

How Predictions and Models Inform the Future

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The Arctic is undergoing rapid and pervasive change that is part of a larger global climate system change. The global climate system is complex, but is governed by physical laws that can be represented mathematically. Numerical climate models solve these equations subject to some approximations and in doing so, provide us with a virtual laboratory to explore the functioning of the Earth's climate system. These models skillfully predict the climate system response to many different types of forcing, including factors driving climate changes in the distant past and how the climate responds to volcanic emissions that have occurred over the historical record. These models can also be used to inform the future and indicate that with continued increases in greenhouse gas emissions, the Arctic will become warmer and wetter and transition away from an ice-dominated system. Notably, these predicted Arctic changes will have global repercussions, enhancing the overall global warming and resulting in sea level rise, among other impacts. By considering different scenarios of human activities, these models can also inform how the choices that we make today and in the years to come will affect the changes that we experience in the future.