

A Detailed Study of Black Carbon and its Regional Impacts

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.. Purpose

Black carbon (BC), is a residual particle that is released due to the incomplete combustion of fossil fuels, biomass and biofuels. Black carbon is the light-absorbing part of soot that is present in the atmosphere, which absorbs on an average 100,000 times more energy per BC particle than a carbon dioxide molecule does. The high absorptivity of BC has caused the increase of melting of snow as it settles into snow and increases the heat being absorbed on the surface of snow. This presentation undertakes a study on the connection of household wood based cookstoves and their direct effect on the contribution to the increasing content of BC in the atmosphere. This presentation also talks about the environmental and atmospheric impact after the reduction of BC. This paper establishes a relationship between solar cookers, wood cookstoves and the amount of BC with a regional focus. This relationship helps us understand the impact of solar cookers to the atmosphere in the context of BC quantities

Result

BC has the potential, in the Indian subcontinent, to warm the atmosphere by $1.0834 \times 10^{-6} \text{ W/m}^2$ of heat energy. In comparison to the CO_2 produced in the region, which can heat up the area by $5.33 \times 10^{-15} \text{ W/m}^2$ of heat energy. That means that black carbon produced by the wood based cookstoves can heat up the atmosphere 2.1×10^8 times more than the CO_2 . This implies that BC from fire wood based cookstoves can heat up the environment 100,000,000 times more than what CO_2 does which is a known GHG that contributes to the warming up of our planet

Conclusion

Eliminating BC could eliminate 20–40 % of the global warming over a period of 3–5 years. On the other hand, reducing carbon dioxide emissions by a third would have the same effect but only after 50–200 years. BC in global climate change, Ramanaathan and Carmichael (2008) have suggested that the BC forcing is the second most important contributor to global warming, after CO_2 emissions. Since BC has an average residence time in the atmosphere of a few days to weeks relative to greenhouse gases which range from years to centuries, mitigating BC emissions to combat climate change can produce almost immediate effects in terms of reduced radiative forcing, subsequently producing direct benefits for public health

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