Influence of Sea Ice on Arctic Marine Sulfur Biogeochemistry In the Community Earth System Model

Clara Deal and Meibing Jin
University of Alaska Fairbanks

Global climate models (GCMs) have not effectively considered how responses of arctic marine ecosystems to a warming climate will influence the global climate system. A key response of arctic marine ecosystems that may substantially influence energy exchange is a change in dimethylsulfide (DMS) emissions, because DMS emissions influence cloud albedo. This response is closely tied to sea ice through its impacts on marine ecosystem carbon and sulfur cycling, and the ice-albedo feedback implicated in accelerated arctic warming. To reduce the uncertainty in predictions from coupled climate simulations, important model components of the climate system, such as feedbacks between arctic marine biogeochemistry and climate, need to be reasonably and realistically modeled. This research involves model development to improve the representation of marine sulfur biogeochemistry simulations and thereby understanding of the controls of sea-ice-related processes on the variability of DMS dynamics. This study will help build GCM predictions that quantify the relative current and possible future influences of arctic marine ecosystems on the global climate system.