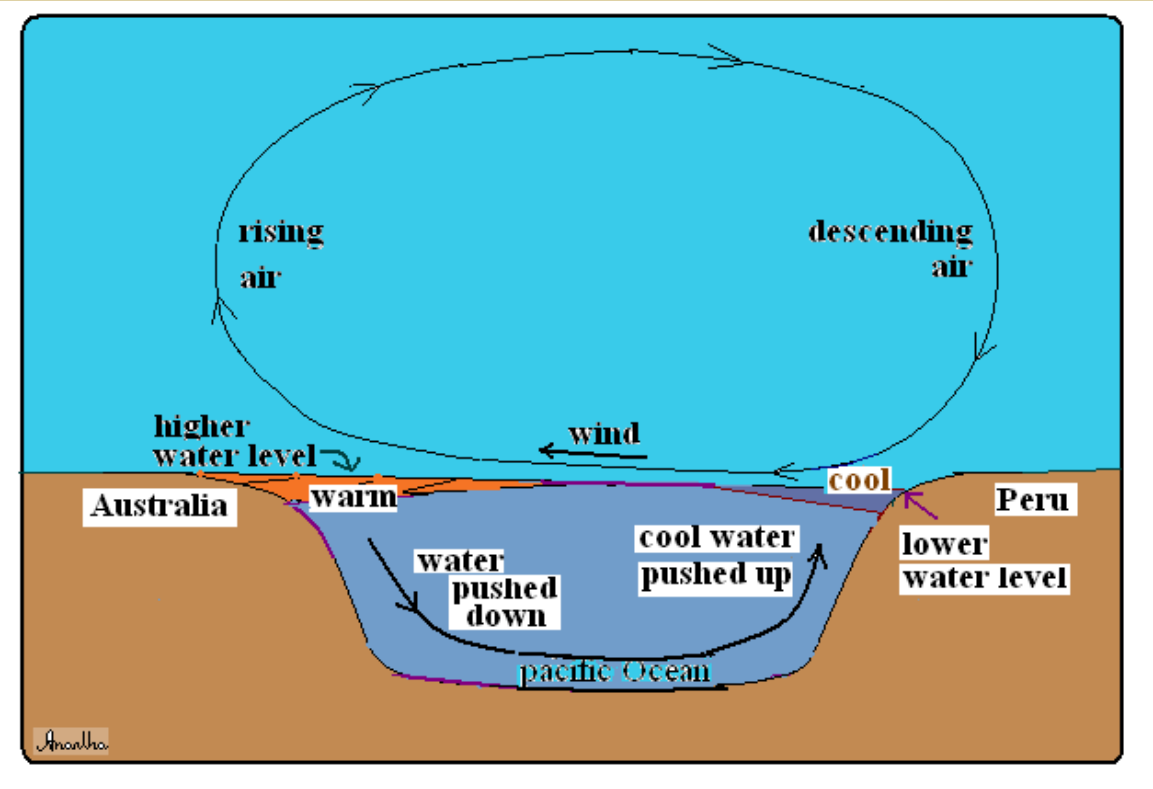
appeaed on 18th Jan 2007

Asia's own El-Niño

Something like the El Nino effect is at work in the Indian Ocean and could lead to climatic extremes, says S.Ananthanarayanan.

El Nino is a weather phenomenon that affects the Pacific Ocean and the continents of South America and Australia. But it is so dramatic and seemingly inexplicable that many curious things, even share market fluctuations, are sought to be 'explained' with the expression, "the El Nino effect, maybe?"

El Niño and La Niña



El Niño became topical after the unprecedented rainfall in the Pacific coast of South America and century's worst drought in Australia, in 1982, which were linked to the Peruvian experience of 'El Niño'.

The usual weather in Peru, on the Pacific coast of South America, is dry weather, cool coastal waters and plenty of fishing. And in Australia, the Philippines, the far western Pacific limit, there is warm water and ample rainfall.

These conditions cause rising of the air over Australia and blowing of trade winds from the Peru end. The result is that the ocean waters 'shore up' to the west and the sea level itself is half a metre higher around Australia.

The piling up of warmer water in the west causes the cool water in the deeper part of the sea to be pushed lower down. And in the East, near Peru, the cooler, deep seawater ‘wells up’, bringing with it rich nutrients, which make for the flourishing sea fish economy of the Peruvian coast. This is the usual climate, except for a few months in the beginning of the year, when there are some warm currents from the north.

But once every few years, usually in late December, the usual invasion by warm ocean currents in the Peru region is much stronger. This wrecks the fishing, and brings torrential rain. The usually arid Peru becomes green – ‘the desert becomes a garden’, with water snakes, bananas, and coconuts!

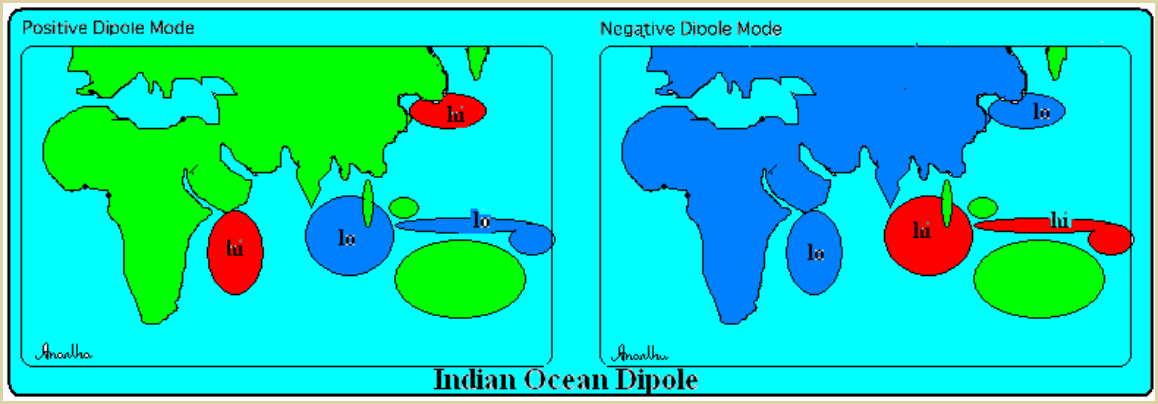
Because this happens in late December, Peruvians connect it to the coming of baby Jesus and have named the mystery ‘El Niño’, the Christ Child.

And then again, the climate slips back to the usual, cool, eastern seas, the coolest being the time of ‘La Niña’, the reverse of the ‘El Niño’ condition. The two effects alternate, usually every two years, but the period can be as long as ten years.

This ‘see-saw’, of a mass of air across the Pacific and in time with climatic changes have been observed for many years, as also the effect of El Niño on even the Asian monsoon!

Indian Ocean

A similar effect in the Indian Ocean is the Indian Ocean Dipole (IOD) – an oscillatory sea and atmosphere coupling that brings on climate extremes. Just like the El Niño effect, IOD has a positive and a negative phase. In the positive phase, the surface sea temperature falls in the south-eastern part of the Indian Ocean – north of Australia, Indonesia. And the temperature rises in the west equatorial region – off the coast of Africa from Madagascar to Somalia. And with the rise in sea temperature, there is greater convective activity in the atmosphere. During the negative phase, the sea surface temperature rises in the south-east and so does the convective activity.



Recent Changes

The relationship between El Niño and the Asian monsoon has been observed since long, but in recent times significant changes have been seen. A question has been raised that maybe the nature of the IOD, which is linked to the Asian monsoon, is also changing. The trouble is that the IOD was identified only in 1999 and records of past periods, to help us understand IOD events and climate changes, do not exist. But, fortunately, past events have left traces in the sea and records can be constructed from the temperature dependant chemical composition of coral deposits in the area.

Nerilie Abram and colleagues of the British Antarctic Survey reconstructed the data of sea surface cooling-warming and associated drought-plenty during the last 6,500 years. This includes periods with the Asian monsoon behaved very much differently from how it acts at present. They find that there was a period marked by longer spells of surface temperature drop, together with droughts that peaked later than could be explained by the effect of El Niño.

Climate models where this should happen suggest that there were strong winds across the equator, corresponding to the strong Asian monsoon of the period. Such winds may have led to ‘shoring up’ of waters, leading to surface temperature changes. The IOD-monsoon link suggests that the changes in the Asian monsoon which have been projected may have effects, which include serious socio-economic ones, all over the South East Asian and Australian regions.