



Aerosol Levels Hit 20-year Low

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Why in News

According to the data published by the **National Aeronautics and Space Administration (NASA)**, **aerosol levels in northern India at the beginning of April were significantly below** the normal for this time of year.

- The levels were the **lowest in 20 years of Moderate Resolution Imaging Spectroradiometer (MODIS) observations.**
- MODIS is a key instrument on NASA's satellites designed to monitor the Earth's atmosphere, ocean, and land surface. Data provided by it **assists policymakers in making sound decisions concerning the protection of the environment.**

Aerosols

- Aerosols are defined as a combination of **liquid or solid particles** suspended in a **gaseous or liquid environment.**
- In the atmosphere, these particles are mainly situated in the **low layers of the atmosphere (< 1.5 km)** since aerosol sources are located on the terrestrial surface.
- However, certain aerosols **can still be found in the stratosphere, especially volcanic aerosols** ejected into the high altitude layers.
- The origin of atmospheric aerosols is either **natural or the result of anthropogenic** activities.
 - **Natural sources of aerosols** include sea salt generated from breaking waves, mineral dust blown from the surface by wind, and volcanoes.
 - **Anthropogenic** aerosols include sulfate, nitrate, and carbonaceous aerosols, and are mainly from fossil fuel combustion sources.

- **Effects of aerosols:**
 - They affect the **atmospheric chemical composition**.
 - They can reduce **visibility**.
 - They have important impacts on **air quality and human health** (e.g. aerosols can cause damage to heart and lungs).
 - They serve as **nuclei for cloud droplets or ice crystals in ice clouds**.

Key points

- **Use of Aerosol Optical Depth (AOD) :** The data published with maps show **Aerosol Optical Depth (AOD) in 2020** compared to the average for 2016-2019. On the day of the **lockdown** on March 25, 2020, it was 0.3 over north India. The AOD fell to 0.2 around April 1 and was found to be 0.1 on April 5.
 - Aerosol optical depth is a measure of **how light is absorbed or reflected by airborne particles** as it travels through the atmosphere.
 - If aerosols are concentrated near the surface, an **optical depth of 1 or above** indicates **very hazy conditions**.
 - An optical depth, or thickness, of **less than 0.1** over the entire atmospheric vertical column is **considered clean**.
- The findings are in line with the analysis of the government's **air monitoring service, System of Air Quality and Weather Forecasting and Research (SAFAR)**, which also found **significant reduction in PM₁₀, PM_{2.5} and nitrogen oxides levels** in major cities, including the national capital, after the lockdown was imposed.
- **Impact of lockdown**
 - Every year, aerosols from anthropogenic (human-made) sources contribute to **unhealthy levels of air pollution** in many Indian cities.
 - Human activities — driving vehicles, operating coal-fired power plants and factories, etc — **produce nitrates and sulphates that contribute to heavy concentration of aerosols** across the Indo-Gangetic Plains, every year.
 - On March 25, 2020 the Indian government placed its 1.3 billion citizens under a strict **lockdown to reduce the spread of Covid-19**.
 - The countrywide mandate **decreased activity at factories and severely reduced car, bus, truck and airplane traffic**. This has **contributed to the decreased levels of aerosols**.
- **Similar conditions are not there in southern India:**
 - Satellite data show aerosol levels have not yet decreased to the same extent. In fact, levels seem to be **slightly higher than in the past four years**.
 - The reasons are unclear but could be related to recent **weather patterns, agricultural fires, winds or other factors**.

Source: BS