
Climate Models: Forecasts of the Future?

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ABSTRACT

Climate models, or General Circulation Models (GCMs), are mathematical representations of the climate system. Numerical algorithms express the physics that describe the Earth's climate (as we understand it) in computational form. This includes interactions between the atmosphere, the hydrosphere, the lithosphere, the biosphere, the cryosphere, the oceans, and even the Sun. This, however, is a daunting task since our knowledge of these interactions is limited, especially those that occur on very long time-scales that cannot be observed. Moreover, many of these interactions occur at spatial and temporal scales that are too small to be modeled by the resolution of current GCMs. Approximating these sub-grid-scale processes with mathematical substitutes and trying to estimate and model the myriad of coefficients and pathways of the Earth's climate make modeling it extremely difficult.

This presentation will focus on providing an overview of climate models—what they are, how they simulate climate processes, what they contain and what they don't—and a brief discussion of where these models fail. Insights as to why climate models tend to exhibit more warming than is observed also are provided.