Climate models have long predicted that the largest and earliest changes due to global warming will be seen in the high latitudes. In order to evaluate the skill of climate model simulations for the 21st century, a detailed knowledge of the biases of the simulated 20th century climate is important. Here we present results from six late 20th century simulation of the Arctic sea-ice and ocean state from the new Community Climate System Model version 4 (CCSM4), and compare them with available observations for this period. This allows us to establish how well the model captures the mean state and the changes of the sea-ice and ocean in the Arctic in this period and to identify biases. For example, we find that the late 20th century spatial sea-ice concentration and thickness in the Arctic Ocean is well simulated by the CCSM4. The observed decreasing trend in the September Arctic sea-ice extent over 1981-2005 is within the spread of the ensemble members, with one ensemble member even showing a larger trend than observed. Two ensemble members, however, do not have a significant trend over 1981-2005, due to differences in the natural variability that lead to stronger or weaker decreases of thick multiyear ice in the individual ensemble simulations. It is therefore important to compare the observed sea-ice extent trend with individual ensemble members, not with the ensemble mean or a multi-model ensemble mean, due to the different possible trajectories caused by natural variability.