We use the 8-year long satellite temperature and water vapor data (2002-2010) from retrieved from Atmospheric Infrared Sounder (AIRS) and Atmospheric Microwave Sounding Unit (AMSU) on the Aqua satellite to identify trends in the troposphere and low stratosphere over the Nino 3.4 region of the Tropical Ocean in the last 11-year solar cycle. Employing the sea surface temperature (SST) data in this region for five solar cycles (1950-2009) and modeled SST since 1871 we show that the satellite trends reflect a typical decrease of the sea surface temperature in this region in the declining phase of the solar cycle. The magnitude of the SST decrease depends on the solar cycle and ranges between 0.5K and 1.9K for the last five solar cycles. We compare our results with the previous data analyses (van Loon and Meehl, JASTP, 70, 2009; Roy and Haigh, Atmos. Chem. Phys., 10, 2010) and modeling (Meehl et al., Science, 235, 2009).