Seasonal and interannual variability of the Subtropical Countercurrent (STCC) in the western North Pacific are investigated using observations by satellites and Argo profiling floats and an atmospheric reanalysis. The STCC displays a clear seasonal cycle. It is strong in late winter to spring with a peak in June, and weak in fall. Interannual variations of the spring STCC are associated with an enhanced subtropical front (STF) below the surface mixed layer. In climatology, the SST front induces local cyclonic wind curls in May north of the STCC on the background of anticyclonic curls that drive the subtropical gyre. The cyclonic wind curl and the SST front show large interannual variability and are positively correlated with each other, suggesting a positive feedback due to local interaction between surface wind and the SST front. The cyclonic wind curl is negatively correlated with the SSH and SST below. The strong (weak) cyclonic wind curl elevates (depresses) the thermocline and causes the fall (rise) in the SSH and SST, accelerating (decelerating) STCC to the south. It is suggested that the anomalies in the SST front and STCC in late preceding winter that result from the meridional Ekman convergence affect the generation of the cyclonic wind curl in May. Results from our analysis of interannual variability support the idea that the local wind forcing in May causes the subsequent variations in STCC.