Spike in pollution could stall monsoon’s flushing action

Other than being an essential source of water for Indian agriculture, the monsoon plays a critical role in flushing out pollutants over Asia. However, increased pollution — particularly from coal burning — could potentially weaken this ability of the monsoon, says a study in this week’s issue of the magazine *Science*.

In winter, when atmospheric moisture is low, fumes from unburnt particles disperse toward the Indian Ocean, creating a vast pollution haze. However what happened to these particles in summer was a mystery till recent research.

Researcher Jos Lelieveld of the Max Planck Institute for Chemistry in Germany and colleagues performed atmospheric chemistry measurements by aircraft in a campaign called the “Oxidation Mechanism Observations.” The researchers measured the summer monsoon outflow in the upper troposphere between the Mediterranean and the Indian Ocean. They found that the monsoon sustained a “remarkably efficient” cleansing mechanism in which contaminants are rapidly oxidised and deposited on the Earth’s surface.

Cooler seas

However, some pollutants were lofted above the monsoon clouds, and chemically processed in a reactive reservoir before being redistributed globally, including to the stratosphere.

“Pollution particles can cool the sea surface temperature, mostly in winter. When the circulation reverses in summer, the cooler sea surface evaporates less, which can reduce the moisture flux into the monsoon convection, ie weaken the monsoon,” Dr. Lelieveld told *The Hindu* in an email.

While pollution levels — especially in north India’s Gangetic plane — skyrocket in winter, there have also been spikes in summer air pollution. Delhi, Gurugram and several parts of Uttar Pradesh and Rajasthan are currently in the grip of a ‘dust haze’ that has pushed pollution levels to the ‘severe’ category on the air quality index.

Scientists had earlier pointed out that the monsoon system may be flushing out pollutants but there was uncertainty over how precisely this effects the monsoon. The “elevated-heat-pump” effect, as it is called, amplifies the seasonal heating of the Tibetan Plateau, leading to increased warming in the upper troposphere during late spring and early summer, subsequently spurring enhanced monsoon rainfall over northern India during June and July.

Indian rainfall, other scientists have pointed out, is enhanced in spring due to increased loading of black carbon but the monsoon may subsequently weaken through increased cloudiness and surface cooling.

Last month, the India Meteorological Department forecast a 3% dip in quantum of the summer monsoon rains this year. After the monsoon set in over Kerala, two days ahead of its typical June 1 date, and lashing several parts of the west coast, it has stalled over Maharashtra and is expected to languish there for at least a week.

Mandatory segregation and recycling of plastic waste must be implemented before it is eventually

phased out

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