Fragrance from Pine Forests Helps to Slow Climate Change

European researchers have concluded that trees in the boreal forest are important contributors to the formation of natural aerosol particles, which are believed to have a substantial cooling effect on climate, thus slowing global warming. Their contribution should be considered in climate change models in order to make more accurate predictions of our future climate.

Climate change is one of the greatest environmental, social and economic threats facing the planet. It is believed that boreal forests play a very important role in both climate regulation and the global carbon cycle. Monoterpenes are plant volatiles that give pine and spruce forests their characteristic aroma. They are very abundant in the boreal regions of northern Europe. There is growing evidence that naturally emitted monoterpenes contribute notably to the formation of atmospheric aerosols (tiny particles of solid or liquid suspended in a gas), which in turn affect climate directly by bouncing sunlight back into space or by seeding clouds. Given that airborne particles are a largely unknown factor for climate scientists and the proven difficulties to assess the contribution natural sources make to particle formation, there are still major uncertainties when attempting to project the effects of greenhouse gases.

A team of European researchers has recently estimated the contribution made by natural emissions of aerosol precursor gases generated by boreal forests. The study focused essentially on monoterpenes, and their role in the formation of aerosol particles, which are believed to exert a substantial cooling effect on climate. The team used a statistical method to analyse long term observations of the abundance and distribution of particles collected at three locations in the Finnish boreal zone.

The study found a strong correlation between the time an air mass had spent over the forest and the load of particles it carried, showing that the trees must be the source. Furthermore, the scientists estimated that Boreal forests in Europe were found to produce 1000 to 2000 particles per cubic centimetre in a climatic relevant size range. The study took place between late spring and early autumn, when trees are actively metabolizing.

These results suggest that the European boreal region is an important contributor to both aerosol mass and abundance through the emission of aerosol precursor gases, monoterpenes. Given the large global coverage of boreal forests (one third of all forest-land on the planet), this could have major implications for climate.

This work will help researchers to separate human-made contributions from natural contributions to aerosol formation and their effects. It provides new insights that will help scientists to improve climate change models, thus allowing more accurate predictions of global warming from greenhouse gases such as carbon dioxide and methane.

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