

Influence of Black Carbon on Gangotri Glacier

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Source: *PIB and The Hindu*

The Black carbon concentration in the region increases by 400 times during summer, according to a study by Wadia Institute of Himalayan Geology, (WIHG). The study suggests agricultural burning and forest fire as the reason behind this seasonal increase. This can trigger glacial melt because of the light-absorbing nature of black carbon.

What is Black Carbon?

- Black carbon **results from the incomplete combustion of fossil fuels and biomass.**
- The fine particles absorb light and about a million times more energy than carbon dioxide.
- **It is said to be the second-largest contributor to climate change after CO₂.**
- But unlike CO₂, which can stay in the atmosphere for years together, **black carbon is short-lived and remains in the atmosphere only for days to weeks before it descends as rain or snow.**

How does Black Carbon lead to melting of snow?

Black carbon absorbs solar energy and warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and increase the melting.

Key findings of WIHG

- Scientists from **Wadia Institute of Himalayan Geology,**

(WIIHG), an autonomous institution under Department of Science & Technology, in a study conducted at Chirbasa station near Gangotri Glacier, for the Year 2016, found that black carbon (BC) concentration in this region has changed drastically during summer.

- It was revealed by investigating the occasional high values of black carbon extricated, that the seasonal cycle of the increase was significantly influenced by the emissions resulting from agriculture burning (in the western part of the country), forest fires (along the Himalayan slopes) in summer, and to some extent by the contribution from long-range transport of pollutants in winter, depending on the prevailing meteorological conditions.
- The Equivalent Black Carbon (EBC) aerosols contribute significantly towards global warming due to its light-absorbing nature. Their presence in the eco-sensitive zone, such as the Himalayan glacier valleys, is a matter of serious concern and needs to be meticulously monitored. However, baseline data on BC is rarely available from most of the glaciated Himalayan region.
- For the first time, the team of Scientists from WIIHG carried out measurements on ambient EBC mass concentration at a high altitude site Chirbasa (3600 m), near Gangotri Glacier in the Indian Himalaya, during the year 2016. The monthly mean concentration of EBC was found to be minimum in August and maximum in the month of May. The observed seasonal mean concentrations of EBC indicated a pristine glacial source and absence of EBC sources in the locality.
- The research led by Dr. P.S. Negi from WIIHG was published in the scientific journal Atmospheric Environment.



Status of Black Carbon in India

India is the second-largest emitter of black carbon in the world, with emissions expected to increase dramatically in the coming decades, says an April 2019 study in the journal Atmospheric Research, **with the Indo Gangetic plains, said to be the largest contributor.**