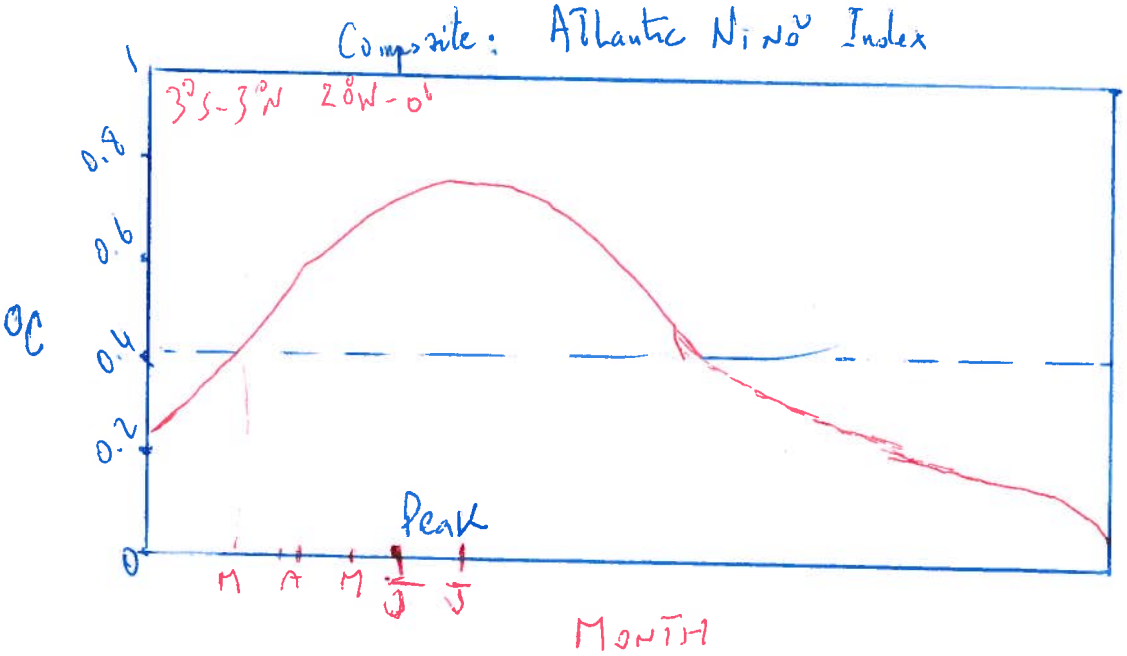
Question: What is Atlantic Nino? Describe its evolution

Answer: Based on Wang (2001), Zebiak (1993), Latif (2000), Carton (1993), Giannini (Science-2003)

An interannual phenomenon similar to but weaker than the Pacific El Nino also occurs in the Atlantic. Atlantic Nino is the Atlantic version of El Nino. It has a strong impact on West African rainfall. It has been shown that the mechanism is the same (Bjerknes feedback) One distinction from El Nino that the Atlantic Nino peaks in boreal summer instead of boreal winter. And the period is shorter.
The largest near-equatorial SST anomalies occur in the equatorial eastern Atlantic. Despite smaller amplitude, the ATL-SST (3S-3N, 20W-0) anomalies also show an interannual oscillation. During the 50-yr period since 1950 there are 11 significant warm events in which the ATL SST anomalies exceed 0.7C and last more than 1 month. The maximum ATL3 SST anomalies for these warm events are centered in July 1963, July 1968, January 1973, November 1981, August 1984, August 1987, July 1988, June 1995, July 1996, January 1998, and July 1999. Among these 11 warm events, the peak phase of the ATL3-SST anomalies occurs in the boreal summer for 8 events and in the boreal winter for events. Thus, the Atlantic equatorial mode also seems to be phase-locked to the seasonal cycle. During these 11 events, it is noted that there is a weakening of the Atlantic Walker circulation and a strengthening of the Atlantic Hadley circulation (Wang).
Zebiak (1993) showed that the interactions between the tropical Atlantic Ocean and atmosphere can produce an interannual oscillation similar to the Pacific El Nino mode, despite a non-self sustaining feature.
Latif (2000) emphasized the remote influence of the Pacific El Nino on the Atlantic equatorial mode. It is possible that both the local coupling and the remote forcing contribute to the Atlantic equatorial mode(Wang).
Carton (1993) find that the cause of the warm event in 1984 stretches back to the intense trade winds during the summer and fall of 1983. The unusual winds led to Ekman deepening of the thermocline in the west on both sides of the equator. Late in 1983 the trade winds in the west relaxed, which led to a surge of warm water eastward along the equatorial waveguide. The arrival of anomalous warm water deepened the thermocline throughout the eastern Gulf of Guinea in early 1984 and gradually spread southward and back into the interior basin throughout that year. Secondary factors in elevating equatorial SST were the local advection of warm surface water from the north and a reduction of advection of cool coastal water from the east. In contrast with 1984, the anomalous warming of 1988 seems to have been largely the result of changes in the equatorial winds during spring of the same year. These wind anomalies are likely, themselves, to have resulted from the increase in SST to the east. During both years anomalous deepening of the thermocline in the east prevented the normal seasonal cooling of the equatorial waters and thus led to elevated SSTs. The eastward shift of heat also had important consequences for the coastal regions of southern Africa.


Composite: Atlantic Niño Index
3°S-3°N 20W-0°
1
0.8
0.6
0.4
0.2
0
°C
Peak
M
A
M
J
J
MONTH