Bitsy beetle warms Canada, study says

November 25 2012

A "ghost forest" of dead and dying trees. An army of rice-grain-sized beetles, attracted by warming weather, has moved into Canada's western forests, where its tree massacre is causing the mercury to rise yet further, a study said Sunday.

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The voracious horde of mountain pine beetles has invaded about 170,000 square kilometres (65,000 square miles)—a fifth of the forest

area of British Columbia, Canada's western-most province, a research team wrote in the journal *Nature Geoscience*.

The beetles lay their eggs under the bark of pine trees, at the same time injecting a fungus that protects their offspring but kills the trees with the help of the larvae eating their insides.

As trees are felled, the cooling effect of their transpiration, similar to human sweating, is also lost.

The researchers measured a corresponding rise in summertime temperatures—about one degree Celsius (1.8 degrees Fahrenheit) over the affected areas, co-author Holly Maness from the University of Toronto told AFP.

"The increased surface temperatures we observe are relatively large and may be sufficient to drive further changes in regional climate, such as changes to circulation, cloud cover and precipitation," she said.

"The effects of climate change cascade. Previous studies have shown that climate change has allowed the beetle to flourish."

The beetle infestation ranks among the largest ecological disturbances ever recorded in Canada, said the team, adding that similar outbreaks were also claiming large forested areas in the western United States.

"The current mountain pine beetle outbreaks serve as a parable, illustrating how the delicate balance of processes imposed by a stable climate can be easily disrupted by climate change," said Maness.

More information: Summertime climate response to mountain pine beetle disturbance in British Columbia, *Nature Geoscience* (2012) doi:10.1038/ngeo1642

Abstract

The present mountain pine beetle infestation in forests in British Columbia ranks among the largest ecological disturbances recorded in Canada so far. These recent outbreaks are thought to have been favoured by large-scale climatic shifts, and may foreshadow outbreaks of a similar magnitude in North American forests over the coming decades. The associated forest dieback could result in substantial shifts in evapotranspiration and albedo, thereby altering the local surface energy balance, and in turn regional temperature and climate. Here we quantify the impact of the Canadian pine beetle disturbance on the local summertime surface energy budget, using measurements of evapotranspiration, albedo and surface temperature, obtained primarily through remote sensing. We show that over the 170,000 km2 of affected forest, the typical decrease in summertime evapotranspiration is 19%. Changes to the absorbed short-wave flux are negligible, in comparison. As a result, outgoing sensible and radiative heat fluxes increased by 8% and 1%, respectively, corresponding to a typical increase in surface temperature of 1 °C. These changes are comparable to those observed for other types of disturbance, such as wildfire, and may have secondary consequences for climate, including modifications to circulation, cloud cover and precipitation.

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Citation: Bitsy beetle warms Canada, study says (2012, November 25) retrieved 3 May 2024 from https://phys.org/news/2012-11-bitsy-beetle-canada.html

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