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Letter to the Editor Open Access

Could Black Body Radiation Be Used for Combatting Climate Change?

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Letter to the Editor

One major problem regarding climate change is the loss of ice at the poles; this is a problem due to that while ice reflects light, the darker ocean absorbs more energy. Thus, the loss of ice leads to a positive feedback with regard to absorption of energy and thus to an increased in the rise in temperature.

Interestingly enough there is an effect called "black body radiation" that we humans in order to combat climate change might be able to harness to compensate for this increased absorption; not at the poles but in deserts close to the equator.

Black-body radiation it the reason that people in many hot areas are wearing black clothing; while black absorbs light, it gives off more energy in the infra-red area than white and thus leads to lower body temperatures. A good example of black body radiation, that most of us recognize, is the heat radiated by black tarmac on a hot summer day.

Black body radiation was described by Planck as the energy, as electromagnetic radiation, given off by a black body at a certain temperature. At 100C this radiation is mainly in the infrared area not visible to the human eye. The amount of energy given off increase with temperature, while the average wavelength decreases.

Using the Stefan-Boltzmann equation for estimating the black-body radiation for a black-body of one square kilometer at 100C suggests that such a body will give off radiation corresponding to ~1.1 GW [1], close to the initial amount of energy absorbed from the sun [2]. Some of the energy irradiated will be reabsorbed by the atmosphere, however, the average wavelength at ~100C of about 1 μm is in an area where there is little absorption [3].

In order to achieve a cooling effect on the climate, one could establish large sand filled black containers arrays placed in areas suffering from high temperatures; potentially close to cities in order to have the beneficial effect of also lowering the temperature there. Indeed, rooftops in such cities could be painted black for added cooling. Importantly, described arrays might have an additional effect of acting to allow colonization of such areas with plants and animals by providing shadow and decreased temperatures. The latter effect would be especially efficient if the containers were lifted above the ground.

References

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