Using El Niño and Antarctic Oscillation data to predict air pollution levels in northern India

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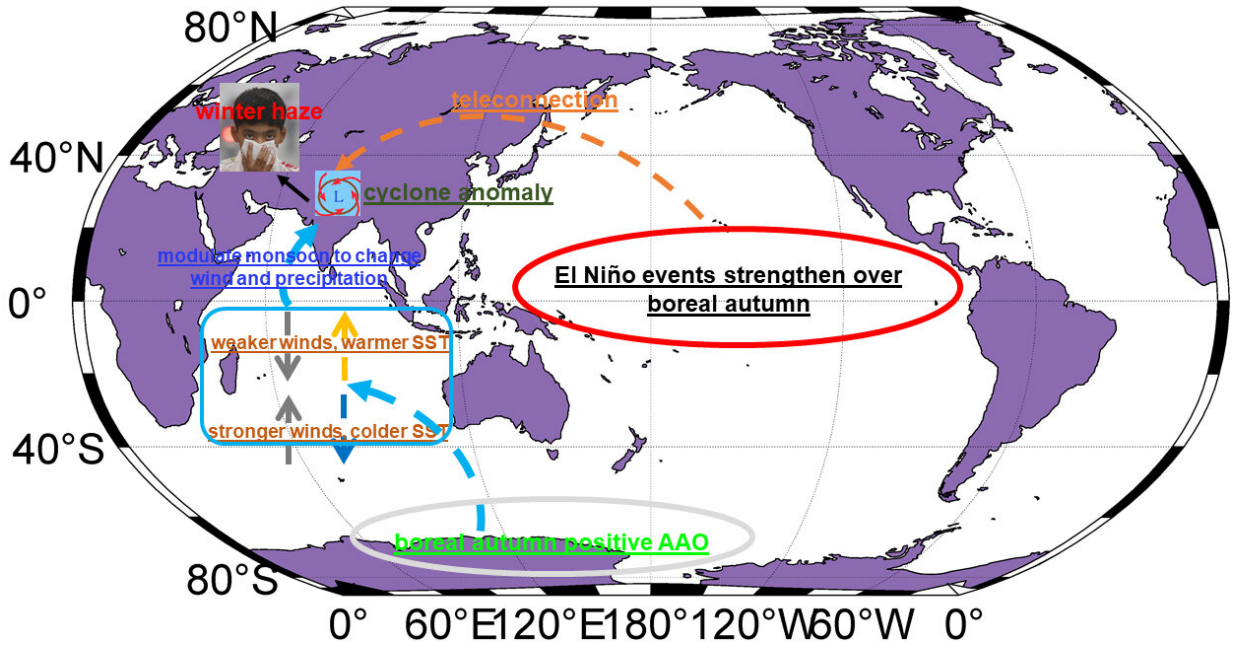

A schematic diagram of the influence of El Niño and AAO on the wintertime haze in North India. Credit: Meng Gao

A team of researchers affiliated with several institutions in China and the U.S. has found that data from El Niño and Antarctic Oscillation events can be used to predict air pollution levels in northern India. In their paper published in the journal *Science Advances*, the group

describes their study of the historical impact of El Niño and Antarctic Oscillation events on weather in northern India and what they found.

In recent years, northern India has experienced poor air quality, particularly in the winter months, to the extent that the country has some of the worst air quality in the world—surpassing even China. Researchers have also noted that in some years, pollution levels seem worse than normal due to weather conditions. In this new effort, the researchers looked at two natural weather events that are known to have a clear impact on winter weather in northern India—El Niño and the Antarctic Oscillation.

El Niño is, of course, an event that involves a large band of warm water forming in the Pacific Ocean—such events have widespread weather impacts across multiple parts of the world. And the Antarctic Oscillation is a wind event caused by a low-pressure belt forming over Antarctica.

To better understand what impact either or both weather events might have on India's air pollution, the researchers collected data on both, covering the years 2003 to 2018. They then used the data to conduct statistical modeling as a way to assess their impacts on northern India. They report that El Niño events tend to result in reduced wind speeds in the region, which prevented airborne pollutants from moving out of heavily populated areas. They also found that Antarctic Oscillation events create stronger winds in some parts of northern India and weaken them in others, resulting in uneven impacts on pollution levels.

The researchers suggest that it is possible to use weather data collected for El Niño and Antarctic Oscillation events to provide government officials with a means of gauging pollution levels in northern India each year.

More information: Meng Gao et al. Seasonal prediction of Indian

wintertime aerosol pollution using the ocean memory effect, *Science Advances* (2019). DOI: 10.1126/sciadv.aav4157