The polar climate of the Energy Exascale Earth System (E3SM) version 1 is relatively well documented in several papers, including as part of the CMIP6 multi-model ensemble. Much of the model’s polar bias and skill is best summarized in terms of oceanic water masses and hemispheric sea ice volume distributions. In E3SM V1, Arctic sea ice and marine snow is poorly distributed in the central Arctic, as determined from satellite emulation. There is a massive Labrador Sea winter bias and poor Antarctic ice extent at standard ~30km resolution that greatly improves at eddy permitting resolutions, while too much sea ice melts in summer in both the Southern Ocean and central Arctic. Now with a large number of model enhancements, corrections and recalibrations to all components of E3SM, we assess the polar climate of E3SM Version 2, at both standard resolution and using a regionally enhanced ice-ocean mesh, and compare it the initial release of the model. As part of this work, we look at the impact of regional resolution enhancement on sea ice freeze-up, drift, deformation and melt, the distribution of storms in the Southern Ocean and Northern Hemisphere, mixed layer depths and water mass modification, and changes in the land snow distribution in this first look at E3SM Version 2.