Vegetation water content (VWC) plays an important role in water and energy balance. Satellite based passive microwave instruments have shown much potential to monitor the total above ground VWC at global scales. A recently developed approach to retrieving surface parameters from microwave emissions can be used for all bands in the microwave domain, allowing data collected by different satellites (e.g., Special Sensor Microwave/Imager (SSM/I from middle 1987), Tropical Rainfall Measuring Mission (TRMM from 1998) and Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E from middle 2002)) to yield a long time series. However, differences in measurement specifications prevented merging the data directly. Here we developed a merged product by adjusting SSM/I and TRMM products against the reference sensor (AMSR-E) using the cumulative distribution frequency matching approach. Results of Mann-Kendall trend analysis on the merged VWC product during 1988-2008 show that some regions experienced significant (at the 0.05 level) increases in VWC (e.g., Sahel, India), whereas regions such as Mongolia and parts of the tropical rainforests experienced significant declines. Gridded rainfall and temperature products were used to assess climate induced changes during the study period. By performing multiple linear regression analysis over varying periods of precipitation, temperature and annual maximum monthly VWC, we identify the proportion of VWC change that is explained by precipitation and temperature, and distinguish the contribution of natural climate and human activities on the long term change. This study should increase our understanding of the natural and anthropogenic impacts on terrestrial hydrology and vegetation dynamics.