Changes in the properties of the 18° Water of the western North Atlantic are studied using hydrographic data from a long time series at the Panulirus station (32°10'N, 64°30'W). The 18° Water is identified by its low potential vorticity \((\nabla \rho)(\rho/\partial z)\) which is due to the vertical homogeneity imparted by convective formation. Using the synoptic Gulf Stream '60 data, it is seen that the 18° Water is formed in an east-west band of varying characteristics offshore of the Gulf Stream. The 18° Water which is seen at the Panulirus station is formed on the eastern side of the subtropical gyre. Renewal of 18° Water occurred regularly from 1954 to 1971, ceased from 1972 to 1975, and began again after 1975. The properties (18°C, 36.5 o/oo) of 18° Water seen at the Panulirus station were nearly uniform from 1954 to 1964. There was a shift in properties in 1964 and by 1982 the 18° Water properties were 17.1°C, 36.4 o/oo. The new 18°Water formed after 1975 had nearly the same characteristics as that of 1954.

The density, potential temperature, salinity and the temperature-salinity relation of the entire upper water column at the Panulirus station changed at the same time as the 18° Water properties. The upper water column was denser and colder from 1964 to 1975 than from 1954 to 1964 and after 1975.