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The regionally varying effects of forests on cloud cover based on satellite observations

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Forests cover changes impact regional and global climate by altering surface roughness, albedo, and evapotranspiration. While previous research mainly focused on the impact on temperature, there has been evidence of cloud enhancement over forests at the regional level. However, how forests affect cloud cover at a global scale is unclear. In this paper, we utilized long-term cloud data from MODIS in junction with other satellite data sources to investigate the effects of forests on cloud cover in boreal summer months across the globe. Results show that forests either increase or decrease cloud cover depending on the region and such effect exhibits considerable spatial heterogeneity. We found that forests in the southern edge of tropical Amazon decreased cloud cover as much as 6%. In contrast, forests can significantly increase cloud coverage in southern part of China in temperate region. Furthermore, the cloud increase was also observed in boreal forests but with a smaller magnitude than temperate forests. Our study provides new evidence for understanding the impact of forest cover change on cloud and water cycle.