The goal of this research study was to evaluate the accuracy of NCEP’s Climate Forecast System Reanalysis (CFSR) model output to in situ Ameriflux measurements at four Ameriflux sites and the closest CFSR grid point for all of the terms in the surface and radiation budgets along with air temperature and precipitation. A statistical analysis considering the CFSR and Ameriflux datasets was performed to determine if the major source of disparities between the datasets was due to biases that arise in the CFSR model, differences in the standard deviation in the measured and outputted datasets, or due to a lack of correlation between the CFSR model output and the Ameriflux observations. Another major focus of this project was to find and analyze the biases in the CFSR Model. These biases, which arose in the surface energy budget terms, are understood to arise because in the CFSR model because the surface energy budget, defined as the difference between atmospheric net radiation and the sum of the sensible and latent heat flux minus the ground heat flux, was set to be equal the theoretical value of 0 Wm-2. However, under the assumption that the Ameriflux observations are accurate, within the error of the flux tower sensors, the calculated surface energy budget at the four Ameriflux sites would almost never be perfectly balanced; resulting in residual energy. The use of the theoretical assumption that the surface energy budget always balances, forces the heat fluxes to perfectly balance the CFSR model estimates of the atmospheric net radiation and results in noticeably higher or lower heat fluxes form the observed heat fluxes. Biases found in the radiation budget, air temperature, and precipitation are to be pointed out, but the reasoning behind these biases are yet to be determined.