Changes in global monsoon area, precipitation and intensity associated sea surface temperature (SST) patterns in response to greenhouse gas increasing are investigated based on a set of simulations by ECHAM5 high-resolution (T106) atmospheric general circulation model (AGCM). Forced by present-day SST, ECHAM5 shows capability of reproducing the observed global monsoon area. In simulations with uniform and spatially varying SST warming scenarios, projected global monsoon area, precipitation and intensity all increase, indicating that global monsoon activities tend to be vigorous under global warming. The increasing rates of global monsoon precipitation in the uniform SST warming simulation are roughly twice larger than those in the simulation with anomalous SST gradients. These differences are attributed to the impacts of SST patterns on moisture budget processes. The thermodynamic component via increasing moisture plays the major role in strengthening global monsoon precipitation, while the effects of circulation changes are negligible under uniform SST warming. In the spatially varying SST warming simulation, on the contrary, the dynamic component associated with weakening circulations induced by SST gradients contributes negatively to the global monsoon precipitation and it cancels parts of positive contributions from moistening atmosphere. As a result, the changes in global monsoon precipitation are weaker when the spatial patterns of SST warming are taken into consideration in the simulation.