The new interactive ensemble modeling strategy is used to diagnose how noise due to internal atmospheric dynamics impacts the forced climate response during the 20th Century (i.e., 1870-1999). The interactive ensemble uses multiple realizations of the atmospheric component model coupled to a single realization of the land, ocean and ice component models in order to reduce the noise due to internal atmospheric dynamics in the flux exchange at the interface of the component models. A control ensemble of so-called Climate of the 20th Century simulations of the Community Climate Simulation Model version 3 (CCSM3) are compared with a similar simulation with the interactive ensemble version of CCSM3. Despite substantial differences in the overall mean climate, the global mean trends in surface temperature, 500 mb geopotential and precipitation are largely indistinguishable between the control ensemble and the interactive ensemble. Large differences in the forced response; however, are detected particularly in the surface temperature of the North Atlantic. Associated with the forced North Atlantic surface temperature differences are local differences in the forced precipitation and a substantial remote rainfall response in the deep tropical Pacific. We also introduce a simple variance analysis to separately compare the variance due to noise and the forced response. We find that the noise variance is decreased when external forcing is included. In terms of the forced variance, we find that the interactive ensemble increases this variance relative to the control.