This paper analyzes and offers improvements to the understanding of the effects of astronomical variations on Earth’s climate. In reviewing the Milankovitch Effect, we discover that not only does the eccentricity of Earth’s elliptical orbit around the Sun have a larger effect on temperature variation of the Earth than the Earth’s precession or obliquity (tilt), but it should be the only parameter among these three used to model the timing of the ice ages. We determined that the solar insolation covering the entire Earth should be used to model climate change, without considering insolation at different latitudes as Milankovitch first suggested. This paper utilized a MATLAB package provided in another research paper by T. S. Kostadinov and R. Gilb. Some minor improvements were made to the software regarding the distance of the Earth from the Sun. Our model matches past ice age data and predicts future ice ages assuming no increase in artificial (human induced) greenhouse gases occurs. (Received January 28, 2019)