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Can we expect sudden loss of Arctic sea ice due to a non-linear sea ice-albedo feedback?

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The rapid loss of Arctic sea ice in recent decades has fueled speculation that we are facing a tipping point. In simple energy balance models, such a tipping point is a robust feature, but experiments with Atmosphere-Ocean Global Circulation Models (AOGCMs) show no evidence of bi-stability. In this work, we point out that the question of bi-stability with respect to radiative forcing is of little practical relevance, since the slow climate response of the deep ocean prevents reversibility on decadal, and even centennial time scales. A more interesting question is whether the sea ice albedo feedback acts non-linearly to reduce the climate system's stability, and if this can cause accelerated sea ice loss in response to relatively small perturbations in forcing. This question is not answered by the AOGCM experiments that are designed to detect bi-stability, but we present a simple approach based on direct evaluation of the global energy balance along warming trajectories. We also compare AOGCM experiments with idealized energy balance models that exhibit accelerated sea ice loss, but no tipping points.