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Forest role in Climate and Water cycle

Forests, which cover a third of Earth's land surface, are pivotal in carbon storage and the water cycle, though the full scope of their impact remains to be fully understood. Researchers from Stockholm University and international colleagues provide new insights into the complex role forests play in the climate system and water cycle, highlighting the intricate relationship between forests, particularly their emission of organic gases, and the formation of reflective clouds that could influence global temperatures.

The unique aspect of this study is its focus on both boreal and tropical forests, which constitute 27% and 45% of the Earth's forested area, respectively. These ecosystems differ in their emissions and cloud formation processes, leading to varying impacts on the forest-cloud-climate feedback loop. The research also points out that as man-made particle emissions decrease due to air quality policies, the natural particles from forests become increasingly significant. These feedbacks are more potent in cleaner air environments and could play an important role in moderating global warming.

Forests release substantial amounts of organic gases, particularly noticeable as the distinctive scent of a pine forest on a warm day. These gases, once released into the atmosphere, contribute to particle formation. Clouds are composed of minuscule water droplets and each of these droplets nucleate around a particle in the air. An increase in atmospheric particles results in clouds with more droplets, enhancing their reflectivity of sunlight and leading to cooler surface temperatures. As climate change raises temperatures, forests are anticipated to emit more of these gases, thereby creating more particles and potentially more reflective clouds. (Source: Nature Comm., 2024).