Seasonal Variations of Single-Layer Low Cloud Properties and Shortwave Radiation Forcing over East Asia: Postprint

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Date: 2020-01-02T00:00:00+00:00

Abstract

Using data from the Clouds and the Earth' s Radiant Energy System (CERES), we investigate the seasonal spatiotemporal distribution characteristics of physical properties of single-layer low clouds and surface shortwave radiation forcing in different regions of East Asia from 2003 to 2016. The results show: 1. In terms of spatial distribution, radiation forcing exhibits good similarity with single-layer low cloud amount in spring and autumn, and shows good consistency with ice/liquid water path in spring, summer, and autumn. 2. In terms of temporal variation, the weakening effect of single-layer low clouds on shortwave radiation is strongest in summer in the northern region; the strongest weakening effect occurs in spring in the southern region and northwestern region; and occurs in winter in the eastern sea area. Spatially, the strongest low cloud weakening effect in spring, autumn, and winter occurs in the southern region. In summer, the weakening effect of East Asian low clouds on shortwave radiation is weak across all regions, with the absolute value of negative radiation forcing being less than 200 $W \cdot m^{-2}$ in most areas.

Full Text

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