

2023 PAMIP Webinar Series

Correcting for artificial heat in coupled sea ice perturbation experiments

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Abstract

Recent work with a simple 1-dimensional energy balance model (EBM) shows that coupled sea ice perturbation experiments add artificial heat to the climate system. In this talk, I will present results which confirm this effect in a broader range of models and suggest a technique to correct for the artificial heat post-hoc. The technique successfully corrects for artificial heat in the EBM, and a possible generalization of this approach is developed to correct for artificial heat in an albedo modification experiment in a comprehensive earth system model. Generalizing this technique to sea ice perturbation methodologies that employ a "ghost flux" seen only by the sea ice model would require a more detailed analysis of the surface energy budget. Applying the correction to the comprehensive albedo modification experiment, we find stronger artificial warming than in the EBM. Failing to account for the artificial heat also leads to overestimation of the climate response to sea ice loss, and can suggest false or artificially strong "tugs-of-war" between low latitude warming and sea ice loss over some fields, for example Arctic surface temperature and zonal wind.



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