

Aerosols led to increased incidents of high rainfall in Himalayan foothills

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In news

A new study finds that Aerosols in Indo-Gangetic Plain have led to increased incidents of high rainfall in the Himalayan foothills

What are the findings of the study?

- Scientists have found that aerosols like black carbon and dust, which makes the Indo-Gangetic Plain one of the most polluted regions of the world, have led to increased incidents of high rainfall events in the foothills of the Himalayan Region.
- **A team of researchers included**
 - National Institute of Technology Rourkela
 - Leipzig Institute for Meteorology (LIM), University of Leipzig, Germany
 - Indian Institute of Technology Madras
 - Indian Institute of Technology Kanpur
- **The team was supported by the Department of Science & Technology, Government of India under DST Climate Change program** have highlighted the crucial role of the aerosol direct radiative effect on high precipitation events over the Himalayan region.
- **They showed that particulate emissions can alter the physical and dynamical properties of cloud systems** and, in turn, amplify rainfall events over orographic regions downwind of highly polluted urban areas.
- **The study used 17 years (2001–2017) of rainfall rate, aerosol measurement called aerosol optical depth (AOD)**

- It also included meteorological reanalysis fields such as pressure, temperature, and moisture content at different altitudes are used to compute the thermodynamic variable “moist static energy” and outgoing long-wave radiation from Indian region to investigate high precipitation events on the foothills of the Himalayas.
- **The team found clear associations between high precipitation events, high aerosol loading, and high moist static energy (MSE) values** (Moist static energy of an air mass includes the potential energy due to its height above the ground and the latent heat due to its moisture content).
- **The findings also highlight the crucial role of the radiative effect of aerosol** on high precipitation events over the Himalayan region.

Why Indo-Gangetic Plain to study the impact of aerosol?

The region is associated with high aerosol loading, much of which is black carbon and dust, and thus provides an opportunity for studying how aerosol affects extreme rainfall events, particularly when air mass is forced from a low elevation to a higher elevation as it moves over rising terrain technically called orographic forcing.

What is aerosol optical depth(AOD)?

- **Aerosol optical depth is a measure of the extinction of the solar beam by dust and haze.** In other words, particles in the atmosphere (dust, smoke, pollution) can block sunlight by absorbing or by scattering light.
- AOD tells us how much direct sunlight is prevented from reaching the ground by these aerosol particles