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PREDICTING POLLUTION LEVELS USING OCEANS' MEMORY

Relevant for: Geography | Topic: Indian Climate including Monsoons

Winter haze: The ocean data serves as a memory to foretell how the weather conditions and pollution will play out. | Photo Credit: Vijay Verma

Researchers from China and the U.S. have been successful in predicting air pollution levels in northern Indian States. The model they have developed shows 75% accuracy in predicting pollution levels, and the prediction can be done even a season in advance. The model takes into account certain climatic patterns related to the ocean which have a regulatory effect on the wintertime air pollution over northern India. Studying these patterns can help predict pollution levels.

India has been emerging as one of the world's most polluted countries, with particulate matter PM 2.5 levels spiking more than 999 microgram per cubic metre in parts of Delhi last year.

Studying a combination of El Nino, Antarctic Oscillation and the anomalies in sea surface temperature during autumn (September-November), can help forecast the pollution conditions in winter (December-February).

The statistical model developed by the team can also help the government in adjusting policies and strategies for pollution control before winter comes, the paper published in *Science Advances* adds.

It is known that the aerosol over an area is modulated by meteorological conditions and circulation patterns. Stagnant weather conditions such as low wind speeds and descending air can favour rapid aerosol formation and accumulation. Understanding these climatic factors which influence the wintertime haze pollution can help foresee the future ventilation conditions too.

Also, the ocean data serves as a memory and large-scale climate patterns like El Nino can tell what the weather conditions and pollution will be, nearly a season in advance.

The team constructed a computer model which incorporates the El Nino and Antarctic Oscillation data for autumn. Climatic data from the National Oceanic and Atmospheric Administration, U.S for the period 2003- 2018 and the aerosol optical depth observed by various satellites were also used.

"It will help identify if the weather conditions will be favourable or unfavourable for pollution, helping the government frame a more stringent pollution control plan if needed," explains Dr. Meng Gao, assistant professor at the Hong Kong Baptist University, China. He is the first author of the study.

The Antarctic Oscillation does not act directly to influence Indian climate but affects the Indian Ocean Meridional Dipole which in turn plays a role in our climatic conditions.

He added that there have been several studies in China connecting extreme pollution with East Asia winter monsoon, Arctic sea ice loss, the El Nino–Southern Oscillation, and Pacific sea surface temperature anomalies. The predictions from these studies have helped the government

makethe needed reforms, especially in its industrial sector, helping bring down pollution levels in the country.

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