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Large eddy simulations of Arctic mixed-phase clouds COLLEEN M. KAUL, JOAO TEIXEIRA, GRAEME L. STEPHENS, Jet Propulsion Laboratory, California Institute of Technology — Mixed-phase stratocumuli have been observed to persist in the Arctic for hours or even days, despite the inherent instability of liquid droplet–ice particle mixtures. Since mixed-phase and ice-only clouds have very different radiative effects, identifying the factors that allow the maintenance of mixed-phase clouds is an important component of understanding Arctic climate. Various feedbacks between turbulence, radiation, and microphysical processes are hypothesized to exist, but further information about these conjectured feedback mechanisms is needed. Prior large eddy simulation studies of Arctic mixed-phase clouds have largely focused on the details of their microphysical modeling, although microphysical processes alone cannot explain the longevity of mixed-phase Arctic stratocumuli. Therefore, this study investigates the representation of turbulence in large eddy simulations of such clouds, considering the effects of turbulence closure, grid resolution, and domain size on the predicted cloud characteristics in three different case studies.

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