OBSERVATIONS OF THERMAL VARIATIONS IN THE MIXED LAYER DEPTH OF THE EASTERN EQUATORIAL ATLANTIC

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Abstract

Variability of the thermal structure of the upper layer drives the oceans' mixing processes which regenerates nutrients into the euphotic zone to support phytoplankton production. In the Gulf of Guinea, upwelling processes between August and September has been tied to the shoaling of the thermocline, but the source of upward entrained water has not been associated with a particular depth. Monthly surface to 500m depth temperatures acquired from moored buoys (PIRATA) in the eastern equatorial Atlantic were analyzed to verify the contribution of subsurface temperature and oscillation characteristics of the thermocline to surface thermal variability during warm and cold periods. Upsurge of colder water from the 120m depth was seen to break the quasi-stratified column of water above during upwelling (cold) periods. 40-60m column of water in the eastern equatorial Atlantic were predominantly dynamic especially during warm periods. High stability of the upper 20m column of water observed for most periods along the equatorial Atlantic was connected to the constant inflow of warm North Equatorial Counter Current (NECC) at the surface except during upwelling when the stratified water column breaks. Processes leading to the upward movement of cold water had strong connection with the dynamics of 40-80m depth west of Prime Meridian (Lat 0°, Lon 0°) which shows high thermal variability. The increasing westward mixed layer depth corresponded with a decreasing temperature-depth gradient. A hypothetical 20°C isotherm estimated from the temperature profile indicated a relatively shallower thermocline at the east increasing in depth towards the west, stressing the importance of temperature variations at 50-80m depths in the eastern equatorial Atlantic.